INTERNATIONAL DEVELOPMENT ENTERPRISES
Nepal

Final Report

Reporting Period: October 1, 2001 – September 30, 2004

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Project Title:
Developing BDS Markets for Small Commercial Horticulturists in Rural Areas of Nepal

USAID $ Budget Request	Recipient $ Contribution
LOP $ 650,000	LOP $ 167,000

Program Period: 3 Years
(October 1, 2001 – September 30, 2004)
December 2004

LIST OF CONVERSION FACTORS AND ACRONYMS

Conversion Factors

1.5 Bigha = 1 ha.	20 Ropani = 1 ha.
30 Katha = 1 ha.	1 Ropani = 500m^2

Exchange Rates (Rupees per US $ 1.0)

September 2001	Rp 77
December 2001	Rp 79.5
2001 average	Rp 74
2002 average	Rp 77
2003 average	Rp 78
2004 average	Rp 73

Acronyms and Abbreviations

BDS	Business Development Services
BDSP	Business Development Service Providers
BSP	Business Service Provider
CBO	Community Based Organization
DOA	Department of Agriculture, Ministry of Agriculture & Cooperatives
DOI	Department of Irrigation
HURDEC	Human Resource Development Centre
IDE	International Development Enterprises
ISP	Integrated Service Provision
IT	Irrigation Technology
IWMI	International Water Management Institute
KSK	Kaski
KPB	Kapilbastu
MARD	Market Access For rural Development Project
MIT	Micro Irrigation Technology
MSE	Micro and Small Enterprise
NGO	Non-Governmental Organization
NWP	Nawalparasi
PLP	Palpa
RPD	Rupandehi
RUPP	Rural Urban Partnership
UNDP	United Nations Development Programme
VDC	Village Development Committee

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I. INTRODUCTION

IDE Nepal, an affiliate field program of IDE International, has been developing markets for agricultural inputs, including micro irrigation technologies, since 1993. Micro irrigation includes a foot-powered treadle pump for pumping ground water in the *terai* (plains) region, and local versions of drip, micro-sprinkler and mini-water storage systems for upland farmers in the hills region. Input markets have focused on poor farmers with minimal land. Specifically, IDE has been supporting the production of vegetable crops to increase cash income of small farm units. The goal has been to transform farmers from subsistence to a micro and small enterprise (SME) market production orientation.

The USAID Innovative Grants Program has provided support to IDE Nepal's pilot BDS project entitled "Developing BDS Markets for Small Commercial Horticulturists in Rural Areas of Nepal." The objective of the program is to dramatically increase the incomes and agricultural productivity of small–scale and marginal farmers in Nepal. To fulfill its objective, the program (1) developed micro-irrigation and ancillary products and service packages tailored to needs of small-scale and marginal farmers; (2) engaged in promotional/demand creation activities; (3) developed linkages with a network of farmer groups and NGO's interested in demonstration and disseminating information on the benefits of high value horticultural production using improved inputs and practices; (4) developed a profitable and penetrative private sector horticultural input supply chain (made up of manufacturers, distributors, agri-input dealers, and agents) to produce, distribute and sell affordable service packages; and (5) promoted linkages and information sharing among horticultural SME's and the downstream marketing chain (produce traders, wholesalers).

To fulfill program objectives, IDE facilitated development of the following business development services (BDS):

a) Identified and strengthened farmer groups through intensive training in vegetable production and marketing. Working through these groups, IDE improved their capacity to adopt, use and promote high value irrigated horticulture production technology. They trained farm groups in appropriate production techniques to produce high quality horticulture commodities.

b) Strengthened the market delivery of upstream services needed by the farm groups to improve productivity. This included strengthening and expanding the marketing chain associated with the manufacture, licensing and sale of micro-irrigation equipment and complementary inputs (improved seeds, fertilizer and agricultural chemicals). IDE identified the structure of these marketing chains, identified constraints and focused interventions to assist involved SME's to improve performance.

c) Facilitated linkages between farm groups and the existing regional, national and international horticultural marketing systems. IDE worked closely with participating farmers and horticulture wholesalers to identify high value market windows for different horticultural crops. They worked with market wholesalers and farm groups to facilitate the timing, size and quality of produce sales and also worked with government organizations to distribute available market price data to maximize returns to producers.

The IDE approach sought to build upon links between farm groups and input and output markets already established through a previously funded USAID project (MARD), which closed the end of 2001. The program approach focused on privatizing the services provided by

MARD and expanding market coverage to include smaller, resource-poor farmers in five of the six districts previously covered by MARD. These include the three terai districts of Kapilbastu, Rupandehi and Nawalparasi and two hill districts of Kaski and Palpa, all in the Lumbibi/Gandaki zones of western Nepal. The project started with farmer's groups that had already been formed under the MARD project in these five districts. Syangja, a district included in the MARD project, was not included in the BDS-IGP. At the time of the transition, there were 36 groups engaged in vegetable cultivation with 2,271 members served by 305 BDS providers[1].

- The primary types of BDS providers found in these districts included:Agro-input suppliers for providing seeds, fertilizers, plant protection chemicals and other necessary inputsVegetable traders buying fresh vegetables from the vegetable growers. They also trade out of production areas and explore markets to expand volume which allows greater production without decreasing the prices received by the MSEs

Using the existing BDS providers and MSEs interested in growing high value vegetables, six major project interventions were used to provide sustainable income generating opportunities for both the BDS providers and MSEs:

- Development of supply chain networks and linkages to marginal and small farmers. Sub sector analysis found that the following types of BDS providers, required for a supply chain to support project objectives, were not present to the extent needed: irrigation dealers supplying small treadle pumps, drip irrigation and sprinkler irrigation kits and other materials; leader farmers have who have been trained to provide technical services to the vegetable growers to help them increase production and productivity; masonry workers to provide services by constructing water harvesting tanks in villages; and *mistries* (village level installers of wells, etc) to provide services in the installation of treadle pumps, drip sets, shallow tube well boring as well as repairing works;
- Demand creation for BDS providers;
- Market development to strengthen input and output service providers;
- Mobilization of marginal and small farmers (enterprises) for income generating activities;
- Explicit consideration of gender roles and participation in all project activities;
- Coordination between government organizations (GOs) and NGOs in project activities.

This required three main types of activities to operationalize these interventions:

1. **Capacity building**: Capacity building of BDS providers through intensive training in vegetable production and marketing. BDS helps in capacity building of MSEs as well as service providers. It made service providers into viable businesses in the long run.
2. **Promote horticultural production**: Promotion of increased vegetable production through improved technology in farmers' groups especially in the production of high value vegetable crops because of small farm units, high labor requirements, and quick turnover of investment (2-4 months) and high profitability per unit of land making the enterprise suitable to the land and capital-poor, labor rich family farm environment.
3. **Linkage and coordination:** Creation of linkages from private entrepreneurs (inputs and outputs) to commercial horticulture farmers and farmers groups through meetings, and workshops.

[1] Shrestha, T.N. 2003. Preliminary Impact Study of BDS Project Areas. Field Survey Report submitted to IDE. April, 2003. Kathmandu.

Capacity building focused on a series of specific training activities for MSEs (6 packages), and for BDS providers (6 packages). Promotional and motivational activities covered seven specific tasks while ten discrete activities were carried out for the linkage and coordination function. These are further described in Shrestha (2003).

IDE worked with existing farmer groups who serve a key role as service providers to neighboring farmers in fulfilling the following two functions: 1) the channeling of technical and marketing information to small commercial horticulturists from government and other sources, and 2) the provision of linkages to private sector merchants for inputs purchases and produce sales. Three sets of key actors provide a range of integrated services to the rural smallholder (Table 1): 1) agri-input dealers (agro-vets), 2) vegetable traders, and 3) leader farmers, who have been selected from within the farmer groups and intensively trained to act as repositories of indigenous knowledge on local farm practice. In addition to this level of service provision, hardware provision of treadle pumps and drip irrigation technology is delivered through a supply chain network of manufacturers, distributors, assemblers, retailers, and on-site installers.

Table 1. Integrated Service Provision (ISP) Actors in the Horticulture Value Chain - Nepal

ISP Provider	Products	Services	Client	Payment Mode
Agri-input Dealer	Micro irrigation equipment, seeds, fertilizer, pest control	Information about proper selection and use of products	MSE	Embedded in the price of the product
Vegetable Trader	Fresh vegetables	Access to major markets	MSE	Embedded in the price of the product
Lead Farmers Self-Help Group (SHG)	Fresh vegetables	Agricultural training, access to dealers & traders, information about technology	MSE	Embedded in the price of products to farmers.
Farmer's group		Ag training, access to dealers and traders, information technology	MSE members	

The program evolved into a modified BDS approach appropriate for situations facing weak markets. The weaknesses of rural markets in Nepal are well known. The BDS-IGP program has as a major objective the development and strengthening of rural markets, particularly these crucial to the production of high value vegetable crops. In particular, the market for BDS providers of technical services and knowledge to marginal and small farmers was absent. To avoid loss of production from one production season when leader farmers would be trained, the project provided some direct BDS direct training for groups of farmers so they would be ready to start production the first winter season for vegetables (November 2001- March 2002).

II. STATUS OF AGREEMENT AT END OF PERIOD

A number of measures are put forward to evaluate project success and impact. For those indicators dealing with monetary values, the impact of the BDS IGP Project is almost certainly underreported. Farmers and BDS providers are typically reluctant to report accurate information of income and sales due to social pressures to "share the wealth" plus fears of taxation and extortion. These fears are now even worse due to threatened and real extortion by Maoist insurgents. In midterm and final external evaluations conducted by a local consulting firm (HURDEC 2004 a,b), one entire district (Kapilbastu) was not surveyed because of a Maoist blockade and the planned size of the sample survey was reduced due to these same problems. It should also be noted that the project was implemented following significant liberalization of the economy which increased availability of key inputs and made markets operate more efficiently. Annex 1 provides this background; these factors make it likely that a project identical to IGP BDS carried out in the 1980's would have been less successful.

Results of the IGP program have been encouraging, although slowed somewhat by a Maoist insurgency movement that has recently impeded project implementation in the countryside. In three years, the project has reached 7,097 MSEs, and built an ISP value chain of 839 BDS providers. Table 2 provides a summary of income generated by BDS providers.

Table 2. Integrated Service Provision Horticulture Value Chain Development – BDS IGP Nepal

Sourrce: Adapted from IDE Nepal Field Report, March 2004

ISP Value Chain Providers	Number of Providers	Average Annual Sales $	verage Net Annual come $
Leader Farmers	333	$479	$386
Agrovets	91	$10,653	$1,024
Vegetables Traders	163	$8,592	$918
Installers/Masons	224	$146	$146
TP Manufacturers, Drip Assemblers	2	$23,275	$4,057
Treadle Pump/Drip Dealers	25	$13,300	$998
Total	**839**	**$56,445**	**$7,528**

Table 3 provides the most important single impact indicator for the project. This is the impact on marginal and small farmers that are specific clients for years 2 and 3 of the project. The Year 1 farmers are the “old” farmers coming in from the MARD project who tended to be better off with income from vegetable growing of $210/MSE prior to joining BDS IGP. After joining the program and adopting the MIT package, they increased their income to an average of $315, a 50 percent increase, which in most projects would be considered exceptional. The farmers who joined the project in year 2 were more characteristic of the target population, making an average of only $77/MSE from vegetable farming. After joining the project in year 2 they were able to increase incomes to $269/MSE by the end of the second year (participating in project years 2 and 3), an increase of about 250 percent. By year 3, the network of BDS suppliers, leader farmers, trained staff and linkages were in place and farmers who joined the project in the last year were able to capitalize on this, raising incomes from vegetable farming from $39 /MSE before joining to $323/MSE in only one year, an increase of over 7 times.

Table 4 presents the standard reporting format used in this project. This data indicates the outstanding impact, particularly in expanding the number of SMEs and increasing the levels of income of the newer participants (summarized in Table 3). Table 1 in Annex 2 provides additional information about the end of project status.

Not every figure in Table 4 and Annex Table 1 matches due to different assumptions used by various authors when compiling the tables. We can observe from Annex Table 1 that the initial coverage of the project. BDS IGP inherited from the MARD Project was 10 VDC's with 2,271 participating farmers in the five districts BDS IGP operated in, or 227 MSEs per VDC. This reflected the MARD project strategy of providing a broad range of support activities to a limited number of VDCs. The MARD project cost about $10 million and only reached about 40,002 farmers over a 5+ year period. BDS IGP provided BDS services to pockets that often covered parts of many VDCs.

Another area to assess is the overall income added to local economies, primarily in rural areas and local small towns where many BDS providers live. This is the sum of income from BDS providers and MSEs plus multiplier effects through the local economy. Table 2 indicates end of project status net income of $7,528/BDS over 839 suppliers, or a provider aggregate net income of $6.3 million. The average net income/MSE (excluding family labor cost) from the HURDEC (2004b) survey was $304 (Annex Table 5) over a total of 7,093 MSEs, or $2,156,270. Total income added as a result of project interventions was thus in the order of $8.5 million. In low-income rural communities, a number of authors using the social accounting matrix approach have found multipliers of 2.0 – 2.5 as the newly generated income flows through the economy. This indicates that the project could have added between $17 million - $21 million to the economy. The HURDEC (2004b) report provides a number of testimonials from MSE participants describing how they used additional cash generated for priority areas such as child education, paying off debts, consuming more and better food, purchasing land, improving housing and enhanced social status. The figures from Table 2 indicate that income generation has been sufficient to allow this to happen.

[2] The MARD project included more districts and VDCs than were taken over under BDS IGP so the total number of MSEs that BDS IGP started with was less than total coverage of MSEs under MARD.

Table 3. MSE Smallholders – Before and After Program Annual Sales and Income ($)

Smallholder Sales and Income	Year 1			Year 2			Year 3		
	Baseline	Intervention	%Change	Baseline	Intervention	% Change	Baseline	Intervention	% Change
MSEs Sampled (N)	81	81	0	72	72	0	123	123	0
Total Sales Quantity (Kg)	199,470	249,071	24.9	58,389	130,941	124.3	76,900	314,900	309.5
Total Sales Volume ($)	$21,219	$34,680	63.4	$8,782	$24,289	177.0	$8,653	$52,389	505.5
Total Cost of Material ($)	$2,199	$4,477	103.6	$1,358	$2,382	75.4	$1,861	$6,194	232.8
Total Cost of Labor ($)	$3,310	$4,782	44.4	$1,933	$3,074	59.0	$1,944	$6,194	218.6
Total Net Income ($)	$15,710	$25,421	61.8	$5,492	$18,833	242.9	$4,847	$40,000	725.2
Average Net Income/MSE	**$210**	**$315**	**49.8**	**$77**	**$269**	**250.8**	**$39**	**$323**	**725.2**

Source: Adapted from HURDEC, 2004 (a)

Table 4. BDS-IGP Report for Providers

	Year 1			Year 2		Year 3	
	2001-2002	2001-2002	2001-2002	2002-2003	2002-2003	2003-2004	2003-2004
Indicators	Baseline	Target	Achievement	Target	Achievement	Target	Achievement
ASSESSING THE MARKET FOR GOODS AND SERVICES (FINAL SALES)							
Market-Level							
1. Annual Sales Value in US$	$375,000	$830,773	$2,361,125	$1,140,003	Not available		
Program-Level					Not available		
2. Annual Value of Sales (in US$)	$45,000	$141,250	$204,842	$121,500	Not available	$274,650	
ASSESSING THE MARKET FOR GOODS AND SERVICES (FINAL SALES)							
3. Total number of BDS providers by service	1,382	563	1,397	574	1,665		1,665
a. Service 1 (Agro-vets)	160	NA	NA	0	160		160
Y	1,222	NA	NA	Not specified	1,222		1,222
Program-Level							
4. # of BDS providers participating in the program by service	169	287	385	292	471	169	1,140
a. Service 1 (Agro-vets)	25	NA	46	38	68	38	96
b. Service 2 (Veg. Traders)	12	NA	56	Not available	97	52	176
c. Service 3 (TP manufacturer & Drip Assemblers)	1	NA	2	2	2		2 in & and 5 outside Project area
d. Service 4 (Mistries and masons)	0	NA	117	23	168	23	198
e. Service 5 (Leader farmers)	0	NA	164	85	114	126	314
f. Farmer Groups Formed	136	NA	204	35	251	170	354
5. Number of firms acquiring BDS from program supported providers, by services				NA	NA		NA
a. Service 1 (Agro-vets)	46		46				
b. Service 2 (Veg. Traders)	56		56				
c. Service 3 (Pump installers)	51		117				
6. Number of micro-enterprises acquiring BDS from program supported providers, by services	2,289	2,250	2,289	1,050	4,773	4,800	7,093
a. Service 1 (Agro-vets)	2,289	NA	2,289	Not specified	2,484		7,093
b. Service 2 (Vegetable traders)	1,789	NA	1,789	Not specified	2,484		7,093
c. Service 3 (Irrigation dealers	0	NA	668	Not specified	1,777		3,656
d. Service 4 (Leader farmers)	0	NA	2,289	Not specified	2,484		7,093
e. Service 5 (Pump installers)	0	NA	550	1500	1,462		3,035
7. Micro-enterprises as percent of total firms	Not specified	NA	NA	Not specified	NA		NA
8. Number of woman-operated Micro-enterprises acquiring BDS from program-supported providers, by services	706	800	706	0	1,811		3,086

Table 4. BDS-IGP Report for Providers (continued)

	Year 1			Year 2		Year 3	
	2001-2002	2001-2002	2001-2002	2002-2003	2002-2003	2003-2004	2003-2004
Indicators	Baseline	Target	Achievement	Target	Achievement	Target	Achievement
8. Number of woman-operated Micro-enterprises acquiring BDS from program-supported providers, by services	706	800	706	0	1,811		3,086
a. Service 1 (Agro-vets)	706	NA	706	Not specified	1,105		3,086
b. Service 2 (Vegetable traders)	706	NA	706	Not specified	1,105		3,086
c. Service 3 (Irrigation dealers)	0	NA	207	Not specified	0		3,086
9. Woman-operated micro-enterprises as% of total (line 8/line 6)	31%	36%	31%	36%	44.5%		43.51%
10. Total program costs ($US)	NA	NA	$217,000	NA	$251,066		$442,290
11. Total program costs per micro-enterprise served (line 10/line 6)	$95		$95	NA	$101		$62
12. Micro-enterprises as percent of total firms				NA	NA		NA
13. Total expenses				NA	NA		$650,000
14. Return on operations [line 12/ line13]				NA	NA		NA
15. BDS Providers profitability (average income of sample BDS providers)	NA	$6,750	NA	$19,913	NA	$42,000	NA
a. Treadle pump manufacturer	10.0%				22.0%		
b. Drip kit assembler	10.0%				8.9%		
Number of BDS Providers (Program)	Not available		385	292	471		838
Annual Value of Sales of sample BDS providers (program) $	141,250	NA	$204,842		Under study		$344,736
Number of MSE's buying services	2,289	NA	2,289	Not specified	2,484		7,093
ASSESSING THE IMPACT ON MICRO-ENTERPRISE CLIENT (Program Level)							
16. Annual value of sales by micro-enterprises participating in program ($)**							
a. Value of sales by sample MSEs (in $US)	$470,000		$745,190		$1,856,697		$2,993,246
b. Costs of production (in US$)	$146,000		$111,693		$205,239		$347,557
c. Net return (Gross Profit) (in US$)	$324,000	$108,000	$633,497	$295,000	$1,651,458	$576,000	$2,645,689
17. Micro-enterprise client satisfaction							

Table 4. BDS-IGP Report for Providers (continued)

	Year 1			Year 2		Year 3	
	2001-2002	2001-2002	2001-2002	2002-2003	2002-2003	2003-2004	2003-2004
Indicators	Baseline	Target	Achievement	Target	Achievement	Target	Achievement
17. Micro-enterprise client satisfaction							
a. Agro Vets				NA			
1. Seeds			77%	NA			
2. Fertilizer			65%	NA			
3. Plant protection chemicals			69%	NA			
b. Vegetable traders				NA			
1. Reguler Buying			57%	NA			
2. Good Price			39%	NA			
c. Participants in training organized by Leader farmers							
1. Nursery			67%				
2. Crop production			39%				
3. Plant protection			51%				
4. Post harvest handling			28%				
5. Irrigation			22%				
18. Exchange rate used to calculate US $ Nr.72 = $1.00							
19. Estimated percentage of micro enterprises on line 6 who have poverty loan from different sources			80%				
a. From Money lenders			30%				
b. Group Fund			50%				
c. Bank			20%				

* Year 2 and 3 targets and achievements are cumulative so year three results are the End of Project results.

** Annual value of sales, cost and income: Year 2 from HURDEC (2004 (a)) report, Annex table 4 of Rp. 25,456 ot $344/MSE. Year 3 is from HURDEC (2004 (b)) data, annex table 8. Sample survey results multipled by # of MSEs. The End of Project report compile

To expand the number of MSEs, the project trained and oriented 164 leader farmers who worked with group members to provide training, inputs and output marketing. By the end of the project 314 leader farmers had been trained and were operating as successful BDS providers. The project was thus able to expand the number of VDCs, MSEs and BDS providers quickly and at low cost because they had a proven package to generate income at low cost. This allowed the project to quickly expand the number of farmer groups (from 136 at the start to 354 at the end of the project). To help overcome the second constraint, the project trained 117 installers/mistries/masons (up to 198 at the end of the project) to provide new services required for smooth expansion of MIT as demand increased due to efforts of the lead farmers and effective promotion campaigns.

Annex Table 1 provides some insight into the "diffusion" effects of the MIT outside of the BDS pockets (the program areas). In section 6 of the table these are distinguished as "MIT users in BDS area" and "MIT users in non-BDS area". The terai districts can be characterized as having better communications, more uniformity of ethnic groups, more BDS services and large areas where water availability for MIT was good. MIT users in non-BDS areas in the terai ranged between 19% in Nawalparasi to 47% in Kapilbastu. The hill districts of Palpa and Kaski had no MIT users outside of the BDS program pocket areas. This situation more closely corresponds to the scenario of the question about the interested farmer described in the Section III. Lessons Learned.

Annex Table 1 also indicates that the hill districts are, on average, producing higher value vegetable crops than terai districts whose climate is less favorable for producing many of the off season high value vegetable crops that are popular in the hill districts. In the terai winter season, long duration heavy morning fog is common. This reduces solar radiation and increases problems such as mold and mildew affecting vegetable crops. The average price per kg. of vegetables sold (Annex Table 1, section 9) is Rs.11.61 in Kaski and Rs.10.00 in Palpa, compared to prices/kg in the terai districts which ranged between Rs.8.0-8.97/kg. Palpa also had the highest yield/kg., almost double that of Nawalparasi. Consequently, gross and net income per MSE, from vegetable production is higher in the hill districts.

Additional Analysis of Income Estimates

Additional insights can be gained by examination of the survey data summarized in Annex 2, Annex Tables 2-5. These data allow before-after comparisons of the "Old Farmers" who were under MARD project support when BDSIGP started and "New Farmers" who joined the program after it started and tended to be considerably worse off at the start than the old farmers (Table 3 above). These summaries are in Annex Tables 2 and 3. Annex Tables 4 and 5 present the same type of before-after comparisons but at the end of the third year of project operations when the "Old" group had been under project support for 3 seasons. This included four of the five BDS IGP districts so does not present a complete picture but provides some excellent insights into the dynamics of income levels between and within groups. This allowed not only before-after comparisons but also provided some insight into changes in income levels after joining the program and differences in income levels over time between districts. By including the area planted to vegetables, it was then possible to analyze returns per area planted for comparison purposes. Annex Table 6 presents a compilation of returns to vegetable crops in Nepal that provides a useful comparison.

The HURDEC {2004a,b)} reports include family labor as a production cost using an estimate of its opportunity cost. There are a number of arguments against this procedure when dealing with the BDS IGP target group of small and marginal farmers. The summary in Table 3 excludes labor cost and thus those figures vary slightly from the HURDEC reports. Annex Tables 2-5 also exclude family labor cost.

First, we look at the status of the MSEs after two years of project operations, the Old vs. New group comparisons in Annex Tables 2 and 3. If we remove family labor cost, average income/MSE for both groups at the end of program year 2 increases to Rp 25,456 or $344. Excluding family labor as a cost of production, before the project started the "old group" supported by MARD averaged returns of Rp 16,627/MSE ($225, it is $210 in table 3) from vegetable cultivation; this increased to Rp. 28,036 ($379) in the first year under IDE. “New” farmers who joined the group in year 2 had average income from vegetable production of Rp 7,753/MSE ($103, it is $77 in Table 3) before joining the project and by the end of the first year under the program had increased income/MSE to Rp. 22,877 ($309, $269 in Table 3) from vegetable production.

Table 5 shows the mean increase for both groups over both years was Rp. 12,379 ($167)/MSE with the largest increases coming in Rupandehi (both groups) and in Palpa (“Old” group). The low income in Kaski Old Group was due to a hailstorm in the second season that reduced output. Table 6 analyzes performance of each group compared to mean for all groups and all years. This shows how much better or worse a group did each year compared to overall performance. A severe hail storm affected the figures for the hill districts (Kaski and Palpa) and reduced incomes the first year of joining the program.

Table 5. Change in average Income level/MSE from vegetable cultivation after joining IDE group

District	Old group	New group	Mean
Kaski*	-26,423	18,426	-3,998
Nawalparasi	12,023	9,309	10,666
Palpa	19,034	-3,509	7,762
Rupandehi	31,906	38,269	35,087
Mean	9,135	15,624	12,379

*Parts of Kaski and palpa were affected by a severe hail storm.

Table 6. Deviations from the mean in income from vegetable cultivation after joining IDE group

District	Old Group	New Group	Mean
Kaski	-38,802	6,047	-16,378
Nawalparasi	-356	-3,070	-1,713
Palpa	6,655	-15,889	-4,617
Rupandehi	19,527	25,889	22,708
Mean	-3,244	3,244	0

*Parts of Kaski and Palpa were affected by a severe hail storm.

Next, summaries from the HURDEC (2004b)) report are used to summarize data for the final season using the three categories of MSE participants – those in the program for 1 year (3rd year participants indicating they joined the project the third or final year), 2nd year participants who joined the 2nd year and 3rd year participants who have been in the program all three years. Annex Tables 4-5 summarize the before – after situation excluding family labor cost. Tables 7 and 8 provide a summary of the data from those tables excluding the cost of family labor.

Table 7. Change in average income level/MSE from vegetable production after joining

District	1st year (3rd year in program) – Rp	2nd year (2nd year program) – Rp	3rd year (1st year in program) - Rp	Mean – Rp
Kaski	23,167	31,567	25,065	26,599
Nawalparasi	15,000	12,500	11,500	13,000
Palpa	22,567	19,300	26,800	22,889
Rupandehi	25,879	22,061	27,606	25,182
Mean	21,653	21,357	22,743	21,917

Source: HURDEC. 2004 (a). Performance Evaluation of Developing BDS Market for Small Commercial Horticulturalists in Rural Areas of Nepal. Report submitted to IDE-Nepal, Human Resources Development Centre, Kathmandu, tables 18 and 28a.

Table 8. Deviations from mean income/MSE after joining IDE vegetable cultivation program

District	1st year (3rd year in program) – Rp	2nd year (2nd year program) – Rp	3rd year (1st year in program) – Rp	Mean – Rp
Kaski	1,249.2	9,649.2	3,147.0	4,681.8
Nawalparasi	-6,917.5	-9,417.5	-10,417.5	-8,917.5
Palpa	649.2	-2,617.5	4,882.5	971.4
Rupandehi	3,961.3	143.1	5,688.6	3,264.3
Mean	-264.5	-560.7	825.1	0.0

Source: Derived from table 7.

Annex Table 4 indicates the average income per MSE over all groups and all districts before joining on IDE vegetable production group was about Rp. 4,700 with a range of almost zero to 13,640 with higher figures concentrated in the Terai districts, Nawalparasi and Rupandehi. With one exception, the average net income per MSE from growing vegetables before joining the program in the two hill districts (Kaski, Palpa) was less than or about Rp.1000 ($14). After joining the program (Annex Table 5), net income from vegetable production was Rp. 27,000/MSE ($375) for first, second and third year clients. The average increase in income after joining the program averaged Rp 22,000/MSE ($306) over all groups and districts. The largest increase was in the third year clients (first year in the program, Table 7 above) at Rp. 22,743, followed by first year clients. Table 7 shows increases in each district for 1st, 2nd and 3rd year clients. The mean increase for all districts and years was Rp 21,917. The deviations from the mean (Table 8) indicate that Kaski District made the largest increases relative to the group mean followed by Rupandehi. Palpa was about average but Nawalparasi had consistently poorer performance with an average increase in income of Rp. 13,000 ($180) over all three classes.

It is also possible to examine change within a District among 1st, 2nd and 3rd year participants. This presents a very mixed picture that requires further examination. The use of MIT reduces greatly the influence of climate on production except in the case of the hill

districts, many of which are subject to devastating hail storms in the late winter season such as hit Kaski and Palpa in the 2002-2003 season and affected many of the second year adopters. Based on the nature of innovation, learning and experimentation by farmers, we anticipate a gradual increase in income/MSE as farmer's progress from the first year to the third year in the group. The poor performance of second year participants in Nawalparasi, Palpa and Rupandehi needs explanation as does the generally poor performance of Nawalparasi relative to the other districts.

Impact on Women

In Nepal, women are integral, active producers in rural farming systems. They comprise approximately 45 percent of the project beneficiaries and have observed positive changes in their quality of life since project participation. Household vegetable consumption and market sales have risen, thus improving the nutrition of family members while also boosting disposable income. Some women have used this additional family income for improved schooling of their children and investment in household assets including livestock. Most importantly, some women have noted an increased sense of self-confidence and social status due to their increasing economic independence from marketing high value crops. The role of women is crucial in vegetable production from planning to implementation; their priorities often differ from those of men. Women constitute the backbone of the rural food system cultivating food crops together with men. In placing women within the household context, it is necessary to emphasize that although individual households have shared interests, they also have separate interests. Although vegetable farming is a joint family enterprise, more and more active women and less economically active men are becoming involved in it as indicated by the government's Bureau of Statistics. An independent study of the first year program showed that women's involvement in vegetable cultivation is 56%.

Women were well represented in the groups formed to channel BDS through for vegetable production. The survey by Shrestha (2003) shows the situation as of early 2003 for the 136 MSE groups in existence at that time (Table 9). About 30 percent of the group members were women. In the actual vegetable production task, however, in every district women were involved in over 50 percent of the effort (Table 10).

Table 9. Summary of MSEs Involved in Vegetable Production in Project Area (as of December 2002)

S.N.	District	No. of Groups	Group Members (No.)		
			Male	Female	Total
1	Nawalparasi	26	254	245	499
2	Rupandehi	29	361	79	440
3	Kapilbastu	32	411	89	500
4	Palpa	27	274	170	444
5	Kaski	22	283	123	406
	Total	**136**	**1583**	**706**	**2289**

Source: Shrestha, T.N. 2003. Preliminary Impact Study of BDS Project Areas. Field Survey Report submitted to IDE. April, 2003. Kathmandu, table 1.a.

Table 10. Women involvement (%) in Vegetable Cultivation in the BDS Project Area

Land Category	RPD	KPB	NWP	KSK	PLP	Average
0.1 - 2.0	48.1	54.2	68.1	47.3	56.1	54.8
2.1 - 4.0	48.3	51.7	71.7	55.5	60.0	57.4
4.1 - 6.0	47.5	50.0	70.0	74.0	60.0	60.3
6.1 – 8.0	45.0	61.7	70.0	0	60.0	59.2
> 8.0	45.8	50.0	60.0	0	60.0	54.0
Kitchen garden	0	57.5	63.3	48.0	52.0	55.2
Average	46.9	54.2	67.2	56.2	58.0	56.5

Land Category (0.1 Ropani to > 8 Ropani including kitchen gardening)
Shrestha, T.N. 2003. Preliminary Impact Study of BDS Project Areas. Field Survey Report submitted to IDE. April, 2003. Kathmandu, table 5.

Comparative Estimates of Income from Intensive Vegetable Production

Annex Table 6 provides a compilation of different estimates of income from vegetable production by smallholders using micro irrigation technologies. The most comprehensive listing of input costs is the International Water Management Institute (IWMI) study. Consequently, their estimates of net returns turn out to be lower than most of the other studies which were based on less complete sets of data. The HURDEC (2004a,b)) studies provide estimates of income per MSE and land used for vegetable production. By combining these, we were able to get estimates per katha for income from vegetable farming in general. This is included in Annex Table 6 with returns standardized on a 500m2 basis. Most of the estimates found by the HURDEC studies were between $85-$110/500m2, compared to the mean of $90/500m2 found for all the studies combined.

III. LESSONS LEARNED FROM PROJECT ACTIVITIES

Policy Considerations

Incomes of rural communities are affected by policy changes at the macro level as well as by existing market structures. Project staff working at the micro level may in the end find their efforts for income enhancement for communities limited by higher-level policy constraints. For poverty alleviation purposes it is not enough to work only with grassroots organizations. A parallel approach to build the capacity to work on policy issues at the national or other levels is imperative. IDE Nepal has been lobbying with the DOI and the Ministry of Agriculture regarding government policies on micro irrigation, credit, agriculture extension and input supply. It is necessary to work with the organizations that are active at national, regional and local levels to analyze policies and regulations that affect BDS and high value agriculture. Equally important is working with local governing bodies such as DDC, VDC and municipalities regarding local taxes, infrastructure and other issues.

Facilitating Market Information

Market information makes both BDS Providers and MSEs more effective. In the rural areas market information is often distorted or non-existent. By improving the quality and flow of market information, IDE has facilitated a more informed, transparent, and competitive marketplace for both BSPs and MSEs . Tools such as community radio, FM stations and promotion campaigns are being used to ensure that information is pushed back into the market.

Reaching Downstream Markets

IDE Nepal started with the simplest downstream market interventions. They include orientation of farm groups on output marketing, and conducting of workshops where farmers and output traders can meet and learn about the nature of each other's business. Both groups are encouraged to develop effective business relationships through attendance at these workshops. The response of both groups has been very positive, with attendance at the meetings running as per expectation. In addition to these simpler interventions, IDE has begun a process of seeking out linkages to agro-processing industries. The first such linkage has been to a tomato sauce factory in eastern Nepal.

Integrating the Poor into Mainstream Markets. Essentially, this entire project focused on integrating the poor into mainstream markets. Poor farm producers of cash crops were integrated into the mainstream vegetable markets in Nepal by increasing sustainable access to productivity-enhancing products and services. These products and services include: micro-irrigation equipment, agricultural inputs (seeds, fertilizer, and pest control), repair and maintenance of irrigation equipment, access to downstream markets, and access to agricultural information. The project has made significant progress in providing access to these items. A private sector supply chain for micro irrigation equipment (treadle pumps, drip irrigation, sprinkler irrigation, and water storage tanks), has been facilitated in all of the five project districts. This chain includes manufacturing, dealerships, and trained technicians for installation repair and maintenance. By helping to set up this network, we ensure the sustainable (for-profit), availability of irrigation equipment and associated services to farmers in their local area. The same has been developed for supply of agricultural inputs, and for trading of vegetable produce. By linking the farmers and farmers groups into these input and

output market networks, we are essentially facilitating the quick integration of small vegetable producers into several mainstream markets. By increasing the capacity of these marketing networks to supply quality goods and services through training and orientation, we also assure the sustainability of this access.

Complementarity. There should be complementarity between micro irrigation and water source development to scale up micro irrigation. In many hill areas even water saving drip irrigation may not be feasible without development of small water sources and harvesting of rainwater for household potable water supply and other domestic use purposes.

Sustainability Issues

1. Ensuring the Poor Benefit from BDS Market Development. IDE Nepal carefully selected target groups of farm enterprises to fit in well with the smallholder BDS IGP project. IDE has developed a set of technology options for small farmers. While expanding the customer base (number of farm micro-enterprises) we have focused on this group of farmers, because these types of farmers are the majority of the farmers in Nepal. Thus IDE is facilitating provision of services to the small farmers and transforming them into viable micro-enterprises. The experience of IDE and other organizations has shown that other agricultural inputs (such as high quality seeds and plant protection input and output services (such as down-stream marketing and market linkages) can be made affordable for the small-holder and still be profitable for suppliers. With the right products, appropriately sized, priced and marketed –the private sector can deliver appropriate inputs and output services to smallholders in a sustainable relationship. It can be assured that the poor benefit from these developments by focusing on the small-scale technologies that we have used in the past (treadle pumps and drip irrigation).
2. Creating a Multiplier Effect. Building capacity of BDS providers to deliver services to the underserved segment of the MSE market helps create multiplier effects in the sense that support given to one BDS provider would be transferred to hundreds of MSEs through the services the provider sold. Any move toward a more commercially oriented market strategy maintains and even expands the multiplier effect by improving the overall efficiency of the market to deliver more services to more MSEs over a sustained period of time.
3. Finance and Organizational Issues. Sustainability is possible only through participation and empowerment of stakeholders (target MSEs, private sector service providers, NGOs and line agencies). Capacity building is needed for all stakeholders; institutional development should start from the planning stage and be continuous. The three-year time frame of a project is too short for achieving sustainable results. At least a six-year term is necessary for a project to generate desired results. IDE Nepal has also taken note of a synergy effect outside the project areas as a result of activities conducted in the project area. A new strategy was devised to provide support services outside the project area by involving private sector trained BDS providers.
4. Role of Beneficiaries. Beneficiary participation is key to the success of a project. Project priorities should be demand-driven and flexible: user groups should be fully involved in project implementation. There should be cost sharing by the beneficiaries to increase their sense of ownership. Beneficiary participation is key to the success of a project. Project priorities should be demand-driven and flexible: user groups should be fully

involved in project implementation. There should be cost sharing by the beneficiaries to increase their sense of ownership.

5. Embedded Services. Most of the services available to vegetable producers in this project are embedded services. It would take a long time to develop a market in this sector based on fee for service, because the farmers have come to expect that all services are free (even if they are not available). Therefore, embedding services in the input and output markets are the most effective strategy in the short term. By building the capacity of the input providers to make informed recommendations at the point of purchase, IDE is strengthening a system that is already in existence, but has been relatively ineffective. Also, the development of leader farmers as local entrepreneurs will make embedded services available at a more local level in the hills. The same goes for the output marketing networks. By building the capacity of the farmers to understand and effectively interact with the output markets, and by building the capacity of the traders to effectively market produce, we make produce marketing services available and effective. However, the market for BDS in Nepal is probably too small to entertain full cost recovery for critical services. In a similar project in Maharashtra, India, IDE found that even with a market size of 28,000 MSEs earning on average $800/MSE and over 700 BDS providers, it was not feasible to get full cost recovery for just the manufacturing quality control services they provided.
6. Institutionalization of Leader Farmers as a Commercial Entity. IDE Nepal has trained Leader farmers as BDS providers. The focus was on enhancing both skill and incentive levels to enable them to function as a commercial entity as other BDS providers. Since most MSEs were reluctant to pay for their services, efforts were made to facilitate the embedding of their charges in the costs of inputs or encourage them to enter into vegetable marketing. It was equally important to build up MSEs faith in the know-how of Leader farmers by intensively involving them in practical project activities as both resource persons and trainees.

Future Issues based on Key Questions

1. Now that the package of BDS services has been shown to be well suited and profitable for small and marginal farmers, can we now expect the package (the high value crop production package) to continue to expand on its own? Nepal is a case where topography, communication, language and market segmentation makes the spread of information about successful technologies very difficult. The relatively poor performance of the formal agricultural extension system is a case in point. That type of system typically focuses on just one or two messages concerning a new "improved" technology, e.g. Manakamana –1 maize plus a fertilizer application package. The BDS approach, while not complex, requires a much broader approach and understanding of markets and a careful analysis of where interventions are needed to overcome market failure or market imperfections. This type of approach cannot be easily packaged or easily transferred to other areas without support from trained, experienced staff that understand the whole BDS approach. Take the hypothetical case of a farmer who has no knowledge of Micro Irrigation Technology (MIT) and who visits a relative in another district who is having good success growing off-season high value vegetables under IDE support. While the visitor can quickly learn about the basics of the technology and perhaps even carry back a drip

kit or treadle pump head, he/she will not have the range of BDS services available to use MIT efficiently. If they have a treadle pump, they will need the services of a mistry, a local agro-input dealer and a leader farmer who is knowledgeable about vegetable production and can advise the farmer on correct use of the inputs needed. The local hardware store or agrovet will need to stock all the inputs needed, including spare parts for the pump and to have knowledge about the use of these inputs. The new producers probably won't have enough information on the best time to plant off-season vegetables and will lack information about plant protection, markets, product quality, marketing options and optimal harvest times.

2. What are some options for "privatizing" the key extension delivery activities needed to speed up this transfer? The BDS IGP made an important innovation by the use of leader farmers to serve this linkage role between traditional providers of BDS and the MSEs. The selection of these individuals by the groups ensured at least a minimal level of trust and accountability would follow. The training and orientation was to be a BDS provider rather than the traditional extension role model of a demonstrator. This ensured the leader farmer would have some financial incentives to do a good job and build a clientele for his/her services. This was done by letting the leader farmer serve as an agent for inputs and outputs. In many cases, they took over a significant marketing role. The survey by Shrestha (2003) found the main "extension services" provided to the MSEs was assistance in nursery raising (44%), production technology (36%), plant protection (40%), post harvest handling (27%), and irrigation management (22%).
3. Can the "package" spread gradually from the pockets into the surrounding areas? While the marketing chain is successful and profitable following a concentrated pocket approach to get all the pieces in place, the package is difficult to disseminate in areas far from the pockets because of the need to have the marketing chain in place to support the entrepreneur. The package can slowly spread from existing pockets by taking advantage of the BDS services that have been put in place around the pocket[3]. However, it seems likely that spreading these packages to new areas will require a similar effort, operating in a project mode, in the absence of alternative suppliers of a complete range of BDS activities in new areas separated from existing pockets. The project summary sheet provides some clues to this and is discussed later.
4. What elements of the BDS IGP project could now be provided by various units of HMG/N? If the Ministry of Agriculture and Cooperatives and the Ministry of Water Resources put a high priority on providing extensive services and support to the elements each agency should be responsible for, some of the technical support could be supplied to specific pockets. The Ministry of Industry, Commerce and Supply has received considerable assistance from UNDP for a Micro-Enterprises Development Programme[4]. The services provided to entrepreneurs included technical and managerial support, entrepreneurship and skills training, market research and product

[3] The BDS IGP project data supports this argument. See Section 2 of Final Report prepared for USAID/Nepal.
[4] The first phase covered the period 1988 – 2003 and covered 10 districts. The programme was extended to another 10 districts in 2004 and includes a number of partners including District Development Committees, Agricultural Development Bank of Nepal, Cottage and Small Industries Development Board, Federation of Nepalese Cottage and Small Industries, Department of Cottage and Small Industries, Federation of Nepalese Chamber of Commerce and Industries, and the Industrial Enterprise Development Institute.

diversification, providing access to micro credit, and business consultation services. These services are oriented towards individual micro-entrepreneurs and firms. However, these types of micro-enterprise development projects generally don't assess performance of the overall supply chain or examine alternative ways to supply private sector BDS providers. Neither do they focus on development of technology appropriate for producers with very limited resources, or on how to integrate small and marginal farms into the type of BDS framework that IDE has developed. Achieving the level of coordination between these agencies that is required to use a BDS approach for specific pockets would not be possible, particularly for MSEs in remote areas.

5. Finally, what could be the limits to income generation by MSEs using small pieces of land? Table 3 indicates that as the project matured, the impact on recent participants (Year 3 MSEs) was very large as more of the BDS structure needed to support the project was in place. It would have been interesting to extend the project for another 3-4 years to examine how old and new participants would benefit from maturity and spread of BDS suppliers. This longer period would have allowed for more learning, experimentation and more innovations once producers had mastered the basics, used surplus cash for reinvestment and made use of increasingly sophisticated training in off-season vegetable production, post harvest handling and marketing. Table 7 shows the highest income per MSE was 2nd year farmers in Kaski at Rp. 31,567 ($438) excluding family labor cost. It would seem that further innovations (higher value crops, better fertilization, attention to micronutrients, modified cropping patterns including interplanting, plastic tunnels, simple post harvest handling and further development of linkages to markets specializing in higher quality vegetables) would allow a significant number of farmers to add 25-50 % more in net income, bringing income from vegetable farming up to at least $500 per MSE on a sustainable basis and lifting them well out of poverty.

Annex 1. Background to Providing BDS in Nepal

IDE's experience in Nepal with providing BDS started with the promotion of treadle pumps in 1992 followed by low-cost drip and sprinkler irrigation systems in 1995. One reason for the success of promoting these systems in Nepal was undoubtedly IDE's careful assessment of markets and a strategy of intervening only in these areas needed to ensure quality control and adequate profits to participants in the marketing chain. A second reason was refining water supply technologies for very small farmers that were low cost, reliable and could be supported by networks of local suppliers and dealers, all operating at a profit. The third innovation was the use of leader farmers as quasi-extension agents, operating as BDS suppliers to local marginal and small farmers[5] for fees or acting as local input and output dealers. This allowed for sustainability, accountability and development of local markets for these services using financial incentives based on performance.

The fourth factor which indirectly supported these efforts at about the time IDE got started in the area of providing BDS was gradual liberalization of the economy. This included opening of markets and reducing state intervention in the economy. This process started in 1987 with a series of structural adjustment loans from the World Bank. In the agriculture sector, the Asian Development Bank's Second Agricultural Program loan (1998-2001) supported this process through a series of 28 conditionalities including complete deregulation of the fertilizers trade, phasing out of subsidies for shallow tube wells, promoting competitive agricultural markets by phasing out National Food Corporation market interventions and setting up a department specifically tasked with building and maintaining rural roads. The main impact on farm productivity was deregulation of the fertilizer sector, which dramatically increased availability, consumption and product choice. While this had the most impact on the major users of chemical fertilizer (grains, sugarcane) and areas along the Terai with good access to Indian fertilizer now moving across the border, decontrol has undoubtedly made it easier for dealers to stock inputs required by farmers participating in BDS programs. It is particularly important for dealers to be able supply a range of fertilizers on a daily basis without having to rely on Agriculture Inputs Corporation's uncertain deliveries and limited product mix. Overall, between 1997/98 and 2000/01, fertilizer consumption in Nepal increased by an average of 18.6 percent per annum, from 34.7 kg/ ha (nutrient basis) to 59.9 kg/ha (nutrient basis) in 2000/2001. Over the period 1995/96-1999/2000, agricultural exports grew by 37 percent and agricultural exports to India grew by 45 percent with the exports composed primarily of pulse crops, fresh fruits and vegetables, and animals and animal products. Between 1999/2000 and 2002 /2003 production of vegetables grew by 21 percent spurred on by increased demand and better input availability[6].

The general economic liberalization included reduction of tariffs, reducing licensing requirements, liberalization of the banking sector and rural micro finance institutions, and reducing the role of state owned enterprises in the economy. These helped increase the

[5] To emphasize these target farmers are also enterprises capable of making profits, they are also referred to as Marginal and Small Enterprises or MSEs.

[6] De Boer, A. J. 2004. Personal communication based on consultancy with Asian Development Bank to help prepare the Program Performance Audit Report for the Second Agriculture Program-Nepal.

supply of the other terms critical for BDS success such as low-cost PVC pipe, vegetable seeds, agricultural chemicals, GI pipe and cement. This allowed expansion of dealer networks based on increased availability of these items while reducing the cost to end users.

The final factor contributing to project success was rapid expansion of the Indian economy over the past few years and particularly since 2000. This has created a favorable price and demand situation for vegetables and even in areas not in direct proximity to the major Terai markets, the "demand - pull" effect is at work. IDE 's work on understanding and strengthening these "downstream" markets has generally helped prevent gluts in local markets which discourages producers from staying with the program. Due to these last two factors, it is likely that a project identical to IGP BDS carried out in the 1980's would have been less successful.

Annex 2. Statistical Tables

Annex Table 1. BDS-IGP Major Achievements over Life of Agreement (3 years)

SN	Activity/indicator	Unit	Starting number*	Total Achievements in Three Years					Total progress	Three year target	%
				Rupandeh	Kapilbastu	Nawalpara	Palpa	Kaski			
1	**Project coverage:**										
	# VDCs project working in	No	10	23	15	26	8	14	86	Not specified	
	Total VDC + NP in District	No	336	71	78	74	66	47	336	Not specified	
	% VDCs covered by project	%	3%	32%	19%	35%	12%	30%	26%	Not specified	
2	**Farmer groups and MSEs:**										
	Farmer Groups	No	136	76	81	71	58	68	354	170	208%
	MSE: Male members	No	n.a.	953	1,229	772	648	405	4,007	Not specified	
	MSE: Female members	No	n.a.	658	408	821	503	696	3,086	Not specified	
	Total MSEs (BDS households)	No	2,271	1,611	1,637	1,593	1,151	1,101	7,093	6,818	104%
	Total HHs in district:	No	398,051	118,175	72,932	97,144	48,828	60,972	398,051	n.a.	
	Coverage by project:**	%	0.57%	1.36%	2.24%	1.64%	2.36%	1.81%	1.78%	Not specified	
	Female participation in groups:	%		41%	25%	52%	44%	63%	44%	Not specified	
	Dalit members in groups:	No	n.a.	201		88	85		374	Not specified	
	Dalit participation in groups:	%	n.a.	12%		6%	7%		5%	Not specified	
3	**Input service providers:**										
	Agro-vets	No	n.a.	14	13	24	15	30	96	38	253%
	TP/drip dealers	No	n.a.	9	9	5	1	1	25	8	313%
	TP/drip mistri	No	n.a.	83	47	68	0	0	198	23	861%
	Lead farmers trained	No	n.a.	82	80	64	44	44	314	126	249%
	TP manufacturer	No	n.a.	1	0	0	0	0	1	2	50%
	Drip kit assembler	No	n.a.	0	0	0	0	1	1	0	0%
	Sub-total	No	305	189	149	161	60	76	635	197	322%

Annex Table 1. Continued

SN	Activity/indicator	Unit	Starting number*	Total Achievements in Three Years					Total progress	Three year target	%
				Rupandeh	Kapilbastu	Nawalpara	Palpa	Kaski			
4	**Output service providers:**										
	Vegetable traders	No	n.a.	37	21	14	38	66	176	52	338%
	Collection venters	No	n.a.	1	1	2	7	20	31	7	443%
	Marketing groups/committees	No	n.a.	1	1	2	1	0	5	Not specified	
	Haat bazaars	No	n.a.	20	15	6	0	0	41	Not specified	
	Sub-total	No	n.a.	59	38	24	46	86	253	Not specified	
5	**MIT promotion and support:**										
	Treadle pumps	No	n.a.	1,181	1,055	799	0	0	3,035	Not specified	
	Drip kits	No	n.a.	0	0	0	192	269	461	Not specified	
	Micro sprinklers	No	n.a.	0	0	0	7	2	9	Not specified	
	Water harvesting tanks	No	n.a.	0	0	0	29	122	151	Not specified	
	Sub-total	No	n.a.	1,181	1,055	799	228	393	3,656	Not specified	
6	**MIT users in BDS & non-BDS area:**										
	MIT users in BDS area	No	n.a.	693	559	647	228	393	2,520	Not specified	
	MIT users in non-BDS area	No	n.a.	488	496	152	0	0	1,136	Not specified	
	Sub-total	No	n.a.	1,181	1,055	799	228	393	3,656	Not specified	
7	**Coordination & partnerships:**										
	GO (DADO, DDC, etc)	No	n.a.	2	4	2	1	4	13		
	NGO (Women's Partnership)	No	n.a.	6	14	8	3	22	53		
	Sub-total	No	n.a.	8	18	10	4	26	66	21	314%
8	**Vegetable area & production:**										
	Total area of vegetables in 3 years	ha	n.a.	347	189	335	162	212	1,245	Not specified	
	Total production in 3 years	MT	n.a.	5,151	3,696	3,453	3,427	3,880	19,607	Not specified	
	Average production/ha	MT/ha	n.a.	14.8	19.6	10.3	21.2	18.3	15.7	Not specified	

Annex Table 1. Continued

SN	Activity/indicator	Unit	Starting number*	Total Achievements in Three Years					Total progress	Three year target	%
				Rupandeh	Kapilbastu	Nawalpara	Palpa	Kaski			
9	**Sales volume and value:**										
	Total volume of sales in 3 years	MT	n.a.	4,850	3,360	3,303	3,115	3,252	17,880	Not specified	
	Total value of sales in 3 years	Rs.' 000	n.a.	41,249	26,881	29,618	31,157	37,753	166,658	Not specified	
	Average price/kg	Rs.	n.a.	8.50	8.00	8.97	10.00	11.61	9.32	Not specified	
10	**Sales and home consumption:**										
	Sales (%)	%	n.a.	94%	91%	96%	91%	84%	91%	Not specified	
	Home consumption (%)	%	n.a.	6%	9%	4%	9%	16%	9%	Not specified	
11	**HH gross income from vegetables**										
	Total MSEs (BDS households)	No	2,271	1,611	1,637	1,593	1,151	1,101	7,093	Not specified	
	Total sales volume	Rs.' 000	n.a.	41,249	26,881	29,618	31,157	37,753	166,658	Not specified	
	Gross income/HH after 3 years	Rs.	n.a.	25,605	16,421	18,593	27,070	34,290	23,496	Not specified	
12	**Overall project cost recovery+**										
	Gross income/HH after 3 years***	$ US	n.a.	$351	$225	$255	$371	$470	$322	$300	107%
	Gross income, all HHs after 3 years	$ US	n.a.	$565,055	$368,233	$405,726	$426,808	$517,164	$2,282,986		
	Additional value of home consumption	$ US	n.a.	$35,068	$36,823	$18,425	$42,749	$99,871	$220,510		
	Total value produced, year 3	$ US	n.a.	$600,123	$405,056	$424,151	$469,558	$617,035	$2,503,496		
	Cost of inputs/MSE at $62 [#]	$ US	n.a.	$99,882	$101,494	$98,766	$71,362	$68,262	$439,766		
	Net value produced, year 3	$ US	n.a.	$500,241	$303,562	$325,385	$398,196	$548,773	$2,063,730		
	Total cost of project, including match	$ US	n.a.						$817,000		
	Cost recovery	%	n.a.						253%	111%	228%

Source: BDS-IGP Project. A Report on Project Completion Workshop, Pokhara. Compiled by Komal Pradhan. IDE, Kathmandu.

+ Additional calculations made by author of this report.

n.a. = not available

* This includes all five districts inherited from the MARD project. See: Shrestha, T.N. 2003.

** These are of limited use as they do not specify how many HHs have access to water supplies needed to adopt the package for high value vegetables.

*** Assumes 73 Rs.=$1.00 U.S.

[#] Shrestha, T.N. 2003. Preliminary Impact Study of BDS Project Areas. Field Survey Report submitted to IDE, April 2003, Kathmandu, page 30.

Annex Table 2. Income levels from vegetable cultivation before joining IDE group

SN		Old Members (from MARD)					New Members					Average,
	Particulars	K	N	P	R	Total/ave.	K	N	P	R	Total/ave.	2 groups
1	No. of MSEs	18	20	23	20	81	19	20	17	16	72	77
2	Sales (kgs)	132,560	7,650	27,852	31,408	199,470	18,314	15,085	16,700	8,290	58,389	128,930
3	Sales (Rs.))	1,075,836	43,040	238,230	238,328	1,595,434	222,500	106,030	281,600	50,200	660,330	1,127,882
4	Input costs (Rs.)	46,541	2,715	36,900	79,150	165,306	50,759	5,135	22,000	24,200	102,094	133,700
5	Labor cost (Rs.)	106,315	7,100	46,600	88,890	248,905	76,570	27,520	27,850	13,400	145,340	197,123
6	Net income (Rs.)	922,980	33,225	154,730	70,288	1,181,223	95,171	73,375	231,750	12,600	412,896	797,060
7	Average net income / MSE (Rs.)	51,277	1,661	6,727	3,514	14,583	5,009	3,669	13,632	788	5,735	10,159
8	Ave. area in vegetables (katta)	5	5	6	4	5	4	7	4	4	5	5
9	Total area in vegetables (katta)	90	100	138	80	408	76	140	68	64	348	378
10	Ave. area in vegetables (ha/MSE)	0.167	0.167	0.200	0.133	0.168	0.133	0.233	0.133	0.133	0.161	0.165
11	Average net income / ha (Rs.'000)	307,660	9,968	33,637	26,358	86,855	37,568	15,723	102,243	5,906	35,594	61,225
12	Average net income/ha ($ US)	$4,273	$138	$467	$366	$1,206	$522	$218	$1,420	$82	$494	$850
13	Average net income / 500m2 (Rs.)	15,383	498	1,682	1,318	4,343	1,878	786	5,112	295	1,780	3,061
14	Average net income/500m^2 ($)	$214	$7	$23	$18	$60	$26	$11	$71	$4	$25	$43

K=Kaski, N=Nawalparasi, P=Palpa, R=Rupandehi

Source: HURDEC. 2004. Performance Evaluation of Developing BDS Market for Small Commercial Horticulturalists in Rural Areas of Nepal.
Report submitted to IDE-Nepal, Human Resources Development Centre, Kathmandu, tables 18 and 28a.

Annex Table 3. Income levels from vegetable cultivation after joining IDE group

SN		Old Members (from MARD)					New Members					Average,	Difference,
	Particulars	K	N	P	R	Total/ave.	K	N	P	R	Total/ave.	2 groups	before & after
1	No. of MSEs	18	20	23	20	81	19	20	17	16	72	77	n.a.
2	Sales (kgs)	64,994	37,839	90,848	55,390	249,071	54,461	40,060	19,990	16,430	130,941	190,006	61,077
3	Sales (Rs.)	643,000	295,170	758,525	910,800	2,607,495	611,593	305,480	234,200	675,000	1,826,273	2,216,884	1,089,002
4	Input costs (Rs.)	89,315	14,381	119,410	113,500	336,606	89,753	18,400	34,260	36,700	179,113	257,860	124,160
5	Labor cost (Rs.)	114,080	27,750	120,890	96,820	359,540	129,101	46,008	38,250	17,800	231,159	295,350	98,227
6	Net income (Rs.)	439,605	253,039	518,225	700,480	1,911,349	392,739	241,072	161,690	620,500	1,416,001	1,663,675	866,616
7	Average net income / MSE (Rs.)	24,423	12,652	22,532	35,024	23,597	20,670	12,054	9,511	38,781	19,667	21,632	11,473
8	Ave. area in vegetables (katta)	5	5	6	4	5	4	7	4	4	5	5	n.a.
9	Total area in vegetables (katta)	90	100	138	80	408	76	140	68	64	348	378	n.a.
10	Ave. area in vegetables (ha/MSE)	0.167	0.167	0.200	0.133	0.168	0.133	0.233	0.133	0.133	0.161	0	n.a.
11	Average net income / ha (Rs.'000)	146,535	75,912	112,658	262,680	140,540	155,029	51,658	71,334	290,859	122,069	131,305	70,080
12	Average net income/ha ($ US)	$2,035	$1,054	$1,565	$3,648	$1,952	$2,153	$717	$991	$4,040	$1,695	$1,824	$973
13	Average net income / 500m2 (Rs.)	7,327	3,796	5,633	13,134	7,027	7,751	2,583	3,567	14,543	6,103	6,565	3,504
14	Average net income/500m^2 ($)	$102	$53	$78	$182	$98	$108	$36	$50	$202	$85	91	$49

K=Kaski, N=Nawalparasi, P=Palpa, R=Rupandehi

Source: HURDEC. 2004. Performance Evaluation of Developing BDS Market for Small Commercial Horticulturalists in Rural Areas of Nepal.

Report submitted to IDE-Nepal, Human Resources Development Centre, Kathmandu, tables 18 and 28b.

Annex Table 4. Income levels (excluding family labor cost) from vegetable cultivation before joining IDE group

SN		First Year Client					Second Year Client					Third Year Client					Average,
	Particulars	K	N	P	R	Total/ave.	K	N	P	R	Total/ave.	K	N	P	R	Total/ave.	3 groups
1	No. of MSEs	30	30	30	33	123	30	30	30	33	123	31	30	30	33	124	123
2	Sales (kgs)	900	49,900	23,700	22,900	97,400	500	27,800	600	57,600	86,500	4,500	33,900	1,700	36,800	76,900	21,733
3	Sales (Rs.' 000)	8	321	189	213	731	5	222	4	541	772	43	278	20	282	623	177
4	Input costs (Rs.'000)	4	55	32	41	132	1	28	2	91	122	10	46	4	74	134	32
6	Net income (Rs.'000)	4	266	157	172	599	4	194	2	450	650	33	232	16	208	489	145
7	Average net income / MSE (Rs.'000)	0.13	8.87	5.23	5.21	4.87	0.13	6.47	0.07	13.64	5.28	1.06	7.73	0.53	6.30	3.94	4.70
8	Ave. area in vegetables (katta)	4.4	6.4	5.4	4.6	5.2	4.2	6.4	4.9	5.1	5.1	5.2	6.7	3.5	6.4	5.5	5.3
9	Total area in vegetables (katta)	132	192	162	151.8	637.8	126	192	147	168.3	633.3	161.2	201	105	211.2	678.4	162
10	Ave. area in vegetables (ha/MSE)	0.147	0.213	0.180	0.153	0.173	0.140	0.213	0.163	0.170	0.172	0.173	0.223	0.117	0.213	0.182	0.18
11	Average net income / ha (Rs.'000)	0.91	42	29	34	28	1	30	0.41	80	31	6	35	5	30	22	27
12	Average net income/ha ($ US)	$13	$577	$404	$472	$391	$13	$421	$6	$1,114	$428	$85	$481	$63	$410	$300	$373
13	Average net income / 500m2 (Rs.)	45	2,078	1,454	1,700	1,409	48	1,516	20	4,011	1,540	307	1,731	229	1,477	1,081	1,343
14	Average net income/500m^2 ($)	$0.63	$29	$20	$24	$20	$0.66	$21	$0.28	$56	$21	$4	$24	$3	$21	$15	$19

K=Kaski, N=Nawalparasi, P=Palpa, R=Rupandehi

Source: HURDEC. 2004. Performance Evaluation of Developing BDS Market for Small Commercial Horticulturalists in Rural Areas of Nepal. Report submitted to IDE-Nepal, Human Resources Development Centre, Kathmandu, tables 18 and 28a.

Annex Table 5. Income levels (excluding family labor cost) from vegetable cultivation after joining IDE group

S		First Year Client					Second Year Client					Third Year Client					Average,	Ave increase,
N	Particulars	K	N	P	R	Total/ave.	K	N	P	R	Total/ave.	K	N	P	R	Total/ave.	3 groups	all 3 groups
1	No. of MSEs	30	30	30	33	123	30	30	30	33	123	31	30	30	33	124	123	n.a.
2	Sales (kgs)	75,000	80,400	93,600	90,500	339,500	77,000	55,600	60,600	103,900	297,100	71,000	82,400	77,100	84,400	314,900	79,292	57,558
3	Sales (Rs.' 000)	900	804	1,030	1,086	3,820	1,012	612	732	1,351	3,707	896	686	924	1,266	3,772	942	764
4	Input costs (Rs.'000)	201	88	196	60	545	61	43	151	173	428	86	109	104	147	446	118	86
6	Net income (Rs.'000)	699	716	834	1026	3275	951	569	581	1178	3279	810	577	820	1119	3326	823	679
7	Average net income / MSE (Rs.'000)	23	24	28	31	27	32	19	19	36	27	26	19	27	34	27	27	22
8	Ave. area in vegetables (katta)	4.4	6.4	5.4	4.6	5.2	4.2	6.4	4.9	5.1	5.1	5.2	6.7	3.5	6.4	5.5	5.3	n.a.
9	Total area in vegetables (katta)	132	192	162	152	637.8	126	192	147	168	633	161	201	105	211	678.4	162	n.a.
10	Ave. area in vegetables (ha/MSE)	0.147	0.213	0.180	0.153	0.173	0.140	0.213	0.163	0.170	0.172	0.173	0.223	0.117	0.213	0.182	0.18	n.a.
11	Average net income / ha (Rs.'000)	159	112	154	203	154	226	89	119	210	155	151	86	234	159	147	152	125
12	Average net income/ha ($ US)	$2,206	$1,554	$2,145	$2,816	$2,140	$3,145	$1,235	$1,647	$2,916	$2,157	$2,094	$1,196	$3,254	$2,208	$2,043	$2,113	$1,740
13	Average net income / 500m2 (Rs.)	7,943	5,594	7,722	10,138	7,702	11,321	4,445	5,929	10,499	7,766	7,537	4,306	11,714	7,947	7,354	7,608	6,264
14	Average net income/500m^2 ($)	$110	$78	$107	$141	$107	$157	$62	$82	$146	$108	$105	$60	$163	$110	$102	$106	$87

Annex Table 6. Summary of Recent Estimates of Returns to Growing Vegetables under Micro Irrigation in Nepal

Revenue - cost per Ropani ($500m^2$)

SN	Region	Source	Crop	Season	Returns (Rp)	Returns ($)
1	Hills (drip system)	DeBoer, 2004	Cauliflower	Early (August-October)	5,847	$81
2	Hills (drip system)	DeBoer, 2004	Cabbage	Early (August-October)	6,917	$96
3	Hills (drip system)	DeBoer, 2004	Cabbage	Monsoon (May-August)	4,142	$58
4	Hills (drip system)	DeBoer, 2004	Tomato	Monsoon (May-August)	11,013	$153
5	Hills (drip system)	AEC, 2004	Hybrid tomato	Monsoon (May-August)	5,685	$79
6	Hills (drip system)	DeBoer, 2004	Cucumber	Late winter	14,830	$206
7	Terai (treadle pump)	DeBoer, 2004	Cauliflower	Early (August-October)	6,664	$93
8	Terai (treadle pump)	DeBoer, 2004	Cabbage	Early (August-October)	6,664	$93
9	Terai (treadle pump)	DeBoer, 2004	Cabbage	Monsoon (May-August)	2,188	$30
10	Terai (treadle pump)	DeBoer, 2004	Tomato	Winter	12,368	$172
11	Terai (treadle pump)	DeBoer, 2004	Cucumber	Winter	10,179	$141
12	Terai (treadle pump)	IWMI	Cauliflower	Early (August-October)	2,612	$36
13	Terai (treadle pump)	IWMI	Cabbage	Early (August-October)	726	$10
14	Terai (treadle pump)	IWMI	Cucumber	Late winter	4,845	$67
15	Terai (treadle pump)	IWMI	Tomato	Winter	3,105	$43
16	Terai (treadle pump)	IWMI	Green leafy vegetables	Winter	413	$6
17	Hills (drip system)	HURDEC 2004 (a)	Average, all vegetables	Kaski, old & new	6,763	$94
18	Hills (drip system)	HURDEC 2004 (a)	Average, all vegetables	Palpa, old & new	4,806	$67
19	Terai (treadle pump)	HURDEC 2004 (a)	Average, all vegetables	Rupandehi, old & new	11,069	$154
20	Terai (treadle pump)	HURDEC 2004 (a)	Average, all vegetables	Nawalparasi, old & new	3,705	$51
21	BDS-IGP overall	HURDEC 2004 (a)	Average, all vegetables	Hills & terai	6,586	$91
22	BDS-IGP Kaski	HURDEC 2004 (b)	Average, all vegetables, 3rd year clients	Hills	6,458	$90

Annex Table 6 (continued). Summary of Recent Estimates of Returns to Growing Vegetables under Micro Irrigation in Nepal

Revenue - cost per Ropani ($500m^2$)

SN	Region	Source	Crop	Season	Returns (Rp)	Returns ($)
23	BDS-IGP Nawalparasi	HURDEC 2004 (b)	Average, all vegetables, 3rd year clients	Terai	3,090	$43
24	BDS-IGP Palpa	HURDEC 2004 (b)	Average, all vegetables, 3rd year clients	Hills	10,886	$151
25	BDS-IGP Rupendehi	HURDEC 2004 (b)	Average, all vegetables, 3rd year clients	Terai	7,173	$100
26	BDS-IGP Kaski	HURDEC 2004 (b)	Average, all vegetables, 2nd year clients	Hills	10,179	$141
27	BDS-IGP Nawalparasi	HURDEC 2004 (b)	Average, all vegetables, 2nd year clients	Terai	3,836	$53
28	BDS-IGP Palpa	HURDEC 2004 (b)	Average, all vegetables, 2nd year clients	Hills	4,990	$69
29	BDS-IGP Rupendehi	HURDEC 2004 (b)	Average, all vegetables, 2nd year clients	Terai	9,225	$128
30	BDS-IGP Kaski	HURDEC 2004 (b)	Average, all vegetables, 1st year clients	Hills	6,136	$85
31	BDS-IGP Nawalparasi	HURDEC 2004 (b)	Average, all vegetables, 1st year clients	Terai	4,773	$66
32	BDS-IGP Palpa	HURDEC 2004 (b)	Average, all vegetables, 1st year clients	Hills	6,907	$96
33	BDS-IGP Rupendehi	HURDEC 2004 (b)	Average, all vegetables, 1st year clients	Terai	9,605	$133
34				Mean, all references	6,497	$90

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Source: HURDEC. 2004 (b). Performance Evaluation of Developing BDS Market for Small Commercial Horticulturalists in Rural Areas of Nepal, Report submitted to IDE-Nepal, Human Resources Development Centre, Kathmandu, derived from tables 18 and 28b.
Shrestha, T.N. 2003. Preliminary Impact Study of BDS Project Areas. Field Survey Report submitted to IDE. April, 2003. Kathmandu.
Assumes Rs. 72 = $1.00 US