FINAL EVALUATION

BANGLADESH FERTILIZER DISTRIBUTION IMPROVEMENT PROJECT-I
(USAID Project 388-0024)

Craig L. Infanger,
A. Samad and Raymond W. Hooker
July, 1988

FINAL EVALUATION OF THE BANGLADESH FERTILIZER DISTRIBUTION IMPROVEMENT-I PROJECT (USAID Project 388-0024)

TABLE OF CONTENTS

ACKNOWLEDGMENTS

The FDI-I Evaluation Team would like to acknowledge the helpful assistance of several people. Dr. Ray Renfro, the FDI-I project officer, made every attempt to cooperate and assist the Team with support and information, including special farmer survey data collected under his leadership just weeks before the initiation of the evaluation. Dr. Charles Hash and Mr. Alan Hurdus of the Food and Agriculture Office provided friendly and helpful guidance to the Team, especially after the original team leader was medically evacuated from Bangladesh. Mr. Ken Moots, Chief of Party for IFDC/Dhaka, provided not only information and assistance but also transportation and personnel resources to the Team, without which the evaluation would not have been completed on time. Dr. Ray Diamond of IFDC/Dhaka was tireless and unfailingly patient in his technical and editorial assistance to the Team. Ms. Kay Calavan, the Mission Evaluation Officer, provided helpful assistance in planning the field work and evaluation design. Finally, Mr. A.K.M. Shahjahan of BADC did not always agree with the methods and conclusions of the Team but worked during vacation periods and evenings to provide requested data and complete field trips.

Craig L. Infanger
July, 1988

ABBREVIATIONS AND ACRONYMS

ADP	Annual Development Plan
BADC	Bangladesh Agricultural Development Corporation
BARC	Bangladesh Agricultural Research Council
BBS	Bangladesh Bureau of Statistics
BCIC	Bangladesh Chemical Industries Corporation
BDG	Government of Bangladesh
BIDS	Bangladesh Institute for Development Studies
BRRI	Bangladesh Rice Research Institute
DAP	Diammonium Phosphate
DD&T	Dealer Development and Training (BADC)
EPADC	East Pakistan Agricultural Development Corporation
EPC	Engineering and Planning Consultants
FAO	Food and Agriculture Organization, United Nations
FDI-I	USAID Fertilizer Distribution Improvement Project-Phase One
FDI-II	USAID Fertilizer Distribution Improvement Project-Phase Two
FY	Fiscal Year (July 1-June 30 in Bangladesh)
GTSP	Granular Triple Superphosphate
HYV	High Yielding Variety
IFDC	International Fertilizer Development Center
IFPRI	International Food Policy Research Institute
IECO	International Engineering Company, Inc.
KDC	Korean Development Corporation
KSS	Krishi Samabaya Samity
MP	Muriate of Potash
NFSP	National Fertilizer Storage Plan
NMS	New (Fertilizer) Marketing System
NPK	Compound Fertilizer Containing Nitrogen, Phosphate, and Potash
OMS	Old (Fertilizer) Marketing System
PDP	Primary Distribution Point
PP	Project Paper
TA	Technical Assistance
TCCA	Thana Central Cooperative Association
TDP	Transporation Discount Point
TSC	Thana Sales Center
TSP	Triple Superphosphate
USAID	U.S. Agency for International Development

WEIGHTS AND MEASURES

1 acre (ac)	= 0.405 hectare (ha)
1 kilogram (kg)	= 2.205 pounds (lb) = 1.07 seers (sr)
1 short ton (st)	= 2,000 lb = 0.907 metric ton (mt)
1 long ton (lt)	= 2,240 lb = 1.02 mt = 27.2 md
1 metric ton (mt)	= 1,000 kg = 26.8 maund
1 maund (md)	= 40 seers = 82.27 lb = 37.3 kg
1 seer (sr)	= 2.06 lb = 0.93 kg
1 Taka (Tk)	= $0.0318 (May 1988)
1 U.S. Dollar (US$)	= 31.44 Taka (May 1988)

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

FINAL EVALUATION OF THE FERTILIZER DISTRIBUTION IMPROVEMENT PROJECT-I (USAID Project 388-0024)

Project Purpose

The Fertilizer Distribution Improvement Project, Phase I (FDI-I), is an integration and expansion of three separate USAID agricultural development efforts in fertilizer storage, bulk handling, and agricultural input supply during the early 1970s in Bangladesh. The overall goal of FDI-I was to increase foodgrain production, especially by small farmers. To achieve the stated purpose of increasing fertilizer use on an equitable basis, FDI-I outputs included fertilizer warehouse construction, fertilizer imports, as well as institutional development and policy reform designed to establish private, free market distribution of fertilizer. Implementation was carried out by the Bangladesh Agricultural Development Corporation (BADC), a statutory corporation under the Ministry of Agriculture and Forests. The project agreement was signed in 1978 and total U.S. assistance as of May 1988 has been approximately $222 million.

Purpose of Evaluation and Methods Used

The purpose of this final evaluation of FDI-I is to assess the impact of the project on fertilizer availability and use in Bangladesh, determine if project performance to date is consistent with expectations, and identify actions necessary to sustain and carry forward the positive effects of the project in Phase II (FDI-II). The evaluation was conducted by external consultants from SECID Research International, Dr. Craig L. Infanger (Team Leader), Dr. Raymond Hooker, and one Bangladeshi consultant, Mr. A. Samad. The implementing agency assigned four senior management officials to assist the evaluation team: A.K.M. Shahjahan, Mofazzel Hossain, Giasuddin Ahmed, and Atiqur Rahman.

The Team reviewed pertinent USAID files and project documents as well as related studies completed by other BDG agencies, private consultants, and international agencies. All resident USAID agricultural officers and the TA Team were interviewed regarding project performance. Rapid reconnaissance interviews were conducted with ove forty private fertilizer wholesalers and retailers, and with BADC field officers. Field visits were made to village markets and BADC distribution points in four regions as well as one visit to a fertilizer factory. Key fertilizer use and marketing data were analyzed, including farmer survey data collected by the Mission for the 1987/88 Rabi/Boro season. The in-country portion of this evaluation took place from April 12 to June 5, 1988.

Principal Findings

1. FDI-I has made a positive contribution to the program goal of increased foodgrain production in Bangladesh. During the life of the project, Bangladeshi farmers have increased foodgrain production by

nearly 2.5% per year. While this does not equal the project paper program goal of 4% per year, the impact of fertilizer has been relatively greater in the Boro season when over one-half of all annual fertilizer is applied to rice. Boro rice production has increased 8% per year and wheat production has increased 12% per year over the life of FDI-I. An increase in productivity of small farmers is indicated but could not be definitely determined due to lack of farm-size time series production data.

2. In large part the physical output objectives (warehouse construction, fertilizer imports) have been achieved:

(a) Thirty four godown sites were constructed with a rated capacity of 188,000 MT, representing over 45% of current total capacity. BADC gross fertilizer warehouse capacity is over 400,000 tons, sufficient to meet current and near-term needs.

(b) Fertilizer imports under FDI-I totaled 527,461 tons, about 13% of all fertilizer imports during the project period. These imports contributed to closing the fertilizer "supply gap" Bangladesh experienced at the beginning of the project. Expanded BDG production capacity, improved BADC procurement and distribution, and sustained donor involvement have reduced the supply gap.

3. USAID assistance to Bangladesh under FDI-I has totaled $222 million and has made a substantial positive impact on fertilizer availability. It appears that the gross economic benefits of the project, primarily in the form of fertilizer imports, have exceeded project direct costs.

4. The project purpose of increased fertilizer availability on an equitable basis has been largely achieved. Fertilizer use has increased among farmers of all sizes to the point that virtually all farmers use some fertilizer on foodgrains. The available evidence indicates that small farmers (less than 2.5 acres) have access to fertilizer, pay slightly higher prices, use fertilizer at higher rates than larger farmers, and combine fertilizer with other modern inputs in an improved cropping system.

5. The availability and price of fertilizer in remote and inaccessible areas remains a concern for BADC. Available published evidence and field visits suggest fertilizer is however widely available; prices in remote markets are marginally higher reflecting increased transportation and marketing costs; and there are fewer dealers in remote areas.

6. A free market system of fertilizer wholesalers and dealers has slowly been established nationwide through the policy changes implemented by the BDG and the BADC and as a direct result of FDI-I. This marketing system now handles 99% of all fertilizer and appears competitive, efficient, and capable of handling fertilizer marketing within Bangladesh. The private marketing system has the potential to expand through direct lifting by wholesalers from ports and BCIC factories.

7. The NMS represents an improvement over the OMS. Fertilizer availability has improved, national buffer stock targets have largely

been met, and private marketing costs as a percent of total fertilizer cost are low. BADC could continue to improve regional supply management and reduce internal marketing costs through full implementation of FDI-II.

8. BADC Dealer Development and Training has had a positive impact and is widely supported by dealers and wholesalers. Field interviews of dealers and wholesalers indicated virtually unanimous approval of previous BADC dealer training. However, this training has been sharply attentuated since 1986.

9. The potential exists for improvements in the efficiency of fertilizer use in foodgrains through improvements in cultural practices, addressing micronutrient deficiencies, and expansion of complementary inputs (irrigation and HYVs). There is no evidence that serious constraints on complementary inputs have canceled the positive effects of increased fertilizer use in Bangladesh.

10. As planned under FDI-I, retail fertilizer prices have gradually been completely decontrolled without serious negative impacts on fertilizer marketing. In addition, the BDG has dramatically reduced fertilizer subsidies during the last six years.

11. BADC has improved national-level fertilizer procurement and supply management. Distribution has been streamlined through the PDP system and BADC has steadily improved godown management. Regional stocking and movement problems remain as well as a serious warehouse maintenance problem.

12. Despite considerable opposition, the project and BADC have made fertilizer more available, at competitive prices, and even more progress could be made if the private sector continued to expand. In addition, modest expenditures for infrastructure improvements at a few BADC storage and transit sites represent the potential for further improvements in fertilizer distribution management.

13. Although project implementation has been slower than anticipated, USAID/Washington and USAID/Dhaka have managed FDI-I in an adequate fashion using a consensus approach to decisionmaking and management.

14. The large technical assistance component of FDI-I was implemented primarily by the International Fertilizer Development Center (IFDC) whose resident and short-term consultants have provided technically sound, problem-oriented, and timely input to BADC. IFDC/Dhaka has maintained good working relationships with the BDG, the Ministry, and BADC thus making fertilizer policy changes attainable.

Principal Recommendations

1. The Ministry of Agriculture, BADC and USAID should reaffirm policy objectives for Phase II of fertilizer distribution improvement (FDI-II), especially concerning the role of private sector fertilizer marketing. In this regard, USAID should continue to assist BADC as the

lead agency for implementation of FDI-II. While the BADC asserts that its "social responsibility" to supply fertilizer to farmers is paramount, further expansion of free market distribution of fertilizer may continue to be resisted in the absence of clear policy directions from the highest levels.

2. Intense technical assistance should be offered by USAID to assist BADC in establishing service and regulatory roles in fertilizer marketing. This would include institutionalizing reliable market intelligence and reporting (e.g. the Monthly Fertilizer Newsletter); evaluation of BADC's capacity to maintain fertilizer security buffer stocks in regional long-term storage facilities where product quality can be maintained; and development of a product quality testing and reporting service. Flexibility in programming of USAID financial assistance should be assured in order to support BADC in the establishment of its responsibilities for buffer-stock storage, market information, and quality control.

3. The USAID project manager and BADC senior management, with the assistance of IFDC, should promptly examine the extent of godown excess capacity and develop a strategy for effective alternative uses of godown facilities no longer used for fertilizer storage.

4. The current BADC staffing pattern involved in fertilizer procurement and distribution should be changed to reflect the expansion of the private sector. Technical assistance as well as financial support should be provided to BADC to help reduce or reallocate resources. This would include a freeze on hiring within the fertilizer section of BADC so personnel can be reduced by attrition and some form of incentives for BADC officers and personnel who want to capitalize on their acquired expertise by pursuing private ventures in fertilizer marketing.

5. The BADC Dealer Development and Training curriculum should be recast to address the changing nature of the distribution system and in order to establish a more viable mechanism for disseminating fertilizer use information.

6. Long-term technical assistance should continue to be provided to BADC regarding implementation of FDI-II activities, dealer development and training, and the future role of BADC in fertilizer procurement and distribution. In addition, technical assistance on improved fertilizer use efficiency should be expanded through short-term consultant services.

7. Private sector wholesaling should be allowed to continue to expand through the full implementation of FDI-II. Infrastructural constraints at BADC storage and transit godowns should be evaluated closely and deficiencies corrected as soon as possible.

8. The performance of the private sector should be monitored closely as provided under the FDI-II Monitoring and Evaluation Plan to determine if distribution, pricing, or other marketing problems arise in remote or inaccessible areas or during periods of tight supplies.

9. USAID should continue to work with other donor agencies and international organizations in order to rationalize and facilitate technical advice and policy recommendations to the BDG and BADC regarding organizational management, fertilizer distribution, domestic production, pricing, and godown construction.

Lessons Learned

1. AID agricultural development projects with major policy reform objectives should be expected to have long implementation periods (i.e. 5-10 years) if effective institutional change is to be successful. Despite steady effort by project managers and the technical assistance team, the conditions precedent and special covenants in FDI-I took years to be fulfilled. Over that period of time BDG ministers, BADC chairmen, and USAID project officers changed several times, each time necessitating the re-establishment of understandings and agreements on project policy objectives. In addition, it is apparent that agreement on policy changes and directives by the leadership of the BDG and/or the implementing organization does not mean new policies will be operationalized immediately.

2. Policy reform in agriculture must be viewed as an evolutionary, step-wise process. To develop a private, nationwide wholesale-retail fertilizer marketing system could not occur immediately. The decontrol of retailing and the establishment of the PDP system were necessary steps in the gradual process of building the capacity of the private sector. Now some or most of the PDP godowns are redundant and can be used for other public purposes because the private sector now has the capacity to move larger quantities of fertilizer longer distances. This should be viewed as a sign of project success and surplus fertilizer godowns represent part of the cost of institutional development.

3. FDI-I demonstrated that important policy reform in agriculture is possible, given sufficient resources and commitment by USAID and the host government. BADC has experienced a loss of morale and resisted some of the policy reforms as its fertilizer distribution program has been attenuated. Thus, it is clear that careful thought should be given to the impact of policy reform on existing organization and some project resources devoted to addressing the institutional problems experienced by implementing agencies.

INTRODUCTION AND COUNTRY CONTEXT

This document is the final external evaluation of the Fertilizer Distribution Improvement Project, Phase I (FDI-I), conducted during April-June, 1988. FDI-I is a USAID project (No. 388-0024) initiated in 1978 with the goal of increasing foodgrain production in Bangladesh, especially by small farmers. The purpose of this evaluation is to assess the impact of the project on fertilizer availability and foodgrain production in Bangladesh, determine if project performance to date is consistent with expectations, and identify actions necessary to sustain the positive effects of FDI-I in the successor project.

The FDI-I project purpose is increased [illegible] of fertilizer on an equitable basis, a purpose which has had [illegible] commodity assistance, construction, and institutional policy [illegible] dimensions. U.S. assistance has amounted to approximately $[illegible]ion, $190 million in grants and $32 in loans. Over the life of the project, activities and programs have been implemented by the Bangladesh Agricultural Development Corporation (BADC), a statutory corporation under the Ministry of Agriculture, with primary technical assistance provided through a host country contract with the International Fertilizer Development Center (IFDC).

Country Context

Bangladesh is a relatively small, densely populated country with more than 106 million citizens, over 85% of whom live in rural areas. Per capita income in 1986 was estimated by the World Bank to be $160, however Ministry officials assert it is no higher than $138. Agriculture generates 45% of the gross domestic product, a share which is slowly declining. With diffusion of HYV seeds, irrigation expansion, and a fairly steady increase in fertilizer use, total foodgrain production has increased from 13.3 million MT at the beginning of FDI-I to an estimated 16.7 million MT in 1988. However, over the last four years a growing population has resulted in a per capita foodgrain production decline from a high of 166 Kg/capita in 1981 to 159 Kg/capita in 1987. As a consequence, Bangladesh is considered to be a food deficit country dependent on donor-assisted foodgrain imports.

With only limited potential for expansion of cultivable acreage and a cropping intensity now averaging over 150%, Bangladesh's soil resources are experiencing serious fertility problems. Serious sulfur and zinc deficiencies have been identified. These problems are aggravated by the long-time practice of harvesting most crop residues for use as livestock fodder, fuel, and building materials. Although seasonal monsoon flooding is common, only those fields near main watercourses receive any substantial amount of organic materials deposited by flood waters. The addition of manure, compost, and rice hulls to the soil is practiced but only on a limited basis, insufficient to have any significant impact on foodgrain yields.

Thus, the increase in the use of modern inputs--HYV seeds, mechanized irrigation, credit, and chemical fertilizers--represent the best potential for assisting Bangladesh in meeting food needs. These modern inputs represent a substitute for increasing the land base in agriculture. Of course, use of modern inputs is interrelated requiring complementary applications and management.

The Bangladesh Government (BDG) has a long history of involvement in the promotion and provision of modern inputs to agriculture. Prior to independence in 1971, the East Pakistan Agricultural Development Corporation (EPADC) procured and distributed seeds, fertilizer, and irrigation equipment to farmers at subsidized prices. After independence from Pakistan, in 1971 EPADC became the Bangladesh Agricultural Development Corporation (BADC) and carried forward the same basic responsiblities.

BADC did introduce a limited commercial concept into their fertilizer distribution by appointing local retail dealers to sell fertilizer to farmers. This came to be known as the Old Marketing System (OMS). However, BADC maintained essentially exclusive control over fertilizer importation, storage, and distribution. Under the OMS, BADC delivered fertilizer to intermediate godowns, Thana Sales Centers (TSCs), and to Thana Central Cooperative Association (TCCA) godowns. Sales to the appointed dealers were made through TSCs. The dealer's gross commission was based on distance from the TSC. Sales price and territory were regulated by BADC.

As fertilizer use began to increase significantly in the 1970s--from 108,000 MT in 1965/66 to 465,000 MT in 1975/76--the heavily subsidized price created a serious budget problem for the BDG. By 1976/77 the fertilizer subsidy amounted to 59% of BADC total budget and 4% of total BDG expenditures, with the prospect of increasing to 6%. In addition, erratic and inadequate domestic fertilizer production, poorly programmed imports, chronic foreign exchange deficits, and limited national storage capacity, BADC could not hope to meet fertilizer demands without donor assistance.

It was in this context that the BDG and USAID began negotiations in 1977 on what was to become FDI-I. When the original $150 million grant agreement was signed in July, 1978 the project design represented an integration of three separate USAID efforts in fertilizer storage, bulk handling, and agricultural input supply. To achieve the stated purpose of increasing fertilizer use on an equitable basis, FDI-I also included institutional development and policy reform goals designed to expand the free market involvement in fertilizer distribution. The project agreement has been amended seven times, with a major amendment in 1984, and total expenditures as of May 1988 have been approximately $222 million.

PART A:

IMPACT OF FDI-I ON OVERALL FERTILIZER SUPPLY AND AVAILABILITY IN BANGLADESH

Findings:

1. FDI-I has made a positive contribution to the program goal of increased foodgrain production in Bangladesh. During the life of the project, Bangladeshi farmers increased foodgrain production by nearly 2.5% per year. While this does not equal the project paper program goal of 4% per year, the impact of fertilizer has been relatively greater in the Boro season when over one-half of all annual fertilizer is applied to rice. Boro rice production has increased 8% per year and wheat production has increased 12% per year over the life of FDI-I. An increase in productivity of small farmers is indicated but could not be definitely determined due to lack of farm-size time series production data.

2. In large part the physical output objectives (warehouse construction, fertilizer imports) have been achieved:

(a) Thirty four godown sites were constructed with a rated capacity of 188,000 MT, representing over 45% of current total capacity. BADC gross fertilizer warehouse capacity is over 400,000 tons, sufficient to meet current and near-term needs.

(b) Fertilizer imports under FDI-I totaled 527,461 tons, about 13% of all fertilizer imports during the project period. These imports contributed to closing the fertilizer "supply gap" Bangladesh experienced at the beginning of the project. Expanded BDG production capacity, improved BADC procurement and distribution, and sustained donor involvement have reduced the supply gap.

3. USAID assistance to Bangladesh under FDI-I has totaled $222 million and has made a substantial positive impact on fertilizer availability. It appears that the gross economic benefits of the project, primarily in the form of fertilizer imports, have exceeded project direct costs.

Trends in Fertilizer Consumption

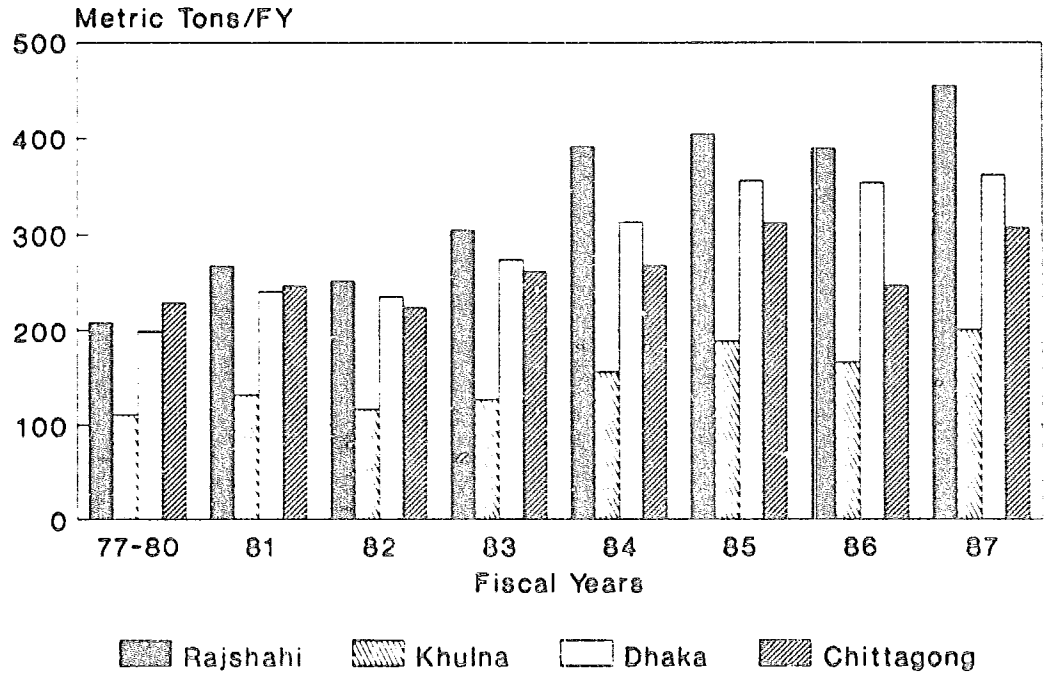
Chemical fertilizers were introduced into Bangladesh in 1952-53, primarily for use in tea gardens and agricultural research. Fertilizer use really began to increase significantly in 1975/76 when 374,000 tons were imported and a total of 465,000 tons were sold to farmers. Total use has increased every year since 1974, excepting two one-year declines in 1981/82 and 1985/86, for an annual growth rate of over 9%. (Table A.1) By 1986/87 total use was 1.32 million MT and is expected to be 1.5 million MT in 1987/88. Urea, triple superphosphate (TSP), and muriate of potash (MP) constitute the three major sources of nutrients for Bangladesh agriculture. In 1986/87 urea constituted 69% of total fertilizer quantity, TSP accounted for 25%, and MP amounted to 5%.

Table A.1 Annual Fertilizer Sales By Fiscal Year
('000 MT)

	Average 1977-80	1981	1982	1983	1984	1985	1986	1987
BANGLADESH	799.8	875	829	968	1129	1260	1156	1321
Divisions:								
Rajshahi	208.5	266	252	304	391	404	389	454
Khulna	111.5	132	117	127	156	189	166	200
Dhaka	198.9	241	236	274	313	355	353	361
Chittagong	229.4	247	224	262	268	311	247	306

Source: BADC and USAID/Dhaka

Figure 1: Annual Fertilizer Sales by Fiscal Year ('000 MT)



Source: BADC and USAID/Dhaka

Increasing use of fertilizer has been widespread around the country but there are large differences in sales by region. Chittagong was the region where fertilizer use spread most rapidly initially. However, the Rajshahi Division is now the region which consumes the largest share of the national supply. Use rates also vary widely, with Kushtia, Dhaka, Bogra, Pabna, and Comilla being major areas with the higher intensities of application (Table A.2). These rates are low in comparison to world standards but comparable to rates in adjacent areas of India.

Table A.2: Estimated Fertilizer Use Per Cropped Acre
By Region, Selected Years

REGION	1970/71	1977/78	1981/82	1983/84	1984/85	1985/86
	(Kg./cropped acre)					
DHAKA	19.7	36.7	47.9	60.7	67.4	78.0
KISHOREGANJ	12.5	30.4	29.6	36.4	38.9	37.0
JAMALPUR	-	-	21.9	34.0	35.3	38.5
MYMENSINGH	7.9[a]	21.6[d]	16.7	25.5	33.3	27.3
TANGAIL	-	20.5	31.6	44.7	49.3	41.1
FARIDPUR	2.5	7.0	8.3	12.7	19.8	16.8
CHITTAGONG	41.8	62.2	47.8	66.0	67.0	33.8
CTG.H.TRACTS	5.5[b]	11.2[b]	20.2[b]	32.5[b]	48.6	55.1
BANDARBAN	-	-	-	-	85.5	60.1
NOAKHALI	13.0	24.8	22.5	20.2	27.0	24.0
COMILLA	16.5	50.3	50.5	55.9	60.0	48.0
SYLHET	3.9	11.4	10.3	15.5	19.3	13.5
RAJSHAHI	7.1	19.5	26.4	38.7	42.3	36.0
DINAJPUR	7.0	22.4	23.1	39.5	43.9	32.9
RANGPUR	5.1	11.9	16.3	28.2	26.9	26.7
BOGRA	17.7	38.2	58.8	71.5	62.8	67.7
PABNA	6.8	22.8	23.5	39.1	47.1	58.5
KHULNA	6.3	9.3	11.2	14.5	19.6	19.1
BARISHAL	8.4[c]	13.3[c]	12.5	15.0	15.6	13.9
PATUAKHALI	-	-	5.3	5.2	5.6	4.2
JESSORE	5.1	19.4	22.9	32.1	47.8	36.2
KUSHTIA	8.5	39.5	92.5	60.1	78.6	71.1
AVERAGE	10.8	24.9	26.1	35.6	42.8	38.2

Source: IFDC/Dhaka (June 1987)

[a] Includes Tangail and Jamalpur
[b] Includes Bandarban
[c] Includes Patuakhali
[d] Includes Jamalpur

Sources of Supply

Bangladesh has historically had a fertilizer "supply gap" and thus had to rely on donor assistance for a substantial share of total fertilizer supplies. The FDI-I mid-term evaluation noted that "Bangladesh is operating on a razor's edge with fertilizer imports and production compared to sales and need for food production. A higher fertilizer production proportion should be attempted and stock levels should be planned to prevent disruptions ...". It is apparent that the situation has improved considerably.

As recently as 1984/85 and 1985/86, imports totaled over 600,000 MT and constituted about 50% of total sales (Table A.3) Import levels dropped to 151,000 MT in 1986/87 and the prospect is good for low levels in 1988. Most imports have been financed with bilateral assistance and concessional loans from over a dozen major donors,

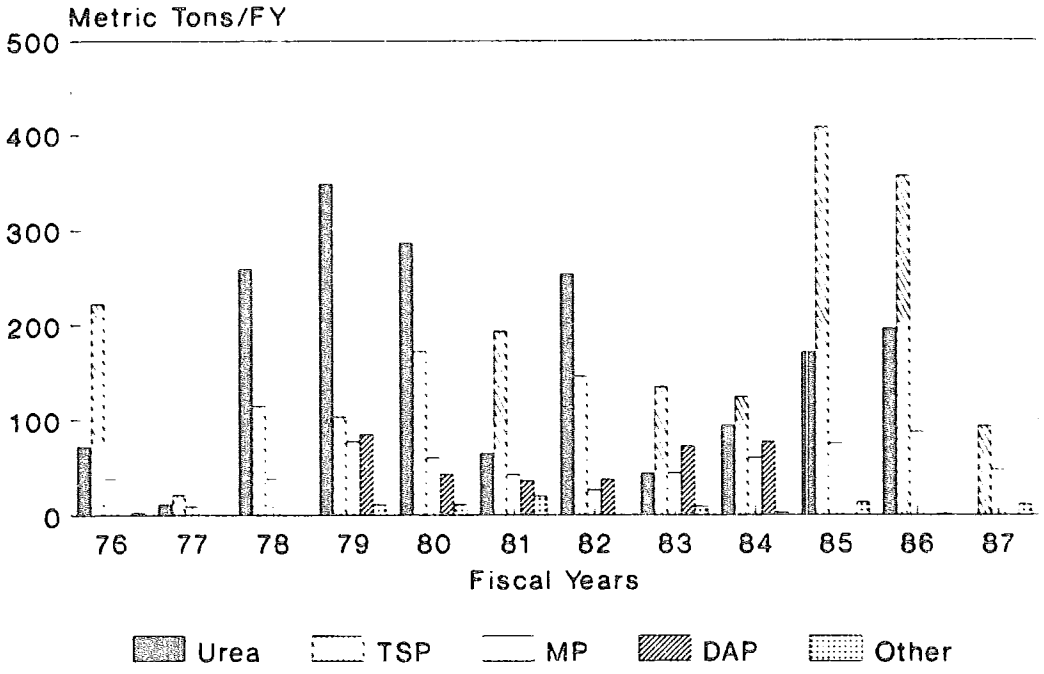
including USAID, the Netherlands, Canada, Saudi Arabia, Denmark, Germany, the International Development Agency, Norway, and Bulgaria.

Table A.3: Fertilizer Imports by Year and Type of Fertilizer, 1971-1987

Year	TYPE OF FERTILIZER					
	Urea	TSP	MP	DAP	Other	Total
	('000 MT)					
1970-71	107	151	2	-	-	260
1971-72	109	3	-	-	-	112
1972-73	126	118	-	-	-	244
1973-74	-	98	41	-	10	149
1974-75	142	48	7	-	36	233
1975-76	72	223	38	-	2	235
1976-77	11	21	9	-	-	41
1977-78	260	115	38	-	-	413
1978-79	348	103	77	84	11	623
1979-80	287	173	60	42	11	573
1980-81	64	194	42	36	20	356
1981-82	254	147	26	37	-	464
1982-83	43	135	44	72	9	303
1983-84	94	124	60	76	2	356
1984-85	171	408	75	-	13	667
1985-86	196	356	87	-	1	640
1986-87	0	93	47	-	11	151

Source: BADC Newsletters and IFDC (June 1987)

Figure 2: Fertilizer Imports by Year and Type, 1976-1987



Source: BADC Newsletters and IFDC

With the successful discovery and tapping of natural gas supplies, domestic fertilizer production was begun in 1961 with the Fenchuganj Urea Factory. Other urea factories have now come into production: Ghorasal (1970), Ashuganj (1984), Polash (1986), and just recently the Chittagong Urea Factory (1987). In addition, a TSP production complex came into production in Chittagong in 1974. These factories have a combined production of 1.2 million tons (Table A.4). Actual production performance has been well below capacity.

Table A.4: Fertilizer Factory Production Performance

		Production ('000 MT)				
Plant	Capacity	1982/83	1983/84	1984/85	1985/86	1986/87
Fenchuganj	106	87	88	95	80	112
Ghorasal	340	283	257	232	307	318
Ashuganj	528	138	379	415	425	337
Polash	95	-	-	-	29	80
Chittagong TSP	152	69	81	55	101	136

Source: BCIC

Domestic production of fertilizer was about 983,000 tons in 1986/87. When the Chittagong urea facility is fully operational, domestic supply should exceed 1.32 million MT. Since this will result in urea production in excess of expected demands, Bangladesh should have the capacity for substantial urea exports in the next few years.

USAID Impact on Fertilizer Availability in Bangladesh

Before Liberation, USAID was involved in encouraging fertilizer consumption in East Pakistan, primarily through fertilizer imports. Since early 1974 USAID has become more involved with the improvement of fertilizer availability in Bangladesh. The assistance obligated to date has totaled over $427 million dollars in support of imports, establishment of production facilities, warehouse construction, and improvement in distribution (Table A.5) FDI-I integrated the earlier USAID efforts into one project with the goal of increased food production and the purpose to increase fertilizer use on an equitable basis. FDI-II is a successor project.

Progress Toward Goal Achievement--The criteria for goal achievement stated in the project design was a minimum 4% annual increase in foodgrain production on all land as well as a minimum 6% increase in foodgrain production on small landholdings. During the period 1978-1987, foodgrain production has increased from 13.3 million MT to 16.5 million MT. (Table A.6) This is an annual rate of increase of 2.62%. All rice production has increased at an annual rate of 2.15% since 1978 but Boro season rice, the season where more than one-half of all fertilizer is applied, has increased 7.96%. This very successful growth in Boro production is the result of increased acreage, improved irrigation, and higher intensity of fertilizer application. Acreage under Aman rice has been stagnant though yields have improved modestly. But the Aus rice crop has declined in acreage

and yields have shown insignificant change. For wheat, the other major foodgrain, production has expanded at an annual rate of almost 12% since 1978, although recently gains have stagnated.

Table A.5: USAID Involvement in Fertilizer Production and Distribution in Bangladesh, 1974-1988

Dates of Funding Obligations	Major Involvement	Amount of Assistance (mil. $)
1974-75	Fertilizer Imports	$55
1975-78	Zia Fertilizer Factory	53
1976-77	Warehouse Construction	5
1977	Fertilizer Imports	27
1978-84	FDI-I	222
1984-1988	FDI-II	65
	Total	$427

Table A.6: Estimated Total and Per Capita Foodgrain Production, FY 1977-1988

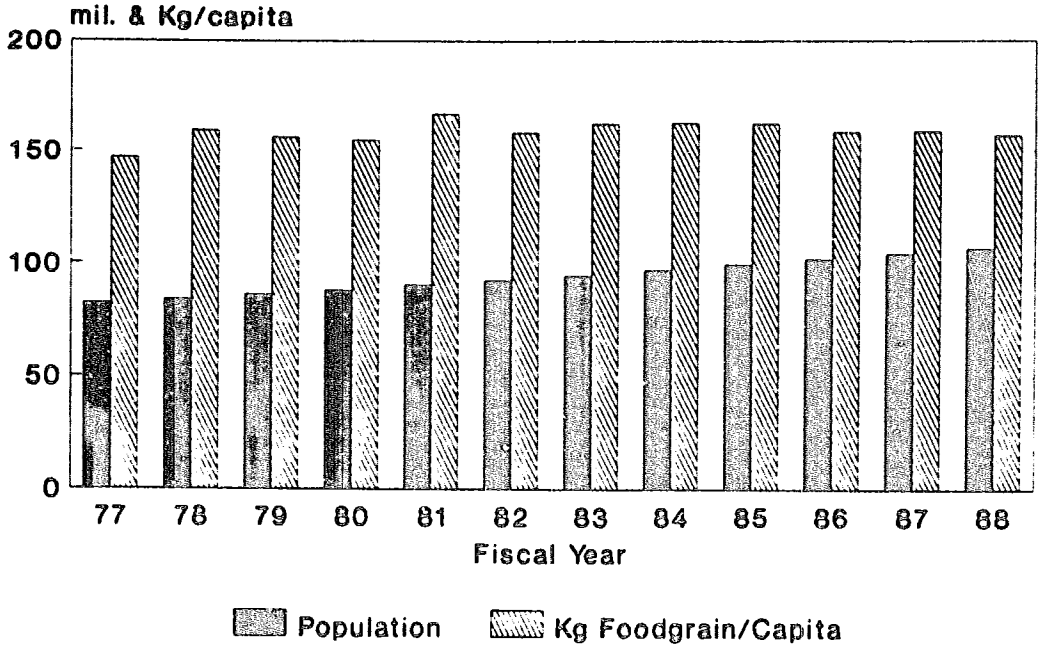
	Class of Rice			All		All	Total	Per Capita
	Aus	Aman	Boro	Rice	Wheat	Grains	Pop.	Grain Prod.
FY	('000 metric tons)						(mil.)	(Kg)
1977	3,059	7,017	1,677	11,753	259	12,012	81.8	146.8
1978	3,153	7,541	2,275	12,969	355	13,324	83.7	159.2
1979	3,341	7,548	1,960	12,849	494	13,343	85.6	155.9
1980	2,854	7,420	2,466	12,740	823	13,563	87.7	154.7
1981	3,289	7,963	2,631	13,882	1,092	14,975	89.9	166.6
1982	3,270	7,209	3,152	13,630	967	14,598	92.2	158.3
1983	3,067	7,603	3,546	14,216	1,095	15,311	94.4	162.2
1984	3,222	7,936	3,350	14,508	1,211	15,719	96.7	162.6
1985	2,783	7,931	3,909	14,623	1,464	16,087	99.1	162.3
1986	2,827	8,540	3,670	15,037	1,042	16,079	101.6	158.3
1987	3,129	8,267	4,010	15,406	1,091	16,497	103.9	158.8
1988[P]	2,993	7,583	4,700	15,276	1,400	16,676	106.4	156.7
Annual trend growth rates[*] (%):								
74-87	-0.06	1.77	5.86	0.84	21.78	2.85	2.40	0.28
78-87	-0.90	1.26	7.96	2.15	11.97	2.62	2.45	-0.04
82-87	-1.73	2.99	4.26	2.28	1.85	2.26	2.44	-0.28

Source: Estimates from USAID/Dhaka

[*]Trend growth rates are computed using the semi-logarithmic trend equation fitted to time series data.

[P]USAID/Dhaka & BDG projections as of Jan'88.

Figure 3: Population and Foodgrain Production Trends, 1977-1988



Source: Estimates from USAID/Dhaka

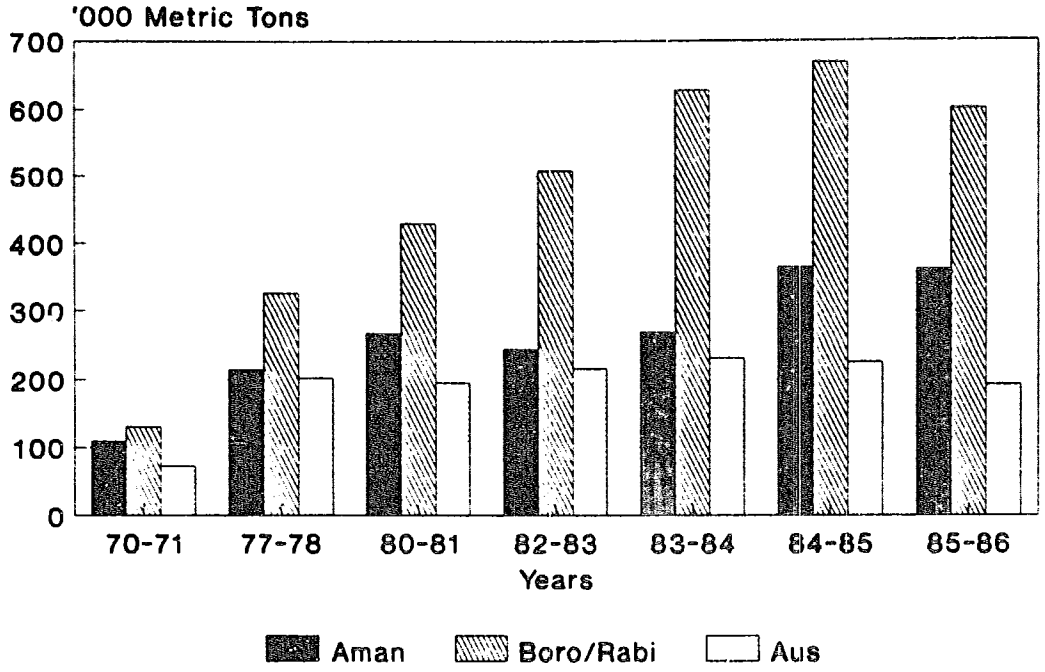
The Project Paper goal of a 4% annual increase in all foodgrain production in Bangladesh has of course not been achieved. However, aggregate growth estimates of historical foodgrain production tend to distort the impact of fertilizer. About 85% of all fertilizers in Bangladesh are applied to rice and wheat, and over one-half of fertilizer used on rice each year is applied in the Boro season (Table A.7). From this perspective, the impact of fertilizer is more significant. Boro season rice productivity has increased about 8% over the life of FDI-I. Fertilizer is, of course, used in conjunction with HYVs and irrigation so the impact on productivity is a combined effect. *However, it is reasonable to conclude that fertilizer has made an important positive impact on total production for Boro rice and wheat. To the extent FDI-I has made fertilizer more available in Bangladesh, the project has had a positive impact on goal achievement.*

Table A.7 Seasonal Trends in Fertilizer Consumption

Year	Aman Season (July-Oct.)	Rabi/Boro Season (Nov.-March)	Aus Season (April-June)
	'000 MT		
1970-71	109	130	72
1977-78	214	326	202
1980-81	265	429	195
1982-83	245	508	216
1983-84	267	629	233
1984-85	365	668	227
1985-86	362	601	193

Source: BADC & IFDC/Dhaka

Figure 4: Seasonal Trends in Fertilizer Consumption, Selected Years, 1970-1986



Source: IFDC/Dhaka

The Project Paper also defined the program goal in terms of a 6% annual increase in foodgrain production on land holdings of two acres or less. Unfortunately, data available to the evaluation team from IFDC farmer surveys and other outside studies do not provide direct estimates of the annual increase in productivity for small farms. However, small farms (less than 2.5 acres) constitute over one-half of all Bangladesh farms. IFDC and other surveys estimate that small farms have increased their use of fertilizer over time, use it at higher intensity than large farms, and combine it with HYV seeds and irrigation. Quasem and Hossain estimate from a two-area survey that small farmers significantly increased their relative share of total fertilizer consumption from 1977-78 to 1982-84, such that they consume about one-third of all fertilizer. Thus, it can only be <u>inferred</u> that yield increases have occurred for small farms over the project period, indicating progress towards that aspect of the project program goal. The extent of this increase in productivity would have to be determined from econometric estimates of farm-size specific foodgrain yield data.

<u>Fertilizer Imports</u>--FDI-I imported 527,461 tons of fertilizer from 1979-85 or about 13% of all fertilizer imports into Bangladesh during the project period. Thus, about 64% of FDI-I assistance has been expended for imports of four major types of fertilizer over the project life: urea, DAP, TSP, and $ZnSO_4$ (Table A.8).

Table A.8: Fertilizer Imports Under FDI-I

TYPE OF FERTILIZER	QUANTITY IN METRIC TONS	C&F COST PER TON IN US $	TOTAL COST IN MILLION US $
1978/79			
UREA	92,498	219.30	20.3
DAP	83,718	241.92	20.3
1979/80			
DAP	42,233	364.73	15.4
1980/81			
TSP	31,500	361.72	11.4
DAP	21,000	393.97	8.3
$ZnSO_4$	1,000	644.00	0.6
$ZnOX_1$-SO_4	500	579.50	0.3
1981/82	----------NIL----------		
1982/83			
DAP	19,317	234.32	4.5
DAP	12,001	325.50	3.9
DAP	10,499	246.35	2.6
DAP	14,380	227.05	3.3
DAP	15,488	319.75	4.9
1983-84			
$ZnSO_4$	1,561	583.84	0.9
UREA	24,237	210.25	5.1
DAP	24,990	306.22	7.6
UREA	26,195	241.96	6.4
1984/85			
UREA	20,896	227.51	4.9
UREA	41,948	281.82	11.8
UREA	20,000	227.51	4.6
UREA	11,750	276.28	3.3
UREA	11,750	208.45	2.5
TOTALS	527,461		$142.6

Source: IFDC/Dhaka

Fertilizer Storage Capacity--The 1981 National Fertilizer Storage Plan (NFSP), developed by FDI-I engineering consultants, identified the need for 657,500 tons of public storage capacity at PDPs (495,000 tons) and transit godowns (162,500 tons) to meet projected fertilizer demand under the New Marketing System (NMS) by 1985. Through USAID and other donor assistance, over the years BADC has built up a large warehouse capacity for handling fertilizer stocks. As of June 1987, total capacity under BADC control was 449,092 tons of which 401,400 tons is BADC-owned and 47,692 tons is on hire. The entire capacity is not used as sales are executed from 75 PDPs only. Total capacity

under operation is 348,000 tons at PDPs and 45,700 tons at four transit points.

FDI-I impact on storage capacity was substantial. USAID financed godown construction at thirty-four sites over two time periods, Phase II and Phase III (Phase I godown construction was completed prior to FDI-I.) This created an additional 188,000 MT of improved godown capacity for BADC. Total cost was $60.67 million or about 27% of all FDI-I expenditures. Final reports from the engineering consultants, IECO and A&W, indicate godown construction was completed roughly on schedule and within estimated costs (Table A.9). An international arbitration claim is still outstanding concerning the construction contract for Phase II with the Korean Development Corporation.

Table A.9: USAID Financed Fertilizer Warehouse Construction Under FDI-I, 1979-1986

Location	Rated Capacity (MT)	Location	Rated Capacity (MT)
Panchagar	4,000	Kishoreganj	5,000
Dinajpur	6,000	Jamalpur	5,000
Charkai	6,000	Dohazari	2,000
Santahar	22,000	Cox's Bazar	2,000
Rohanpur	4,000	Chowmuhani	3,000
Mahendranagar	12,000	Lakshmipur	1,000
Rangpur	5,000	Chandpur	4,000
Muladuli	5,000	Parbatipur	4,000
Amnura	6,000		-----
Atrai	3,000	Total	26,000
Shibganj	10,000		
Mymensingh	3,000		
Madhupur	5,000		
Netrakona	5,000		
Melandah Bazar	5,000		
Brahmanbaria	6,000		
Daudkandi	4,000		
Feni	3,000		
Kushtia	3,000		
Kaliganj	4,000		
Bhola	8,000		
Satkhira	3,000		
Bogra	12,000		
Comilla	8,000		
Chuadanga	7,000		
Barisal	3,000		

Total	162,000		

Source: BADC

At an average storage turnover (or throughput) rate of 4-5 times capacity per year, BADC appears to have sufficient gross warehouse capacity to meet current and near term storage needs. As the BADC role in fertilizer distribution changes under FDI-II, storage capacity will probably exceed needs in many regions. In addition, little if any of the current storage capacity is suitable for long-term storage of fertilizer. Without minimal humidity control, the fertilizer will seriously deteriorate when held for long periods in present BADC godowns.

Given the USAID assistance of over 500,000 tons of imported fertilizer, the significant expansion in warehouse capacity, and improvement in the marketing system (discussed in Part C), the evaluation team concludes that FDI-I has had a positive impact on overall fertilizer supply and availability in Bangladesh. BADC had noted that FDI-I must share the credit for increased supply and availability with (1) other donor organizations and (2) BADC, through improvements in supply and distribution management over the life of the project. This is certainly the case. BADC is still willing to conclude that procurement and warehouse construction "have definitely increased fertilizer availability."

Direct and Indirect Costs and Benefits of FDI-I

The total direct costs of FDI-I constitute the total funds obligated and disbursed by USAID over the life of the project (1978-1988), plus BDG expenditures in support of project activities. Of the total authorization of $235 million, $190 million in USAID grant funds and $32 million in loan funds have been disbursed to date.

In addition to these direct costs, both the BDG and the U.S. Government have incurred substantial indirect costs in support of FDI-I in the form of overhead and administrative expenditures. The BDG has incurred administrative costs within the BADC for the personnel and other resources devoted to the implementation, financial and activity planning, and monitoring and evaluation of the project. U.S. Government indirect costs have occurred in the form of USAID/Washington and USAID/Dhaka general overhead costs, project officers' and foreign service nationals' salaries and support costs, monitoring and external evaluation costs (such as this final evaluation), and financial accounting and auditing expenses.

Other important indirect costs include the "lost opportunities" associated with project implementation. For example, the unforeseen delays in implementing the NMS represented a loss of benefits to the private sector fertilizer wholesalers and dealers. The slow decline of fertilizer subsidies, another indirect cost since removal of subsidies was a BDG policy objective, represented a substantial annual cost in the early years of the project (over one billion Taka annually from 1978-1985).

The primary direct beneficiaries of FDI-I include the recipients of the commodities, training, credit, and technical assistance provided over the life of the project. The largest class of beneficiaries have been Bangladesh's 10 million farmers who have

received fertilizer directly from BADC or had the availability of fertilizer improved at the local bazaar-level. The other large class of beneficiaries are the merchants who have become private wholesalers and dealers under the NMS. Direct training has been provided to 6-10,000 dealers from 1982-86. BADC has also benefited from FDI-I through the management training and technical assistance provided by IFDC. The BDG has benefited from the reduced public burden of fertilizer importation and distribution, making more goods and services available to society for the same level of national resources.

The direct economic benefits of the project have come primarily in the form of: (1) increased foodgrain supplies from the importation, distribution, and utilization of fertilizer on foodgrains (about 85% of all fertilizer is applied to foodgrains), and (2) improved storage and distribution infrastructure which has increased the availability and quality of fertilizer and reduced the costs of distribution. The Project Paper estimated economic benefits only for fertilizer imports, based on a calculated net benefit of $292/ton of additional foodgrain production (estimated value of imported rice). The 1981 Project Amendment estimated fertilizer direct benefits on the basis of foodgrain value of $377/ton. Both documents use the same foodgrain/fertilizer response ratio, 3.5:1 (PP, Annex B.6)

Working from the original Project Paper and Amendment assumptions, the gross benefits of the 527,461 tons of fertilizer imported and distributed under FDI-I would have been approximately $614 million (yearly imports times 3.5 production response rate times estimated foodgrain value). This estimate of gross benefits is below the projected total gross benefits of $797 million in the Project Paper and Amendment because total imports were substantially less than anticipated.

The PP and Amendment assumption about production response and rice prices were overly optimistic. The foodgrain response to fertilizer product at the farm level is probably around 1.6:1. International rice prices (Thai white, 100% second grade) ranged from $236 to $482 over the years of FDI-I fertilizer imports. Using these more reasonable estimates of response and value, the gross benefits of FDI-I fertilizer imports were about $269.5 million. This more modest ex-post estimate of direct gross benefits still exceeds total USAID direct costs ($222 million). However, this estimate of gross benefits does not account for indirect costs incurred by the U.S. Government and the BDG.

The Amendment also estimated additional direct benefits from the improved storage and distribution. These benefits were to be realized in the form of improved availability of fertilizer, reduced distribution costs, and reduced losses of nutrient value of fertilizer products. Over the anticipated life of the warehouses, the discounted value of the benefits ranged from $213,000 to $1.3 million. The magnitude of these benefits in present value terms seems low because anticipated benefits were discounted over the thirty-year life of the godowns. This benefit stream is also attenuated to the extent that PDP godowns are eventually closed.

Indirect benefits of FDI-I include reduced public costs of supporting the BADC distribution of fertilizer. BADC's portion of total distribution costs have declined as private wholesaling has taken over more of the distribution activity in fertilizer marketing. Other indirect benefits may have been realized through improved employment opportunities in agriculture as foodgrain production has expanded and through the expansion of the private sector marketing of fertilizer. It is not possible to estimate the level of these indirect benefits at this time.

PART B:

THE EQUITY ISSUES AND IMPACTS OF FDI-I

Findings:

1. The project purpose of increased fertilizer availability on an equitable basis has been largely achieved. Fertilizer use has increased among farmers of all sizes to the point that virtually all farmers use some fertilizer on foodgrains. The available evidence indicates that small farmers (less than 2.5 acres) have access to fertilizer, pay slightly higher prices, use fertilizer at higher rates than larger farmers, and combine fertilizer with other modern inputs in an improved cropping system.

2. The availability and price of fertilizer in remote and inaccessible areas remains a concern for BADC. Available published evidence and field visits suggest fertilizer is generally available throughout the Bangladesh; prices in remote markets are marginally higher reflecting increased transportation and marketing costs; and there are fewer dealers in remote areas.

The availability of fertilizer to small farmers and to farmers in remote areas of Bangladesh are two of the most important equity issues in FDI-I. The project purpose is "Increased use of fertilizer on an equitable basis." BADC shares a concern for equity in access and use through their historical institutional responsibility for making fertilizer available to farmers throughout Bangladesh.

Considerable professional time and project financial resources have been devoted to examining equity aspects of fertilizer availability and use. By the time this final evaluation was conducted (April-June, 1988) there was substantially more information available on the equity issues than was the case for the mid-term evaluation in 1982. Three "internal" (i.e. IFDC) evaluations of the NMS addressed these equity issues in part in 1979, 1980, and 1982. Extensive survey research was conducted through IFDC and BARC to examine some of the specific equity effects of fertilizer use in 1979, 1980/81/82, and 1985/86. In addition, results of an attenuated farmer survey (71 farms, four sites) were made available by USAID/Dhaka for the 1987/88 Rabi/Boro season (see Appendix III).

Since FDI-I is a major policy reform for Bangladesh, equity issues in the fertilizer sector have also been the subject of some attention by non-project researchers. Independent studies by M. A. Rahman for the BADC (1984) and M.A. Quasem for IFPRI/BIDS (1985) have in part examined aspects of fertilizer equity issues in Bangladesh over the life of FDI-I.

At the request of the Secretary of Agriculture, Mr. M.A. Sayed, the evaluation team devoted extra attention to these equity issues of availability and pricing in remote areas. A special field trip was taken into the Golpalganj to gain some first-hand impressions of the situation. BADC evaluation officers feel additional survey data was needed for the FDI-I evaluation of this aspect of the project. Unfortunately, time did not permit a survey effort. Thus the evaluation team relied on available information and the results of field questionning of dealers, farmers, and Extension officers.

Small Farmer Access to Fertilizer

Bangladeshi farmers are dominantly small. The average farm size in terms of land operated is less than 3 acres. Two of the IFDC studies (1982 and 1984) as well as the BARC equity study (1983) indicate that roughly two-thirds of all Bangladeshi farms are less than 2.5 acres and only about 13% of farmers own more than 5.0 acres. (Note: The IFDC and BARC estimates were based on "land owned". The majority of farmers in both samples--in excess of three quarters--are owner-operators, that is they cultivate only their land.)

Farmer surveys conducted since 1979 indicate that the percentage of farmers using fertilizer has grown from about 65% to nearly 100% (use of some fertilizer on at least one rice crop). The trend in percentage use is depicted in Table B.1 by summarizing results of several surveys.

Table B.1: Estimates of Percentage of Farmers Using Fertilizer On Rice By Season

	Season		
	Boro	Aus	Aman
IFDC Surveys			
	%		
1979/80[a]	68	62	64
1980/81[b]	65	62	61
1981/82[b]	67	62	67
1985/86[c]	93	n/a	n/a
1987/88[d]	98	n/a	n/a
Other Surveys			
1982/83[e]	100	n/a	100

Sources:

a. "Agricultural Production, Fertilizer Use, and Equity Considerations" IFDC, 1982
b. "Agricultural Production, Fertilizer Use, and Equity Considerations", IFDC, 1984
c. "Bangladesh Farmer Profile", IFDC/Dhaka, 1986
d. USAID/Dhaka unpublished survey results, 1987/88
e. Quasem, "Impact of the New System of Distribution of Fertilizer and Irrigation Machines in Bangladesh", BIDS, 1987.

The IFDC 1980-82 surveys concluded that "...the overwhelming majority of farmers using fertilizer in Bangladesh are small farmers". In addition, the IFDC results showed no consistent pattern of differences in fertilizer use in favor of small or large farmers for any of the three tenancy status of land, i.e. owner-operated, sharecropped, and cash-rented. This led IFDC to conclude that both small and large farmers used about the same amount of fertilizer on all three types of land.

Access to fertilizer for small farmers can also be inferred from number of retail outlets where fertilizers can be purchased. Under the OMS retail availability was to be assured through BADC godowns in each thana/upazila and registered dealers with restricted sales areas. However, the second evaluation of the NMS (1980) concluded that "The initial trend of the NMS shows an increased number of sources from which farmers can buy fertilizer." And the third evaluation of the NMS (1982) concluded that "the number of retail places of sale under the NMS was estimated to be slightly increased over the OMS."

Quasem's (1987) survey work for the 1982-83 Boro season confirms the earlier trends. In questions designed to compare NMS and pre-NMS conditions, Quasem found that 100% of farmers surveyed used fertilizer on rice and that 82% of his respondents reported that the availability of fertilizer improved under the NMS.

The EPC study for BADC (Rahman, 1984) also concluded that "over 88 per cent of the non-remote farmers in both [Chittagong and Rajshahi Divisions] stated that the availability of fertilizer increased in 1982-83 as compared to that in 1978 and 1979." This study also found that the overwhelming majority of farmers felt the number of dealers had increased under the NMS.

A question on fertilizer availability was included in the joint USAID-IFDC 1987/88 Rabi/Boro season survey. All sample farmers in the survey used fertilizer on some crop in that season. Of all the sample farmers, 5.6% indicated during that season they were not able to purchase all the fertilizer needed at the time desired because the fertilizer was not in supply at dealers. The figure was 8.7% for both small (less than 2.5 acres) and large farms (greater than 5 acres) but zero percent for medium sized farms. The evaluation team notes that the offtake of fertilizers for the 1987/88 Boro season was much higher than had been projected for both urea and TSP. And there were shortages in some cases before BADC was able to move fertilizer in sufficient quantities.

Eighty three percent of the small farmers in the 1987/88 Rabi/Boro survey indicated that they were using more fertilizer in terms of total volume now than before 1980. And 87% said they were also using more on a per acre basis (see Table B.2). A higher proportion of both medium and large farmers indicated that they are now using more fertilizer than before. This may be due at least partially to the fact that small farmers were using substantially more fertilizer per cropped acre than were medium and large farmers in the late 1970's.

Table B.2: Quantity of Fe tilizer Now Being Used Compared to Pre-1980, By Farm Size Class

Farm Size	Using More in Terms Of Total Volume ? (% of Farmers)		Using More on A Per Acre Basis ? (% of Farmers)	
	Yes	No	Yes	No
Small	82.6	17.4	87.0	13.0
Medium	92.0	8.0	92.0	8.0
Large	91.3	8.7	95.7	4.3
All	88.7	11.3	91.5	8.5

Source: Unpublished USAID/Dhaka survey data

Information was obtained on fertilizer use by farm size in the 1987/88 Rabi/Boro season survey. This is shown in Table B.3. Note that the application rate per acre for rice, as well as for other crops, was substantially higher for the small farmer category than for the medium and large farmer categories. These data confirm the earlier results of IFDC and other studies.

Information on application rates was also obtained for the 1985/86 Boro season by farm size as well as for 1980/81 and 1981/82 Boro season (Table B.4). While the level of comparability of these samples falls short of what one would like, these data do provide at least some comparison over time. *The results indicate that Boro season application rates for all farmers have increased significantly over time and that this trend is continuing.* Application rates for small farmers have remained above the rates for medium and large farmers. The data summarized in Table B.4 indicate a 20% average annual increase in Boro season fertilizer use per acre by small farmers has been experienced in Bangladesh over the 1980/81 to 1987/88 period.

The prices paid by small farmers are also an equity issue. The mid-term evaluation of FDI-I had data from the IFDC/BARC studies which indicated that on average small farmers were paying 0.4%-0.7% higher costs for fertilizer in the Boro season. In addition, the sample data available at that time indicated that the increase in fertilizer prices was slightly greater for small versus larger farmers. However, there was no statistically significant difference and it was believed at that time the differences may have been attributable to small farmer's purchasing at somewhat higher prices of loose versus bagged fertilizer.

Table B.3: Total Fertilizer Used and Average Per Acre Use, 1987/88 Rabi/Boro Season, Rice and Other Crops

	Rice	Other Crops	All Crops
UREA+TSP+MP	----------(Seers)---------		
Small	3001	1373	4374
Medium	4583	3145	7728
Large	7018	3665	10683
All	14602	8183	22785
TOTAL NUTRIENTS			
Small	1446	652	2098
Medium	2155	1484	3639
Large	3305	1764	5069
All	6906	3900	10806
PRODUCT/ACRE	--------(Seers/Acre)--------		
Small	179	128	159
Medium	135	114	126
Large	148	100	127
All	149	109	132
NUTRIENTS/ACRE			
Small	86	61	76
Medium	63	54	59
Large	70	48	60
All	70	52	62

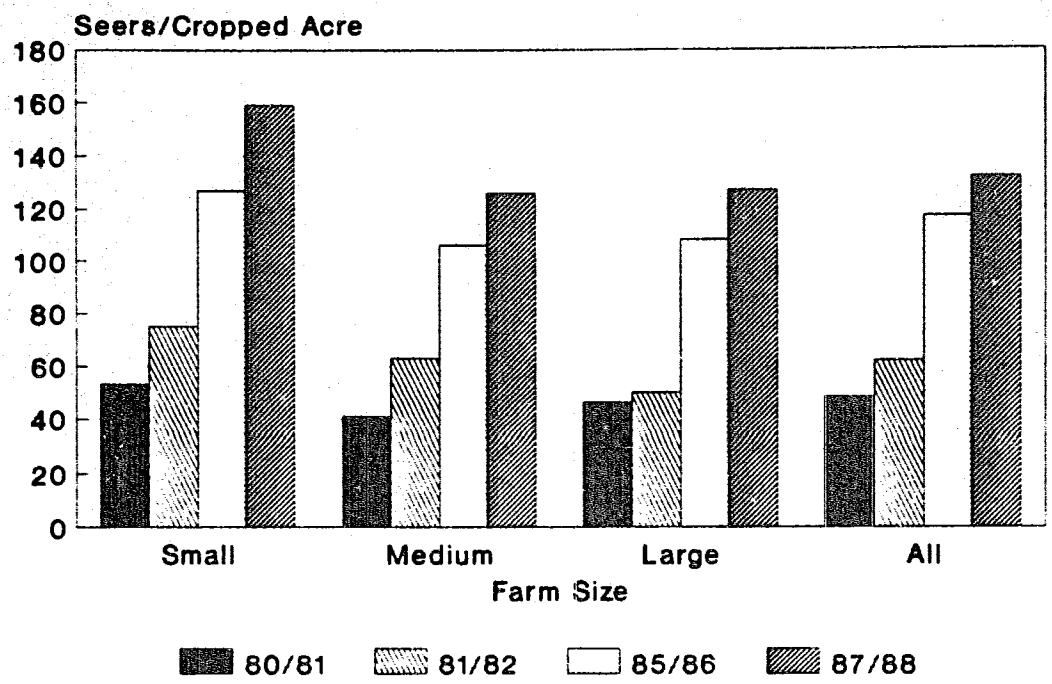
Source: Unpublished USAID/Dhaka survey data

Table B.4: Fertilizer Applied to Crops by Sample Farmers, Boro Season, 1980/81, 1981/82, 1985/86 and 1987/88 By Farm Size.

Farm Size	80/81 a/	81/82 a/	85/86 b/	87/88 c/
	---------(Seers/Cropped Acre)----------			
Small	53	75	127	159
Medium	41	63	106	126
Large	46	50	108	127
All	48	62	117	132

a/ Agricultural Production, Fertilizer Use, and Equity Considerations, IFDC, 1984.
b/ IFDC unpublished data.
c/ USAID/Dhaka unpublished survey data.

Figure 5: Fertilizer Applied to Crops by Farmers in Boro Season, Selected Years



Source: IFDC & USAID/Dhaka surveys

More recent price information indicates the situation has not changed significantly. The IFDC Bangladesh Farmer Profile (1986) concluded that small farmers paid Tk. 2-5 more per bag of fertilizer in the 1985/86 Boro season. Thus, on a per acre basis the small farmer's fertilizer cost was Tk. 25 more than the largest farmer. Indications from the sample data are that the Tk. 25/acre difference did not cause any decline in the quantity demanded by small farmers.

Preliminary survey data for the 1986/87 Rabi/Boro season indicates that although small and medium-sized farms paid higher prices, the difference was less than one-half Taka per seer or about Tk.11-25/bag. If small farmers are buying fertilizer in loose form, this could account for some of the price differential. Also, larger farmers may receive discounts for larger quantity purchases.

Table B.5: Average Prices Paid For Fertilizers by Sample Farmers, 1987/88 Boro Season, By Farm Size Class

Farm Size	Urea	TSP	MP
	Taka/seer		
Small	5.39 (5.8)	5.45 (5.4)	4.77 (5.1)
Medium	5.49 (7.5)	5.44 (5.9)	4.88 (9.1)
Large	5.15 (5.3)	5.23 (6.3)	4.41 (10.6)
All	5.35 (6.8)	5.38 (6.1)	4.69 (9.1)

Figures in Parentheses are C.V.'s.
Source: Unpublished USAID/Dhaka survey data

The foregoing would seem to provide evidence that the project has increased the availability of fertilizer as well as use by small farmers. The evidence also suggests that the levels and rates of increase in fertilizer use by small farmers is consistent with equity objectives. Despite differences in sample size, survey methodology, and analytical techniques among the various studies with equity aspects, the available evidence does not indicate that there has been any serious fertilizer availability problem for small scale farmers.

However, the verifiable indicators for achievement of project purpose are: (1) a 15% annual increase in fertilizer sales and (2) a 22% annual increase in sales to small farmers. Annual growth rate for total fertilizer sales has averaged 9% over the project life. Use rates for small farmers have increased about 20% annually in the Boro season but when Aus and Aman crops are considered the growth rate would be much lower. *Thus, the project purpose has been substantially achieved in terms of the PP criteria. However, the evaluation team feels the design criteria were based on optimistic assumptions about the fertilizer/rice price ratio and the inherent riskiness of rainfed foodgrain production in Bangladesh. The established accessibility of small farmers to fertilizer, their relatively higher intensity of use, and indications of continued growth in fertilizer use, suggest that the project purpose of increased use on an equitable basis has largely been substantially achieved.*

Remote Farmer Access to Fertilizers

Although Bangladesh is a small and densely populated country, there are serious transportation, communication, and access problems for some areas of the country. BADC contends that certain remote areas, most notably the Chittagong Hill Tracts, but including other areas as well, are so inaccessible that wholesalers and retailers will not find it profitable to sell fertilizer in the village bazars. Thus, farmers in remote areas might be denied access; and in the name of fairness, BADC believes it should fulfill the social responsibility for assuring that fertilizer is available in these areas.

What constitutes "remote" is a matter of definition. IFDC defines it in terms of required transport modes and distance. That is, if fertilizer has to move on two or more modes of transport (e.g. boat-to-rickshaw, truck/bus-to-boat, etc.) between the PDP and the bazaar and the bazaar is more than 15 miles from the PDP, then the area is considered remote. Unfortunately there are no statistically reliable data to estimate the number of farmers in this situation or the amount of fertilizer sold in "remote" areas as defined by IFDC. However, IFDC does collect price information on amounts of fertilizer purchased and market prices by distance from the nearest PDP (i.e. intervals of 0-5 miles, 6-15 miles, and 16-25 miles). These data indicate that retail prices rise as distance from the PDP increases. This result should be expected given normal costs of business and in no way indicate a negative equity effect on remote farmers unless the distance differential exceeds movement costs by a substantial degree. The monthly IFDC price survey data do not indicate a price equity problem for remote farmers.

The EPC study for BADC (Rahman, 1984) examined the remote farmer's access issue by surveying both non-remote farmers (i.e. those from villages within an average of two miles from a PDP and away from a main road) and remote farmers (i.e. from villages located at a distance of five miles in two directions and away from a main road). Survey results indicated "...both non-remote and remote farmers would seem to have been benefited from the new marketing system...". In addition, the study concluded that "...by and large, the NMS seems to have ensured relatively lower price to the farmers...the remote farmers are not relatively worse off because of the NMS."

A second important aspect of the remote farmer issue is price. BADC and others contend that remote farmers are paying more for fertilizer. Although BADC may be using the subsidized and uniform pricing of the OMS era as a standard for judgment, there is still a concern that fertilizer prices in remote areas might be unjustifiably higher. Some difference in price for remote areas could be expected on the basis of (1) higher movement costs in both time and Tk. and (2) higher retailing costs due to lower volume and slower turnover for each dealer, and (3) the probable fewer number of dealers located in a remote area. So the issue remains: "Do remote area farmers pay prices higher than might be expected given the marketing and economic conditions which prevail?"

While in the early years of FDI-I, fertilizer prices rose substantially for all farmers as subsidies were removed, the EPC study for BADC concluded that while remote farmers were in fact paying higher prices, these differences were not large over the early years of FDI-I (Table B.6). Thus, nominal prices averaged 2%-5% higher in more remote villages. In the absence of additional information, the magnitude of these differences seem reasonable given higher transportation costs and lower volume for dealers in remote areas.

Table B.6: Price Differences Between Non-Remote and Remote Villages in Two Divisions, 1978-1982

		Chittagong		Rajshahi	
	Official	Farmer Prices			
Year	Price	Non-remote	Remote	Non-remote	Remote
1978	63.69	68.30	70.37	70.49	72.36
1979	80.22	91.10	94.80	90.36	91.72
1980	99.77	110.89	114.27	109.37	113.13
1981	122.52	136.91	143.77	132.71	136.46
1982	141.77	151.89	156.87	144.51	147.95

Source: Engineering and Planning Consultants, 1984
Prices in Tk./md.

Examination of the relative differences in these price data also indicates there was no systematic pattern of significant difference in the relative price changes for remote farmers. This conclusion was

based on a comparison of percentage changes in official prices compared to a weighted average of purchase prices for the farmers survey in the Chittagong and Rajshahi Divisions (Table B.7).

Table B.7: Relative Price Changes in Non-Remote and Remote Villages in Two Divisions, 1978-1982

		Chittagong		Rajshahi	
	% Official	% increase			
Year	Price Increase	Non-remote	Remote	Non-remote	Remote
1978	15.80	10.45	8.51	12.41	16.26
1979	25.95	33.38	34.72	28.19	26.76
1980	24.37	21.72	20.54	21.04	23.34
1981	22.80	23.46	25.81	21.34	20.62
1982	13.58	10.94	9.11	8.89	8.42

Source: Engineering and Planning Consultants, 1984

Using a "remote" definition of more than five miles from a PDP and more than 20 miles from where road and/or rail connections are available, M.A. Quasem,(1985) concluded that during 1982-1984, "The analysis shows that less accessible areas faced higher prices for all types of fertilizers throughout the survey period and the highest prices prevailed in TSC-operated areas...Higher prices in less accessible areas were especially due to poorer transportation systems and other related risks".

Finally, a study by the Center for Development Science (1984) reported a price difference of Tk. 8.0 and Tk. 11.0 per maund for urea and TSP, respectively, between less accessible and accessible areas. It was concluded that these differences were due not only to lower transport costs for the accessible markets but also because of greater competition among suppliers, since wholesalers operating around PDPs often passed on a share of their margin to retailers and sub-dealers.

The evaluation team paid particular attention to the remote access and price issue. During field visits by evaluation team members, informal questioning of dealers and Extension officers provided some indications that under 1988 conditions: (1) fertilizer is available in inaccessible areas and (2) the price differential for the inaccessible areas is in the range of Tk. 10-15/bag, or about 4% to 7%, with the differential being highest for MP. This was true of the most "remote" area visited, Golpalganj. In this area infrastructure is inadequate and transportation costs are significantly higher than in nearby areas. This seems to have caused more temporary supply problems and there are fewer dealers operating in the market. However, fertilizer still seemed to be generally available. Prices were reportedly .5-1.0 Tk./Kg higher in the more distant bazars. However, it appears that the serious infrastructure deficiencies in Golpalganj explain the temporary supply shortages and higher per unit prices. Of course, more systematic surveys may produce a clearer picture of the actual situation for remote areas.

There may be some reason to believe the fertilizer availability and price issues for remote areas deserves more attention during the implementation of FDI-II. BADC could more carefully analyze the price survey data now collected monthly to determine if there is any statistically significant difference in prices for remote bazaars not explained by transportation and other normal business costs. In addition, special surveys could be conducted for areas determined to be remote and inaccessible.

The evaluation team feels it is reasonable to conclude that FDI-I did not have serious negative equity effects both in price and availability terms in the implementation of the NMS. However, despite the results of these published efforts, the equity issues, especially that of availability in remote areas, remain a serious expressed concern by BADC officials. BADC believes remote villages are under-served by private dealers and advocates maintenance or re-establishment of TSCs and PDPs to serve these areas. However, except for the Chittagong Hill Tracts, the exact areas which can be classed as "remote and under-served" have not as yet been clearly identified nor critically evaluated by BADC.

PART C:

AN ASSESSMENT OF THE PROGRESS IN IMPLEMENTING THE NEW MARKETING SYSTEM FOR FERTILIZER

Findings:

1. A free market system of fertilizer wholesalers and dealers has slowly been established nationwide through the policy changes implemented by the BDG and the BADC and as a direct result of FDI-I. This marketing system now handles 99% of all fertilizer and appears competitive, efficient, and capable of handling fertilizer marketing within Bangladesh. The private marketing system has the potential to expand through direct lifting by wholesalers from ports and BCIC factories.

2. The NMS represents an improvement over the OMS. Fertilizer availability has improved, national buffer stock targets have largely been met, and private marketing costs as a percent of total fertilizer cost are low. BADC could continue to improve regional supply management and reduce internal marketing costs through full implementation of FDI-II.

3. BADC Dealer Development and Training has had a positive impact and is widely supported by dealers and wholesalers. Field interviews of wholesalers and dealers indicated virtually unanimous approval of previous BADC dealer training. However, this training has been sharply attentuated since 1986.

Pre-Project Fertilizer Marketing Situation

Prior to the implementation of FDI-I, fertilizer was procured and distributed in Bangladesh by the BADC. This pre-project system has come to be known as the Old Marketing System (OMS). Under the OMS BADC imported fertilizers from abroad and lifted urea from BCIC factories. Supplies moved through three ports, three factories, and 67 intermediate godowns. About 75% of all product was then wholesaled through 423 BADC Thana Sales Centers to registered dealers. The remaining 25% was wholesaled through Thana Central Cooperative Associations.

Retail dealers were appointed by BADC for each union (group of villages spread over an average of 12 square miles). Dealers had an exlusive area in which they could sell product to farmers. Supplies were procured from TSC godowns with payment required by bank draft. Selling prices were fixed by BADC. The dealer's commission was based on distance from the TSC and varied by product. Dealers were required to maintain a cash memo book, stock record book, and sales register, all of which were to be open for BADC inspection. Prior to 1978 there were an estimated 43,000 registered dealers with average annual sales of 20-25 MT and a marketing margin of about 120 Tk./ton.

As fertilizer use began to rise significantly in the 1970s, the BADC distribution system experienced several constraints in meeting its movement and wholesaling responsibilities. Imports were poorly timed, factory production was erratic, transportation infrastructure was inadequate to meet the higher movement demands, storage capacity was deficient. These problems resulted in frequent temporary fertilizer shortages at different times and locations and a restricted product choice for the farmers.

One of the primary activities of FDI-I was the introduction of a New Marketing System (NMS) with the following features:

(1) Expanded role of private fertilizer wholesaling and retailing;
(2) Retail price decontrol and liberalization of dealer licensing;
(3) Increased BADC storage capacity and improved movement logistics;
(4) BADC wholesaling from 97 PDPs and closure of the TSCs, except those TSCs in the remote Chittagong Hill Tracts; and
(5) Improved dealer development and training.

Expansion of the NMS Since 1982

At the time of the 1982 mid-term evaluation, FDI-I had been in implementation four years but the private wholesaling and retailing system was just in the beginning stages. Fertilizer price deregulation had begun in 1982 in Chittagong, private dealers were handling 75%-85% of all fertilizer sold to farmers, the wholesaler program was just being initiated, and most of the new PDP godowns were still under construction. The mid-term evaluation concluded: "...project implementation has been decidedly slower than was initially anticipated...[and]...there is little evidence that the Thana wholesalers program is establishing a nationwide network of competing wholesalers" (pgs. 30,32).

The evaluation team has found that substantial progress has been made since 1982 in meeting the BDG policy goal of establishing a private, free market system of fertilizer marketing throughout Bangladesh. BADC and IFDC reports supplemented by evaluation team field visits and interviews in several regions reveal a well-developed and seemingly competitive system of private wholesalers and dealers throughout the country.

As of mid-1988, the NMS system has the following characteristics and capabilities:

(1) There are now an estimated 8,000 wholesalers and dealers who lift from BADC godowns. In 1986/87 they lifted 1.3 million MT of product from BADC 101 outlets (75 PDPs and 26 TSCs). About 99% of the total volumne of BADC fertilizer now moves directly from PDPs to wholesalers and dealers.

(2) An estimated 50,000 private dealers (retailers) with no licensing requirements or restrictions on price or sales territory have completely replaced the BADC role in fertilizer retailing (except in the remote and politically sensitive Chittagong Hill Tracts). This change to private retailing took seven years. It was not until July 1, 1985 that the final order was issued by BADC to close the last of the TSC retail outlets. Average annual sales per dealer were about 52 MT in 1985/86.

(3) Retail prices are determined by the dealers with no minimum or maximum limitations. Wholesale prices are determined by the BDG based on BCIC production costs or import costs, plus a markup for BADC overhead. BADC PDP prices are discounted for wholesalers lifting a minimum of 84 tons from TDPs. Under the NMS the marketing margins from PDP to farmer have been low, reflecting competitive pricing among dealers. Fertilizer gross marketing margins (farmer's cost minus PDP price) over the last year have averaged 8% of farmer price for urea and TSP and 15.5% of farmer price for MP.

(4) Merchandise credit is commonly provided by wholesalers to dealers and by dealers to farmers. Field interviews by the evaluation team and the IFDC 1988 survey of wholesalers indicate virtually all wholesalers give merchandise credit in the form of 7-15 days delayed payment. A similar credit system has evolved for dealer credit to farmers with the common delayed payment period being 7 days. It is also common that no interest is charged by wholesalers or dealers for the delayed payment period. However, credit constraints do seem to exist for the larger wholesalers and dealers who are desiring to expand business volume.

(5) The system of wholesalers and wholesale/dealers which has emerged since 1982 seems capable of lifting all BADC fertilizer stocks from PDP godowns and supplying dealers and farmers in virtually all areas of the country. This has permitted BADC to attenuate its role as wholesaler supplier (via BADC godowns) with fewer supply or distribution problems around the country. Quasem's marketing survey in eight upazilas from around the country for the 1982/83 Boro season estimated the average monthly lifting by wholesalers was 40 tons/month and the average lift was 20 tons. More recent estimates indicate average annual sales volume is over 225 MT. Larger volume wholesalers are emerging. For example, IFDC's 1988 survey of wholesalers lifting from the Baghabari TDP indicated that wholesalers' average annual volume was 2629 MT and average lifting was 109 MT. Evaluation team field interviews with a few randomly selected wholesalers in several locations indicated wholesaler's annual volumes averaged well in excess of 2,000 MT per year.

(6) Given the current level of institutional development and experience, the wholesaler-dealer system seems capable of expanding its role in fertilizer marketing by directly lifting stocks from ports and factories. This expansion in the role of the private sector would permit a further attenuation of BADC PDPs and create the potential at least for further cost savings to the BDG. Most wholesalers interviewed by the evaluation team preferred lifting from the new TDPs because costs were lower (compared to the PDP) and supplies of desired

product more certain. In addition, larger wholesalers indicated they were interested in and capable of lifting fertilizer directly from BCIC factory gates. (Several wholesalers in the Bogra area were already lifting gypsum directly from the TSP Complex in Chittagong.)

Thus, the evaluation team concludes that a dynamic private sector wholesaler/dealer network has developed resulting in improved fertilizer availability at competitive prices for farmers. Withdrawal of restrictions on fertilizer movement has made the market more responsive to shifts in demand and supply. Price deregulation has brought a major improvement in supply in areas of high transportation costs and/or low sales volume. Competition among dealers, sales promotion activities, and better customer service is contributing to demand creation and growth in sales. Distribution system improvements in BADC and construction of more modern storage facilities at the PDPs and transit godowns have improved national availability of fertilizers and reduced government expenditures on procurement, storage and distribution.

How far will these NMS improvements be sustained? The PDP system has stood the test of time and is acknowledged as a distinct improvement. Market performance of the private sector has been satisfactory and outside studies (Quasem, 1987 and EPC, 1984) have testified to farmer preference for the NMS. Even doctrinnaire critics of the private sector have admitted the superiority of the NMS over the OMS. Price deregulation, the most controversial policy change, has also been accepted as a pragmatic measure.

The evaluation team concludes that most of the NMS reforms are rapidly becoming institutionalized and will remain in place. Vested interest criticism and resistance will also disappear over time. Only severe supply shortage would remain a major threat. Shortages will lead to demands for rationing and price control which would undermine the NMS quickly. Paradoxically, the private sector position could be jeopardized through no fault of its own. Under the NMS, BADC controls upstream supply activities--all procurement, lifting from ports and factories, and movement to PDPs. Any fertilizer crisis would thus result either from a BADC failure in maintaining adequate national-level supplies or from a disruption in BCIC fertilizer production. The acute crisis of the 1984 winter season is an example.

Factors Influencing Fertilizer Sales Under the NMS

During the implementation period for FDI-I, the sales of chemical fertilizers to farmers in Bangladesh has increased substantially. Several factors can be identified as having influenced fertilizer sales, including:

- --The absolute price of fertilizer as crop production input;
- --The price of fertilizer relative to the price of foodgrains;
- --The availability and price of modern inputs used in conjunction with fertilizer in foodgrain production; and
- --Characteristics of the NMS (availability of supplies, accessibility of fertilizer, dealer/wholesaler incentives, market development).

Fertilizer Price: Bangladeshi farmers now operate in a competitive market environment in which they now bear the cost burden for most of the modern inputs they may choose to adopt. Thus, the absolute price of fertilizer has an important impact on farmer purchase decisions and overall fertilizer sales.

When FDI-I began implementation in 1978, the farm-level price of fertilizer was substantially subsidized by the BDG. The nominal budget subsidies exceeded 50% for TSP and MP while urea was subsidized by about one-third. This was accomplished through uniform and subsidized ex-BADC godown wholesale prices and administratively determined and regulated retail prices to farmers.

Under the policy reforms of FDI-I most of these subsidies have been gradually removed (Table C.1) and retail prices have been determined by dealers since 1983. This of course resulted in

Table C.1: Estimated BADC Fertilizer Procurement Costs, Sale Prices, and Approximate Nominal Subsidy, 1975/76-1986/87

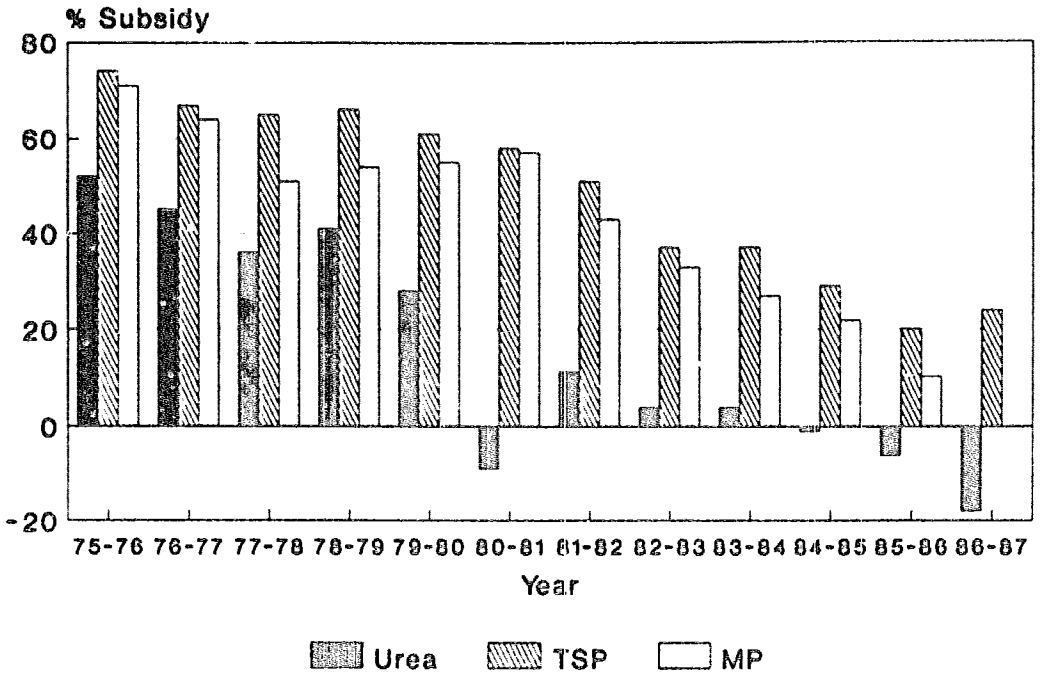
	Estimated BADC Supply Costs[a]			Estimated BADC Sale Price[b]			Approximate Nominal Subsidy[c]		
	Urea	TSP	MP	Urea	TSP	MP	Urea	TSP	MP
FY	(Tk/Metric Ton)						(%)		
75/76	2,841	4,149	2,800	1,361	1,089	816	52	74	71
76/77	2,982	3,985	2,990	1,633	1,307	1,089	45	67	64
77/78	2,564	3,785	2,221	1,633	1,307	1,089	36	65	51
78/79	3,222	4,460	2,670	1,905	1,497	1,225	41	66	54
79/80	3,426	4,926	3,330	2,450	1,905	1,497	28	61	55
80/81	2,741	5,841	4,092	2,994	2,450	1,769	-9	58	57
81/82	3,793	5,474	3,856	3,390	2,802	2,189	11	51	43
82/83	4,118	5,945	4,370	3,966	3,752	2,948	4	37	33
83/84	3,986	5,504	3,866	3,845	3,460	2,826	4	37	27
84/85	4,202	5,594	3,934	4,239	3,941	3,080	-1	29	22
85/86	4,350	5,746	4,022	4,624	4,595	3,622	-6	20	10
86/87	3,836	6,193	3,718	4,525	4,725	3,725	-18	24	0

Source: BADC Newsletters, Joint Bangladesh and U.S. Government Evaluation of the Fertilizer Distribution Project (1982), and IFDC/Dhaka unpublished reports.

[a] Calculated from BADC reported supply costs plus estimated transport and handling costs.
[b] Ratio of supply cost minus sale price to supply cost.
[c] Does not include all marketing and distribution costs.

substantial price increases for fertilizer. When FDI-I was initiated the BADC prices were 1,905 Tk/mt, 1497 Tk/mt, and 1,225 Tk/mt for urea, TSP, and MP respectively. Through a series of price increases over the following eight years, farmers were paying about 4,800 Tk/mt, 5,000 Tk/mt, and 4,000 Tk/mt for urea, TSP, and MP by the end of 1986.

Figure 6: Approximate Nominal Fertilizer Subsidy, 1975-1987



Source: BADC, USAID/Dhaka, IFDC/Dhaka

Thus, farmers are now paying the "full price" (in nominal budgetary terms) for urea and MP. TSP domestic production is being subsidized through greater than world market prices. In fact, the World Bank estimates that BDG pricing policy on urea and MP is now negative in economic terms (if dealer commission is included) and constitutes a tax on that fertilizer at current farm level prices.

The response of Bangladeshi farmers to these significant changes in fertilizer price is an important issue. Economists measure the farmer response to fertilizer price changes by estimating price elasticities (buyer "responsiveness" to price changes) from input demand models. These models attempt to isolate the role of prices as well as other variables (irrigation, HYVs, price of output) in determining the demand for any input like fertilizer.

Fortunately, some research has been devoted to estimation of price elasticities for fertilizer in Bangladesh. The research of IFDC under FDI-I surveys and several outside research efforts have produced a wide ranges of elasticity estimates:

Researcher/Year	Range of Price Elasticity Estimates
M.S. Kahn, 1981	+0.26 to -3.47
IFDC, 1984	-0.30 to -1.02
M. Hossain, 1985	-0.48 to -0.75

Despite the differences in econometric technique, data, and time period(s) covered, which no doubt account for much of the differences in estimates, the price elasticity for fertilizer in Bangladesh is probably near -.5 to -.6. This falls within the range of elasticities of -0.4 to -0.7 estimated for the Asian rice economy by Barker, Herdt, and Rose in 1985.

These estimates indicate Bangladeshi farmers are responsive to fertilizer price changes. That is, the magnitude of response in fertilizer sales is less than the magnitude of the price change. Thus, if in fact the price elasticity of demand for fertilizer in Bangladesh is -.5 to -.6, then a 10% rise in retail fertilizer prices, other things being held constant, results in a reduction in quantity of fertilizer demanded by Bangladeshi farmers of 5% to 6%.

These results, of course, mean Bangladeshi farmers are responsive to fertilizer price changes. Thus, the impact of elimination of fertilizer subsidies and price increases under FDI-I has reduced the quantity of fertilizer demanded from that which would have been demanded under subsidized pricing. M. Hossain in an IFPRI study (1985) estimated the impact of achieving full economic cost pricing on fertilizer would reduce fertilizer quantity demand by 22.5% and rice production by 2.2%. These results were the subject of some debate with IFPRI thinking the estimated response to be too high. In any case, price is clearly a major factor in determining total sales of fertilizer under the NMS.

Prices of Fertilizer and Foodgrains: Fertilizer demand is derived from its profitable use in crop production. Thus, another major factor in fertilizer sales is the price of fertilizer compared to the price of the foodgrain outputs on which fertilizer is applied by farmers. Since it is thought that approximately 85% or more of the fertilizer sold in Bangladesh is applied to foodgrains, the relative prices of fertilizer and rice give some indication about the incentives to use fertilizer.

The relationship of fertilizer prices relative to output prices is commonly measured by two ratios: (1) The ratio of fertilizer price to paddy price and (2) The ratio of the value of paddy produced to the cost of the fertilizer applied, the Value/Cost or Benefit/Cost ratio. Data from the IFDC monthly farmer surveys can be used to estimate the price and value/cost ratios. Using the conservative IFDC assumption about response of rice to nutrients (4.85 kg of rice per kg of nutrients), weighted averages for nutrient costs, and harvest season price averages for paddy, IFDC estimates for price and value/cost ratios by season for 1982-1987 are summarized in Table C.2.

Table C.2: Nutrient and Rice Price and Value/Cost Ratios by Cropping Season, 1982-87

FY	/Season	Average Paddy Price[a] (Tk/Kg)	Nutrient Price[b] (Tk/Kg)	Nutrient/Paddy[c] Price Ratio	Paddy/Nutrient[c] Value/Cost Ratio
1982	Boro	3.7	7.5	2.0	2.4
	Aus	4.5	7.6	1.7	2.9
	Aman	3.9	8.2	2.1	2.3
1983	Boro	3.8	8.1	2.1	2.3
	Aus	4.2	8.3	2.0	2.5
	Aman	4.0	8.3	2.1	2.3
1984	Boro	4.8	8.3	1.7	2.8
	Aus	5.2	8.9	1.7	2.8
	Aman	5.1	9.3	1.8	2.7
1985	Boro	4.2	10.4	2.5	1.9
	Aus	4.5	10.1	2.2	2.2
	Aman	4.5	10.2	2.3	2.1
1986	Boro	4.9	10.8	2.2	2.2
	Aus	5.3	10.8	2.0	2.4
	Aman	5.5	10.7	1.9	2.5
1987	Boro	6.0	10.7	1.8	2.7
	Aus	6.4	10.3	1.6	3.0
	Aman	5.9	10.7	1.8	2.7

Source: IFDC/Dhaka unpublished reports based on data from the IFDC Monthly Farmer Survey.

a/ Paddy prices expressed as two-month averages for each season: May-June (Boro), Sept-Oct (Aus), Nov-Dec (Aman).

b/ Fertilizer prices are two-month averages for principal season of application weighted by national average for N-P-K = 1.0:0.4:0.1.

c/ Assuming average paddy response of 4.85 Kg per Kg of nutrients, as estimated by Ray Diamond (IFDC/Dhaka unpublished reports).

The fertilizer/paddy ratios indicate the amount of paddy, valued at harvest prices, necessary to purchase a unit of fertilizer. Over the past five years this ratio has been close to 2.0, indicating an adequate incentive to purchase and use fertilizer. In fact, the somewhat higher paddy prices in 1987 reduced the ratio below 2.0.

The value/cost ratios, which indicate the amount of financial return to each unit of nutrient applied, should on average exceed 2.0 in order for subsistence farmers to have adequate incentive to utilize fertilizer. Over the last five years this ratio has been at or above 2.0 for every season since 1982, excepting only 1985 Boro. This indicates an adequate incentive for fertilizer use has been sustained over much of the last six years (1985 is an exception).

Given the relative stability in fertilizer prices over the past three years, it can be seen that both the nutrient/paddy ratio and the value/cost ratio have been very sensitive to fluctuations in paddy harvest prices. This is the crucial factor which should be monitored

closely in determining trends in the economic incentive for farmer use of fertilizer.

Availability of Complementary Inputs: Fertilizer is not used in isolation for foodgrain production. This was recognized in the FDI-I conceptual design which gave emphasis to "system" improvements for fertilizer development in Bangladesh. Other inputs which are complements to fertilizer in the food production system include HYV seeds and irrigation.

The early IFDC farm survey research, the mid-term evaluation, and other independent research on fertilizer use in Bangladesh clearly establish the positive complementarity between fertilizer and acreage under HYVs and irrigation. The total acreage under modern methods of irrigation (i.e. tubewells, low lift pumps, projects) has grown from 1.9 million acres at the beginning of FDI-I to over 4.2 million acres by 1986. The annual growth rate in the 1980s has been over 16%/year. Similarly, the acreage under both rice and wheat HYVs has increased significantly. In 1978 about 2.97 million acres were seeded to HYV rice varieties. By 1987 HYV rice acreage had increased to 7.71 million acres. HYV wheat has grown from .39 million acres to 1.44 million acres from 1978 to 1987.

Research on the relationship between fertilizer use and the complementary inputs of irrigation and HYVs has established a strong positive relationship. M. Hossain's research for IFPRI (1985) estimated that irrigation explained 79% of the regional variation in fertilizer consumption and 83% of the variation of HYV during the dry season. This is consistent with the earlier research by IFDC (1984) which indicated that for every 10% increase in paddy area under HYV the quantity of fetilizer demanded would increase 4.4%. For every 10% increase in paddy acreage under irrigation, fertilizer quantity demanded would increase 3.2%.

Characteristics of the NMS: Another factor which has had an impact on fertilizer sales over the last decade is the nature and characteristics of the New Marketing System first introduced under FDI-I in 1978. The NMS is more efficient in making fertilizer available to the final consumer than was the case under the OMS. At the retail level, fertilizer is more available, farmers can commonly purchase fertilizer without the bank payorder, and dealers routinely extend merchandise credit on a 7-21 day delayed payment system. From the wholesale to the retail level, the marketing margins are low, about 6% last year for the high-volume urea, a further indication of marketing efficiency. And finally, the Dealer Development and Training program has increased the competence of retail and wholesale dealers to advise farmers on fertilizer use and promote fertilizer sales throughout the country.

Improvements in the Efficiency of Fertilizer Marketing

FDI-I was in large part a major policy reform project, intended to develop a country-wide free market system of fertilizer marketing to replace the established governmental distribution system.

Substantial progress has been made: a retail and wholesale system is now marketing 99% of the fertilizer across the country (except in the remote and politically sensitive Chittagong Hill Tracts).

One important question posed to the evaluation team is whether or not the NMS, though not yet completely developed, represents any improvements in supply, use and efficiency over the OMS. At the time of the mid-term evaluation this question could not be answered since "Much of what was originally conceived for the NMS has yet to be implemented or has only recently been implemented" (pg. 29).

Now with six years of development, some information is available to judge the operational efficiency of the NMS relative to the OMS in terms of: (1) performance in supplying the desired product to the farmer customer and (2) level of marketing costs as a proportion of total product cost.

Supply Efficiency: The performance of the NMS in supplying the desired product to the farmer at the desired time has several dimensions. The BADC has sole responsibility for the macro-level of supply of fertilizer products in Bangladesh. BADC is responsible for distribution of fertilizer product to wholesalers and the maintenance of a buffer stock for national fertilizer security purposes, three months' requirement of urea and five months' requirement of TSP and MP.

BADC has adequately maintained the national-level supply of fertilizer over the last several years, except for the 1984/85 Boro season. The Fertilizer Newsletter indicates that BADC-held stocks have averaged 25% to 100% over the buffer stock goals in the last two years. Since BADC has one target for the whole marketing year despite the seasonal peak demands, the monthly stock-to-goal situation varies. However, it is apparent that at the national level, BADC has been able to meet national supply demands for the major fertilizers.

At the regional level, the supply performance varies widely. As of December 1987, the regional stock situation, expressed as a ratio of present stock (as of January 1, 1988) in the regional godown to the buffer stock goal, was:

Fertilizer	Average Ratio of Regional Stocks-to-Goal	Range of Regional Ratios of Stock-to-Goal
Urea	.55	.08-6.06
TSP	.51	.05-1.45
MP	.98	.30-4.81

Source: BADC Monthly Newsletter

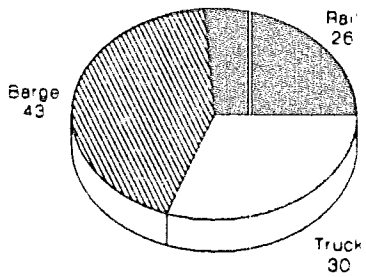
It seems apparent that BADC is not able to meet the regional buffer stock goals very well. This potential stock inadequacy is probably one of the reasons wholesalers register at and lift from two or more PDPs. Thus, it would appear that BADC has a management problem in distributing stocks of the desired products to the wholesalers in the different regions.

At the wholesale and retail level the supply performance of the NMS seems adequate and an improvement over the OMS. The percentage of farmers using fertilizers in the Boro season is now virtually 100% and product seems to be available in the local markets. The EPC survey (1984) found that the overwhelming majority of farmers in Chittagong and Rajshahi reported availability of fertilizer had increased under the NMS. In Quasem's (1987) survey in eight upazilas for the 1982-83 Boro season, 82% of farmers reported availability improved in the NMS versus the OMS.

As regards private sector storage of fertilizer, there is no evidence of any significant change. The prevailing mode of business continues to be one of rapid turn-over with minimum holding of stock with the dealer (wholesaler) who varies PDP-lifting according to prospects of immediate sale within his service area. As expected, PDP lifting rates reflect overall sales volume in the area; according to a recent BADC survey, average lifting in high, medium and low sale areas were 12-15, 8-10 and 5-6 tons respectively. This makes business sense and considering the high cost of fertilizer storage the pattern is likely to continue. Within this scenario, enterprising dealers are expanding sales and market share, not by increasing storage, but by increasing sales outlets (i.e., engaging more sub-dealers/retailers and covering more markets). This has greatly improved farmer access to fertilizer and is a welcome trend. The cost will be different for large TDP wholesalers and some of them may find it profitable to go for storage.

Marketing Costs: After procurement, BADC arranges movement of stocks from the ports and factories to intermediate transit godowns and PDP godowns. BADC movement of fertilizer is about 26% by rail, 43% by barge, and 30% by truck (Figure 6). Wholesalers bear the marketing costs from the BADC godown.

Figure 7: BADC Modes of Fertilizer Movement



Source: IFDC

BADC internal distribution costs for fertilizer are very difficult to ascertain. Cost estimates based on BADC accounting methods are summarized below for movement and handling as well as personnel and other overhead costs:

Costs	FY82	FY83	FY84	FY85	FY86	FY87
			(Tk./MT)			
Movement & Handling	302	323	334	306	394	360
All Other	245	338	211	193	255	258
Estimated Total	547	661	545	499	649	618

Movement and handling constitutes more than half of BADC internal distribution costs. It seems apparent that these cost estimates understate the actual costs to BADC for fertilizer distribution. These costs do not reflect the costs of movement between PDPs when regional inventories become unbalanced nor the costs of the owned godowns. For the last two years, these approximate internal distribution costs are about 14% of average sales price, somewhat above the FADINAP estimates of 11%-13% (marketing costs as a percent of price) in Thailand, Indonesia, Pakistan, and Sri Lanka.

Even though BADC's number of distribution points has dropped under the NMS from 463 to 101, no significant budget savings have yet occurred. IFDC has estimated that 25% could be saved by using least cost routing for fertilizer movement. However, least cost route management by BADC is somewhat constrained by the availability of government-owned railroad cars and barges. More significant savings are possible through the reduction of movement possible by full implementation of the TDPs. IFDC/Dhaka has estimated that BADC could achieve both transportation and other cost savings of Tk.221/MT with full implementation of FDI-II.

No data on wholesaler and dealer marketing costs were available to the evaluation team. However, the marketing margins for the private sector can be estimated from the difference between ex-PDP prices and retail prices. Over 1987 IFDC/Dhaka estimated the gross marketing margin for urea averaged Tk.20/bag for urea and TSP or 8% of farmer price and Tk.34/bag for MP or 15.5% of farmer price. These margins did fluctuate seasonally, reflecting supply and demand situations in different regions. However, these margins reflect a competitive and efficient private marketing situation for fertilizer once it leaves the BADC godown.

BADC Dealer Development and Training

The Dealer Development and Training (DD&T) Program aims to: (a) improve fertilizer knowledge of dealers so that they in turn can transfer it to farmers as part of customer service, and (b) encourage and support dealers to undertake sales promotion activity at the farmer-level thereby increasing fertilizer use. To quote from the Fertilizer Distribution Improvement I (Project Amendment) document:

"To supplement the Ministry of Agriculture and Forests' agricultural extension program, the project will train fertilizer dealers in the correct use of all fertilizer products available in Bangladesh. The dealer is in a unique position to disseminate technical information and to encourage increased application of fertilizer, because he has a degree of farmer contact unrivalled by any extension service and because he is the last informed person the farmer sees before applying his fertilizer. This project will supply technical assistance to train Bangladeshi instructors, who will form several mobile dealer training teams to visit all the district/sub-division of Bangladesh giving short (two days) courses to dealers. It is believed that increased farmer knowledge of fertilizer use, imparted through an informed cadre of dealers, will increase the effectiveness of fertilizer on crops and thereby increase demand for fertilizer products."

The Board of Directors of BADC approved the DD&T Program in January 1982 and decided to create a separate Dealer Development and Training Unit under the MSS Division to administer the program. A chronological listing of events leading to establishment of the unit and important activities undertaken since then is presented in Appendix Table V.1. FDI-I supported the DD&T Program in three areas:

(1) Technical assistance: Resident and short-term consultants of IFDC have been associated with the program from the beginning and have made valuable contributions in conceptualizing its goals, organizing 'Train the Trainer' courses/workshops, and developing curricula/course materials for dealer training. IFDC consultants have also advised and assisted BADC in production and distribution of promotional materials for dealers' use, review, modification and upgrading of training content, and program evaluation.

(2) Funding support: Funds have been provided for production of a large mass of information brochures, pamphlets, training literature and manuals, slides, sale promotion posters and films. Training equipment and transport vehicles for trainers have also been procured (Appendix Tables V.2 & V.3).

(3) Study tours: Two out-of-country study tours were organized for DD&T officials.

The Dealer Development and Training Program has a number of achievements to its credit. Training courses organized under the program have proved to be popular with dealers. During an evaluation carried out in early 1985 (Samad), 72% of trained dealers reported that they had found the program interesting and useful and 95% expressed the willingness to attend a refresher course. Even non-trained dealers gave a favorable opinion; 67% thought that it benefitted those who attended and 97.5% wanted to attend the course themselves.

A general improvement in knowledge level of trained dealers was also noticed. Dealers interviewed during the present evaluation consistently showed a high degree of enthusiasm about the training program and expressed their willingness to attend future courses.

Another important achievement is the production and distribution of a large mass of information brochures, pamphlets, sales promotion materials and display posters. Dealers as well as farmers have found these informative and attractive. The fact that nearly one-third of trained dealers and a smaller percentage of non-trained dealers were willing to buy these if offered on sale is indicative of the quality and usefulness of the material. However, full benefit of the investment has not been derived due to unsystematic brochure distribution to farmers and unsatisfactory follow-up dealer shop visits by BADC personnel.

Impact of the program on dealer income was quite pronounced. Most dealers, both trained and non-trained, felt that the instruction was useful in expanding sales. About 85% of trained dealers stated that their sales had gone up subsequent to the training; of them, 44% reported sales increases by 10%, 61% reported increases ranging between 11-30% and 12% reported increases exceeding 80%. Of non-trained dealers, 44% reported loss of business to trained dealers. Computing for the three-year period from 1981/82 to 1983/84, trained dealers in all categories registered much higher increases in sales compared with non-trained dealers.

The 1985 evaluation also looked into changes influenced by the training in quality of services provided by the dealers to farmers. The survey clearly indicated that farmers do consult the dealer about fertilizer use and that additions to dealer knowledge were being passed on to farmers. Nearly one-third of farmers interviewed stated that they were getting better services than before from trained dealers. Survey results also show a favorable response to 'Farmers' Meeting' and 'Dealers' Demonstration Plot' program of the DD&T unit. In the last two years, 45 demonstration plot sites have been planned for each of 20 regions (Table C.3).

Table C.3: BADC Fertilizer Demonstration Program

Year	Crop	Number of regions	Number of sites	Funding source
1987/88	Wheat	20	45	USAID
1988/89[a]	Aman	20	45	USAID

Source: BADC DD&T Unit

[a]Preparatory actions being completed.

The training program, in particular the later courses, were designed also to strengthen dealers' sales promotion and market development skills, and enhance their management expertise as a means of improving operational efficiency and profitability. The goal is to

create an efficient and dynamic dealer network which would then act as a positive force in promoting fertilizer use. There has been no in-depth study of results of this effort (the 1985-evaluation did not cover this aspect). Interviews with dealers and BADC officials indicate a high degree of dealer interest in these topics. Subsequent to the training course, several dealers set up demonstration plots and organized farmer meetings. Some are reported to have conducted training courses for their sub-dealers/retailers. One visible result is a large increase in sub-dealers and retailers employed by PDP wholesalers; largely to their effort, fertilizer is now available for purchase in almost all village bazars.

There is a sharp decline in dealer training activity during the last two years. BADC has reduced its training outlay by nearly 85% (Table C.4) and only three courses have been conducted since July 1986 (Table C.5). This is unfortunate because a trained dealer force can be of immense help to BADC in expanding sales and improving service.

Table C.4: BADC Expenditures for Dealer Training Programs

Year	Expenditure (Tk)	Source
1983/84	1,669,881	BADC
1984/85	1,623,600	BADC
1985/86	1,480,915	BADC
1986/87	137,296	BADC/USAID
1987/88	154,011	USAID

Source: BADC DD&T Unit

Table C.5: Progress of BADC Dealer Training

Year	Number of Batches	Number of Dealers Trained
1982/83	n.a.	6298
1983/84	287	8354
1984/85	208	6163
1985/86	279	6911
1986/87[1]/	29	599
1987/88[2]/	44	971

Source: BADC DD&T Unit

1/Training focused on Aus crop.

2/Training focused on ARP/fertilizer management.

There is also a need for recasting of the training program to accomodate changes that have taken place in the below-PDP marketing structure. In 1983/84, BADC had 4700 active wholesalers and 18,000 retailers. The interface with farmers has changed. Currently, PDP lifting is done by nearly 8000 wholesalers (the retailer classification was abolished in 1985) most of whom execute sales through sub-dealers and retailers. BADC must work out a viable mechanism of disseminating fertilizer knowledge to farmers through present day retailers (who no longer operate directly under BADC). Secondly, training needs of retailers, PDP wholesalers and other large wholesalers will be different and there may be a case for separate specialized training courses for each group.

PART D:

THE EFFICIENCY OF FERTILIZER USE IN BANGLADESH

Finding:

1. The potential exists for improvements in the efficiency of fertilizer use in foodgrains through improvements in cultural practices, addressing micronutrient deficiencies, and expansion of complementary inputs (irrigation and HYVs). There is no evidence that serious constraints on complementary inputs have canceled the positive effects of increased fertilizer use in Bangladesh.

Fertilizer Use Efficiency

Although total chemical fertilizer sales have increased substantially during the life of FDI-I, there remains a concern about the efficiency of fertilizer use by Bangladeshi farmers. Extensive farm trials conducted by BRRI and BARI have established that potential yield responses to fertilization of HYV rice and wheat in Bangladesh exceed 10:1 (output per unit input). This magnitude of yield response is of course associated with recommended levels of nutrient application, proper nutrient management, good water control, disease and pest prevention, and other improved cultural practices.

Fertilizer efficiency under on-farm conditions cannot be expected to reach the BRRI/BARI experimental yield results. Management Systems International and IFDC (1988, Annex C) estimates of response ratios for rice at the farm level for 1973/74 to 1986/87 averaged 4.85:1 (paddy per unit nutrients). On-farm factors constraining fertilizer response in rice include lack of water control, inappropriate timing and/or method of application, unbalanced application of nutrients, inadequate weed or pest control, and micronutrient deficiencies. These factors result in substantial on-farm producer risk which reduces expected net benefits and, therefore, the incentive to fertilizer.

The difference between the experimental yield response (10:1) and average on-farm yield response (4.85:1) indicates a large potential for efficiency gains in fertilizer use. To achieve efficiency gains current constraints must be overcome by farmers. Since some of these constraining factors are controllable by farmers, there is potential for improvement in on-farm fertilizer efficiency. Some of the more promising areas for improvement include:

1. Water Control--Drought and flooding are probably the most critical sources of yield risk in foodgrains. Large variations in timing and quantity of rain or surface water affect the crops of all the growing seasons in Bangladesh. Irrigation and flood control are the primary sources of improved water control. Although farmers have been using traditional irrigation techniques (swing baskets and

dhones) for decades, improved irrigation methods (low-lift pumps and tubewells) have permitted farmers to increase substantially the acreage under irrigation since 1970 (Table D.1). This growth is continuing in the 1980s with an average annual growth rate for modern methods of 17% for 1981-85. Total land under dry season irrigation is now about 5.6 million acres but only about 25% of total crop area.

Table D.1: Irrigated Acreage Under Modern and Traditional Methods, 1970-1986

	'000 Acres Irrigated				
Irrigation Method	Average 1977-80	1982	1984	1986	Growth Rate 1981-86
Modern[1]	1,897	2,732	3,903	4,254	16.84%
Traditional	1,634	1,855	1,449	1,302	6.74%
Total Net Acreage	3,531	4,587	5,352	5,556	9.18%

Source: USAID/Dhaka

[1] Including tubewells, low-lift pumps, and gravity projects.

2. Soil Nutrient Deficiencies--Sulfur deficiencies in Bangladesh soils are widespread and well recognized by soil scientists. The lack of sulfur may be the most important aspect of unbalanced fertilization. It is known that gypsum, available in Bangladesh as a by-product of TSP production Chittagong, can correct sulfur deficiencies. Application of 60 Kg/ac of gypsum every three years will correct the sulfur deficiency in affected soils.

3. Inappropriate Nutrient Application--Nitrogen nutrient losses through untimely or inappropriate methods of application are thought to be one of the more important sources of inefficiency in fertilizer use. The limited research which has been completed indicates that deep placement of nitrogen and slow-release formulations can improve fertilizer efficiency. Further research and demonstrations on these topics would be helpful under FDI-II, especially in cooperation with the Directorate of Extension and BARC.

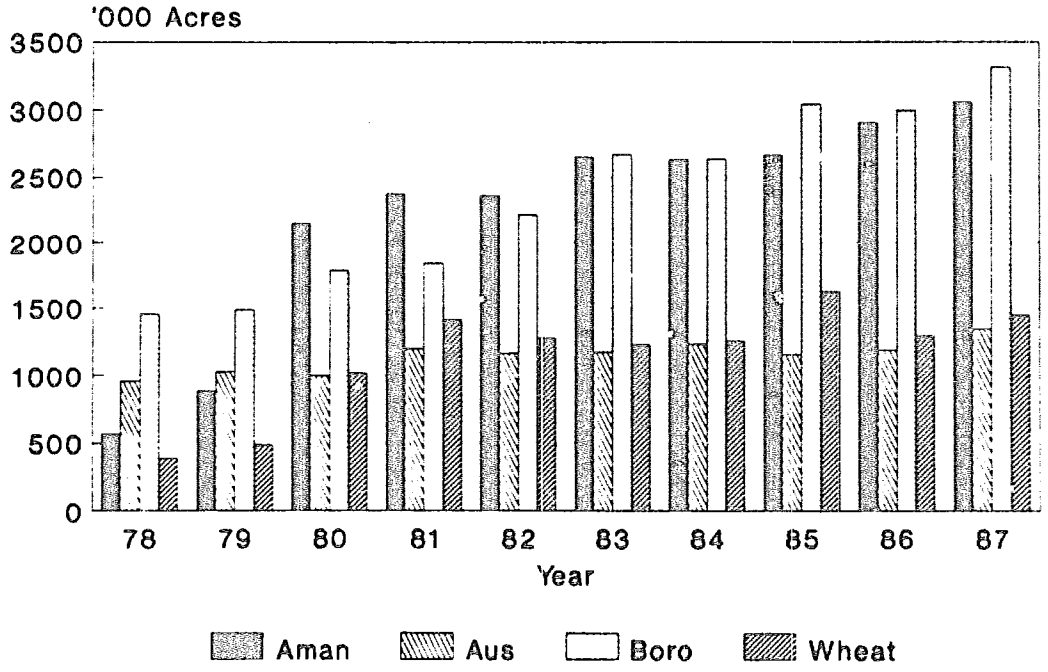
4. HYV seeds still remain one of best complements to increased fertilization and irrigation for production enhancement. Acreage under HYVs in 1987 was estimated to be 3.1 million acres for the Aman rice crop, 1.3 million acres for Aus, and 3.3 million for Boro (Table D.2). For Boro the HYV percentage of total acreage was 79% while for Aman and Aus it was only 20% and 17%, respectively. Virtually all wheat acreage is under HYV. Growth in HYV acreage is expanding but slowly. This indicates that further progress may only come in conjunction with improved water control and fertilizer management. The need for further research on the complementarity of HYVs, fertilizer, and water under on-farm conditions is clear.

Table D.2: Crop Acreage Under HYV Seeds, 1979-1987
('000 acres)

Year	Aman	Aus	Boro	Wheat
1978	567	953	1,455	389
1979	884	1,026	1,482	483
1980	2,154	994	1,788	1,015
1981	2,376	1,200	1,845	1,412
1982	2,361	1,166	2,218	1,276
1983	2,653	1,175	2,670	1,231
1984	2,629	1,235	2,635	1,253
1985	2,669	1,151	3,040	1,622
1986	2,906	1,191	2,998	1,291
1987	3,058	1,342	3,313	1,445

Source: USAID/Dhaka

Figure 8: Crop Acreage Under HYV Seeds, 1979-1987



Source: USAID/Dhaka

Effect of Complementary Inputs on Fertilizer Use

The early IFDC farm survey research, the FDI-I mid-term evaluation, and other independent research on fertilizer use in Bangladesh clearly establish the positive complementarity between fertilizers, HYV seeds and irrigation. The IFDC survey in 1979/80 (1982) concluded that HYVs clearly increased rice yields under either irrigation or rainfed conditions. Likewise, irrigation increased yields of both HYV rice and local varieties. And fertilizer use is greater for both local varieties and HYVs under irrigation. The interaction of these three inputs is illustrated in Table D.3 by data adapted from IFDC survey results.

Table D.3: HYV and Local Variety Rice Yields Under Irrigated and Rainfed Conditions, 1979-80

		Kg/acre			
		Irrigated		Rainfed	
Crop	Variety	Yield	Fertl.Use	Yield	Fertl.Use
1979/80 Boro	Local	730	7	711	5
	HYV	1340	105	1402	129
1980 Aus	Local	768	28	630	19
	HYV	1493	125	1024	60
1980 Aman	Local	783	40	814	16
	HYV	1412	116	1126	16
1979 Aman	Local	686	56	617	30
	HYV	878	80	786	65

Source: IFDC, 1982

The FDI-I mid-term evaluation estimated the elasticity (responsiveness) of fertilizer consumption with respect to irrigation and HYVs were .50 and .53, respectively. Thus, a 10% increase in irrigation or HYV acreage would cause a 5% increase in fertilizer consumption. And this has been generally the case over the last decade--the increases irrigated HYV acreage in Bangladesh have contributed to the growth in fertilzer use.

Other research done outside the project also confirms the strong relationship between fertilizer use and the complementary inputs of irrigation and HYVs. M. Hossain's regression analysis for IFPRI (1985) estimated that irrigation explained 79% of the regional variation in fertilizer consumption and 83% of the variation of HYV during the dry season. In other published research Hossain summarized some 1982 survey results indicating the extent of adoption of modern varieties by farm size (Table D.4).

Table D.4: Use of Modern Inputs by Farm Size and Tenancy, 1982

Farm Class	% Using HYV	% Using Fertl.	% Cropland in HYV Rice	Kg. Fertl. Per Acre	% of Land Irrigated
Size of Farm:					
Small	75	86	43.2	24.4	32.3
Medium	74	92	35.8	21.9	32.9
Large	77	95	32.5	18.1	28.3
Tenure Status:					
Owners	77	88	35.7	22.2	33.6
Tenants	74	91	38.1	27.7	29.6
All Farms	75	89	36.8	21.9	31.7

Source: Hossain, 1987

The Hossain research not only confirms the strong association between fertilizer and other modern inputs, but it also points out that diffusion of modern inputs has been widespread among farmers of all sizes and tenure status. In fact, small farmers tend to use more fertilizer per acre and irrigate a larger percentage of their land.

Examination of the available evidence clearly establishes the strong link between fertilizer consumption and the use of other modern inputs. The growth in irrigation and HYVs has thus contributed importantly to the growth in fertilizer use in Bangladesh. *Given the high rates of adoption of these inputs by farmers of all size classes and tenure status, it does not seem probable that lack of modern inputs could be considered as having cancelled or repressed the positive effects of fertilizer use during the FDI-I implementation period.*

Effect of Constraints on Fertilizer Use

First, looking at the small farmers. The relative amounts applied in 1980/81 by medium and large farmers in comparison with small farmers were not much changed by 1987/88 although the relative amount applied by the large farmers did decrease some (Table B.4) Thus, in 1980/81, the medium sized farmer applied 77% as much as the small farmer on a per acre basis and the large farmer 87% as much. The respective figures of 1987/88 were 79% and 80%. On this criterion, then, the possible constraints (lack of irrigation, HYVs) facing the small farmer did not cancel out the positive effects, relative to medium and large farmers, of increased fertilizer supplies. Yields for small farmers are consistently higher than for larger farmers and the same is true for cropping intensities.

Management Systems International and IFDC (1988), using national data and regression analysis, produced estimates of production and

yield response functions for rice over the 14-year period 1973/74-1986/87. Their results indicate that 4.85 kgs of paddy are produced per kg of (fertilizer) nutrients. There is no evidence that this ratio has been declining in recent years (although aggregate fertilizer consumption grew by an average of 7.9% annually, 1980/81-87/88). Using 1986 prices, the study concludes that "it appears that the average response of rice to nutrients and the fertilizer-rice price relationship are adequate to result in increases in the average rates of nutrient application for rice."

Thus it is reasonable to conclude that other constraints to increased food production, especially by small scale farmers, such as the lack of irrigation facilities or improved seeds, have not canceled out the positive effects of increased fertilizer supplies.

PART E:

ROLE AND INFLUENCE OF FDI-I ON

FERTILIZER PRICING AND SUBSIDY COSTS

Finding:

1. As planned under FDI-I, retail fertilizer prices have gradually been completely decontrolled without serious negative impacts on fertilizer marketing. In addition, the BDG has dramatically reduced fertilizer subsidies during the last six years.

Impact of Fertilizer Price Decontrol

Retail price decontrol was a condition precedent and special covenant for disbursement of funds under the FDI-I project agreement amendment signed in 1981. Final decontrol was not reached until April 1, 1983 when wholesalers and retail fertilizer dealers were free to charge whatever prices the market would bear. This transition from fully regulated retail prices under the OMS to free market prices under the NMS was a cause of considerable concern both in BADC and among outside agencies like BIDS. Many believed that monopolistic practices by fertilizer wholesalers would cause farmer prices to increase, maybe substantially, in the absence of BADC price controls.

Mohinder S. Mudahar (1984) of IFDC/Muscle Shoals analyzed the impact of price decontrol under FDI-I. Using primary data from the monthly BADC/IFDC farmer price survey and other secondary data, Mudahar divided the deregulation period into three phases:

Phase I:	Period prior to April 1, 1982 when prices were regulated at the retail level by BADC.
Phase II:	Period between April 1, 1982 and April 1, 1983 when prices were deregulated in one Division (Chittagong) only.
Phase III:	Period beginning April 1, 1983 when fertilizer prices were deregulated in all Divisions.

Mudahar concluded that with few exceptions, actual prices paid by farmers in decontrolled areas were higher than the official prices during Phase II. Prices in the regulated areas were generally below the official prices in both Phases I and II. There were considerable differences in average prices between individual districts. *These price variations showed no consistent pattern and Mudahar concluded that fertilizer supply and marketing conditions accounted for most of the variation.*

Thus, Mudahar's analysis of price movements indicated that the fertilizer price differences in regulated and deregulated market areas did not appear to be the direct result of price deregulation. Rather, fertilizer availability, supply management, and the operational efficiency of the marketing system had the major impacts on price movements, as well as differences between regulated and deregulated areas.

Quasem (IFPRI, 1985) analyzed fertilizer prices over the same period and concluded that "All in all, it appears that deregulation enabled traders to raise prices, but they remained close to official prices except at times of national supply scarcity."

Removal of Fertilizer Subsidies

Fertilizer prices have been subsidized since introduction to Bangladesh in the 1950s. Subsidies were used as a conscious policy decision, initially to popularize its use and subsequently (from the 1960s) to achieve rapid rates of growth in fertilizer consumption, a key component in the BDG seed-fertilizer-irrigation strategy for agriculture.

The subsidy policy was changed in the early 1980s and since then fertilizer prices have been progressively raised to gradually eliminate most of the subsidy. The BDG has been very successful in this effort; total subsidy costs to the BDG have declined from .Tk. 1153.32 million in 1980/81 to Tk.285.54 million in 1986/87. Subsidy as a percentage of total fertilizer costs, which is a better measure, was only about 5% last year as compared to 50% in 1978/79 (Table C.1). This is all the more remarkable because the reduction in subsidy has been achieved without any sharp impact on consumption. Fertilizer sales have increased at a rate of about 9% per year over the last decade. Fertilizer offtake in 1987/88 is very encouraging and total sales are likely to be 15% higher than last year.

This subsidy is, of course, a budgetary subsidy and reflects the difference between BADC expenditures on fertilizer procurement and distribution and the sales revenues. It must be noted, however, that BADC's procurement costs are different from actual prices of fertilizer in the international market. Domestic ex-factory prices are government administered and imports usually cost more because of the tied-nature of loans/grants used for purchase. For a true measure of farmer benefits, economic subsidies calculated on the basis of border prices are more appropriate. Because of the nature of BADC's funding sources, economic subsidies have always been lower than budgetary subsidy. Internal World Bank estimates of the economic subsidy for 1986/87 are summarized in Table E.1. It is interesting to note that if the unit subsidies for each type of fertilizer are multiplied by total quantities sold in 1986/87, a negative subsidy of Tk.78 million emerges, which is presumably a transfer to the domestic fertilizer production industry.

Table E.1: Estimated Economic Subsidy on Fertilizer, June 1987

	Urea	TSP	MP
	------US$/ton------		
International price[a]	124	126	70
Bagging Cost	0	23	23
Freight	0	22	22
Border Price	124	171	115
	------Tk./ton-----		
Border price[b]	3,844	5,301	3,365
Distribution Cost	550	550	550
Unit Economic Cost	4,394	5,851	4,115
Ex-PDP Sale Price[c]	4,800	5,000	4,000
Unit Subsidy	-406	851	115
Rate of Economic Subsidy	-9.2%	14.4%	2.8%

Source: Internal World Bank estimates

[a] Average international market prices, 1986-88
[b] Exchange rate approximately US$1 = Tk.31
[c] Including dealer margin of Tk.275/ton

Fertilizer subsidy is a much-debated issue in Bangladesh. Arguments for and against subsidies are documented in a number of studies with IFPRI (1985) being a good analysis. Historically, the case for subsidy withdrawal was argued from two considerations: (1) the budgetary burden is too heavy for the BDG and (2) the savings from the subsidy withdrawal could be used more efficiently elsewhere within the agricultural sector, such as irrigation development or output price support. In reality, reduction in the fertilizer subsidy has been followed by a sharp decline in the government's investment in the agriculture sector, both in absolute and relative terms.

Are the savings being utilized in a more productive and socially-efficient manner elsewhere in the economy? The answer is difficult to determine because the BDG has not indicated where the budget savings have gone. Clearly some of the savings are subsidizing indirectly the cost-inefficient domestic fertilizer industry (most notably domestic TSP production). It is quite possible that the foregone output and social benefits of fertilizer subsidy have not been compensated by favorable changes elsewhere in the economy.

PART F:

ORGANIZATION AND MANAGEMENT OF FERTILIZER DISTRIBUTION:

THE ROLES OF BADC, USAID, AND IFDC

Findings:

1. BADC has improved national-level fertilizer procurement and supply management. Distribution has been streamlined through the PDP system and BADC has steadily improved godown management. Regional stocking and movement problems remain as well as a serious warehouse maintenance problem.

2. Despite considerable opposition, the project and BADC have made fertilizer more available, at competitive prices, and even more progress could be made if the private sector continued to expand. In addition, modest expenditures for infrastructure improvements at a few BADC storage and transit sites represent the potential for further improvements in fertilizer distribution management.

3. Although project implementation has been slower than anticipated, USAID/Washington and USAID/Dhaka have managed FDI-I in an adequate fashion using a consensus approach to decisionmaking and management.

4. The large technical assistance component of FDI-I was implemented primarily by the International Fertilizer Development Center (IFDC) whose resident and short-term consultants have provided technically sound, problem-oriented, and timely input to BADC. IFDC/Dhaka has maintained good working relationships with the BDG, the Ministry, and BADC thus making fertilizer policy changes attainable.

FDI-I was implemented through the joint effort of the BADC, IFDC, and USAID. The principal persons involved in implementation over the life of the project are listed in Table F.1.

BADC Management of Project Implementation

BADC is a statutory corporation under the Ministry of Agriculture. Its principal function is the distribution of agricultural inputs--fertilizers, seeds, and irrigation equipment--to farmers. BADC is organized into five functional areas (wings): Field, Supply, Planning, Irrigation, and Finance. Fertilizer procurement and distribution is the responsibility of the Member Director (Supply) and the General Manager (Supply).

FDI-I has provided considerable organizational and technical assistance to BADC. The management improvements provided by the IFDC technical assistance team have been in the interest of BADC and the relevant issue for the evaluation is whether these improvements can be sustained. It is understood that lately there has been a decline in

Table F.1: Administrative Responsibility for FDI-I, 1979-1988

Year	USAID Project Officer	IFDC-Chief of Party*	BADC-General Manager(Supply)	Secretary of Agriculture	Minister of Agriculture
1979-1980	Dean Alter	John M. Hill	M.I.M.Howladar	A.Z.M.Obaidullah Khan	Capt. A. Halim
1981	Jonathan Conly	Robert Benton	M.I.M.Howladar	A.S.M.Obaidullah Khan	Capt. A. Halim
1982	Carl Lawhead	Robert Benton	M.I.M.Howladar/ Kobbad Hossain	A.M. Anisuzzaman	A.Z.M.Obaidullah Khan
1983	Carl Lawhead	Robert Benton	Kobbad Hossain	A.M. Anisuzzaman	A.Z.I. Obaidullah Khan
1984	Carl Lawhead	Robert Benton	Kobbad Hossain	A.M. Anisuzzaman	Rear Admiral M.A. Khan
1985	Tom Wilson	Kenneth Moots	Kobbad Hossain	S.A. Mahmood	Capt. A. Halim/ Maj. Gen.M. A. Munim
1986	David Schroder	Kenneth Moots	Farrukh Ahmed	S.A.Mahmood/ A.M.Anisuzzaman	Maj.Gen. M.A. Munim/ Mirza Ruhul Amin
1987	David Schroder/ Ray B. Diamond	Kenneth Moots	Farrukh Ahmed/ Kobbad Hossain	A.M.Anisuzzaman	Mirza Ruhul Amin/ M.M. Mahbubuzzaman
1988	Raymond Renfro	Kenneth Moots	Kobbad Hossain	M.A. Sayed	Maj. G. Mahmudul Hassan

* Technical Assistance was under FDI-I to February 28, 1987, FDI-II Technical Assistance began March 1, 1987.

staff morale and discipline. The quality of staff work and level of management input necessary for smooth functioning is not always forthcoming. The system already established is not strictly being followed. It is also noticeable that in recent years much of the analytical and planning work and even some routine work of the ferilizer division has been performed by the IFDC team. This is not a desirable trend. BADC should be encouraged to develop in-house management resources and not become too dependent on the IFDC consultant team.

Procurement Management System--During the life of FDI-I, BADC has been the sole BDG agency responsible for procurement and distribution of fertilizers in Bangladesh (excepting ammonium sulfate which is procured separately for the tea estates).

Procurement planning is a critical element of BADC's fertilizer operation. It involves (a) reasonably accurate demand anticipation, and (b) careful scheduling of lifting from local factories and import arrivals so that supply matches demand. It is a difficult task, more so because BADC has to coordinate the import program with a number of donors. Taking the 1980s as a whole, BADC's performance shows a mixed

record. There were two periods of acute scarcity--the winter of 1981/82 and the second half of 1984. The scarcity became so severe in November 1984 that farmers in some areas were reported to have paid as much as 60-100% higher than normal prices. There were also some periods of oversupply leading to large accumulation of stocks in BADC's godowns and BCIC factories. Supply was normal during the rest of the period.

It must be stated that BADC is aware of its responsibility and has been making efforts to improve procurement planning. The sales forecasting system has been refined. Production of local factories is closely monitored and import program updated on a monthly basis to accomodate changes in sales and local production. Closer coordination with BCIC and donor agencies has also been achieved.

Distribution Management--Before 1978 BADC handled all distribution and marketing of fertilizer product throughout the country. FDI-I sponsored the establishment of a New Marketing System (NMS) within BADC, intending to address the major problems with the OMS. The BADC distribution system was sharply attenuated over a phase-in period to consist of ultimately seventy-five PDPs. Three IFDC-USAID evaluations of the NMS (1979, 1980, and 1982) plus two extensive outside examinations (Engineering Planning Consultants--1984, BIDS--1985). All of these studies concluded that to varying degrees, the PDP system of distribution-marketing was an improvement over the OMS.

PDP management by BADC staff has steadily improved. Duties and responsibilities of PDP/Transit Point officials are clearly specified and the operating procedure codified. Much of the credit for system improvement should go to IFDC consultants who took the lead in studying problems, evolving solutions and codifying these in manuals. In particular, two documents, "Procedure Manual for Stock Control and Accounting System" and "Godown Operation and Maintenance Manual" have been of great benefit. Specifically, substantial improvements have been made in the following areas: space utilization, stacking and handling of stock, stock records and physical verification, inventory monitoring, sale records and accounting of sale proceeds, standardization of forms and flow of information from the field to head office. Cases of staff negligence and sloppy performance are not uncommon, but overall there is vast improvement when compared to the 1970s or early 1980s. One must not, however, ignore the fact that new warehouses, spacious office accomodation and staff housing has facilitated the change. BADC has made very large investments in warehousing and should insist upon and secure high standard of performance from PDP staff.

Yearwise fertilizer off-take from PDPs (also non-PDP warehouses where in operation) from 1983/84 to 1986/87 is presented in Table F.2. When compared with capacity at each location, the warehouse utilization picture that emerges is a mixed one. Product throughput in 1986/87 was more than 35 times warehouse capacity in two locations (Joydebpur, Jhenaidah) and less than one in five (Maizgaon, Amnura, Santahar, Hatiya and Mirzapur). Some warehouses are probably not optimally located sites and demand deficiency will constrain their

utilization to maximum of potential. On the other hand, additional capacity is clearly justified in some PDPs.

Some PDP distribution management problems remained. The stocking and inventory control for the PDP and transit godowns still represented a major management challenge to BADC. Wholesalers and dealers reported to IFDC that spot shortages occurred, that they were not able to lift desired quantities or types of fertilizer from nearest PDP, and that larger wholesalers felt it necessary to register at two or more PDPs in order to obtain sufficient stocks to meet customer demands. In addition, the evaluations of the NMS indicated that BADC achieved "significant" cost savings in terms of product movement and storage expense through the reduction in the number of sales outlets. Further savings are probable from reductions in the numbers of PDPs.

Brief field investigations in four regions by evaluation team members confirm the clear improvements of the NMS PDP-distribution and marketing system over the OMS. Wholesalers interviewed in most locations indicated strong support for the distribution plans underway in FDI-II which allow price discounts for larger volume liftings. IFDC unpublished wholesaler surveys indicate wholesalers are moving product substantial distances (in excess of 100 miles) from some BADC godown and distribution locations to meet local demands.

Thus it seems reasonable to conclude that FDI-I assisted BADC in making its fertilizer procurement and distribution system more responsive to the supply and demand factors affecting fertilizer marketing in the early 1980s.

Will BADC require additional warehouse capacity in future? BADC argues that substantial additional capacity will be necessary in the very near future. With a 10% growth in sales, BADC estimates the capacity requirement in 1990/91 will be 657,616 tons--an increase of over 250,000 tons.

The evaluation team feels the answer depends on a number of variables. Completion of underconstruction physical facilities such approach roads, railway siding and jetties will certainly add to present handling capacity. There is also substantial scope for increasing capacity utilization through rationalization of movement program and improved turn-round of transport. The most important factor will be the market share of TDP wholesalers. Considering above factors and the potential for increasing throughput at existing PDPs, it would appear that BADC will not require additional capacity in the near future except at two or three locations where it should consider leasing needed space.

Table F.2: PDP-Wise/Year-Wise Sales and Godown Capacity
1983/84--1986/87

Name of PDP	Capacity (In MT)	ACTUAL SALES 1983/84	1984/85	1985/86	1986/87	86/87 Sales as % of Capacity
Tejgaon(Aligonj)	1450	17659	19913	22139	16765	1156.2%
Joydebpur	500	14403	15120	9754	19907	3981.4%
Kalir Bazar(Khanpur)	2000	15552	14134	22516	16737	836.8%
Narsingdi (I& II)	2900	6823	12025	9660	18890	651.3%
Munshigonj	2400	23122	20337	6057	21459	894.1%
Manikgonj	1600	11547	15242	9816	14621	913.8%
Kapasia	400	3206	4576	-	-	
Kaligonj	400	6516	5903	-	-	
Siranjdikhan	1000	5728	5539	2248	-	
Kishoreganj (Kot.)	6000	16740	18102	19725	25763	429.3%
Sararchar	1000	5929	7234	541	-	
Kuliarchar	2400	3680	3811	6559	8432	351.3%
Bhairab	4400	16680	20966	18408	25891	588.4%
Thakurkona	970	4534	783	-	-	
Sylhet (Kot.)	1900	4115	7093	5695	7667	403.5%
Maizgaon/Chattak	1200	331	510	-	500	41.6%
Sunamgonj	3175	2722	3189	3544	3867	121.7%
Sreemongal	2050	4647	6213	5094	5306	258.8%
Habigonj	200	6048	6929	4024	370	185.0%
Saistagonj	5250	5051	6809	5320	10429	198.6%
Azmirigonj	3790	8394	9549	8211	10721	282.8%
Kulaura	1500	2620	4379	3415	4501	300.0%
Rajshahi (Kot.)	13050	16682	21908	18560	20643	158.1%
Naogaon	2400	22498	22345	14197	17611	733.7%
Atrai	4000	10249	11241	7840	9693	242.3%
Nawabgonj	400	6759	3440	3151	6440	1600.0%
Rohanpur	4000	4858	9847	973'	11057	276.4%
Natore	8400	20844	18502	22733	25250	300.5%
Amnura	6000	125	7008	4152	4505	90.1%
Dinajpur (Kot.)	7400	20742	22064	17217	16813	227.2%
Parbatipur	6400	10427	16266	5581	6696	104.6%
Charkai	7800	11110	13466	10488	13346	171.1%
Shibgonj	12500	13268	15914	15223	18539	148.3%
Panchaghar	4000	8735	9674	8861	9868	246.7%

Table F.2
(continued):

Name of PDP	Capacity (In MT)	ACTUAL SALES 1983/84	1984/85	1985/86	1986/87	86/87 Sales as % of Capacity
Rangpur (Kot.)	8500	22899	21621	25545	26791	315.2%
Gaibandah	5600	16774	15034	18457	22807	407.2%
Saidpur	5859	17139	24486	18513	25855	441.2%
Kurigram	2200	7204	8991	11237	11344	515.6%
Domar	1497	2813	3164	-	-	
M. Nagar	12000	-	-	9578	12494	104.1%
Lalmonirhat	500	5810	7405	-	-	
Bogra (Kot.)	14500	4098	40728	47477	61876	426.3%
Santahar	25000	16871	22591	26956	24776	99.1%
Joypurhat	4340	24899	21418	18627	26500	612.9%
Pabna (Sadar/Ishurdi)	5600	16943	18009	6822	10750	191.9%
Sirajgonj	6600	8888	12747	9467	17050	258.3%
Ullapara	8000	10965	10560	8588	25132	314.1%
Shahjadpur	2000	14408	10824	4012	16234	811.7%
Raygonj	1000	6119	7614	150	-	
Muladuli	5000	-	1678	7750	11591	231.8%
Chittagong(Kot.)	7700	42874	53946	20757	32957	428.0%
Sandwip	2400	2369	3752	2450	2619	108.8%
Dohazari	3500	12240	9260	10368	17855	510.1%
Chakoria	200	9191	9607	-	-	
Cox's Bazar	2400	8018	8347	7727	12504	521.0%
Feni	6500	9367	19081	15700	23696	364.5%
Chowmohani	3500	9748	11300	10164	9042	258.3%
Hatiya	3400	1085	1727	2192	2383	70.0%
Lakshmipur	2400	6108	7980	6619	9903	412.6%
Comilla (Kot.)	9000	37491	43632	42796	55293	614.3%
Laksam	1000	11992	11366	-	-	
Daudkandi	4000	20267	14132	13780	24169	604.2%
B. Baria	6000	29077	37480	30993	33326	555.4%
Chandpur	6500	13137	20986	17920	21338	328.2%
Hajigonj	400	9503	Closed	-	-	
Jamalpur (Kot.)	10500	16331	16857	20515	29238	278.4%
Sherpur	600	7269	7437	9054	3	-
Malendah	5000	8319	13463	13498	18196	363.9%
Mymensingh (Kot.)	5200	15608	23436	17378	21009	404.0%
Shambuganj	7200	12467	17624	18324	20747	288.1%
Goffargaon	2625	6635	10326	6776	7532	286.9%

Table F.2
(continued):

Name of PDP	Capacity (In MT)	ACTUAL SALES 1983/84	1984/85	1985/86	1986/87	86/87 Sales as % of Capacity
Tangail	4000	22982	21501	17359	25995	649.3%
Mirzapur	300	4680	5007	1862	178	59.0%
Tepakhola	4000	8823	8533	12575	14894	372.3%
Rajbari	500	1882	2602	-	-	
Gopalgonj	700	845	2591	-	-	
Madaripur	1750	6115	9144	9607	10305	588.8%
Takerhat	2000	-	3673	7071	6091	304.5%
Khulna (Sadar)	2500	2775	8008	2018	3544	141.7%
Bagerhat	550	4651	4096	4277	4832	878.5%
Satkhira	3500	12262	14050	12430	21071	602.0%
Barisal (Sadar)	7400	6478	11241	8565	11988	162.0%
Bhola	9900	9638	8351	13055	16563	1667.3%
Tushkhali+Kaukhali	4208	3186	4022	3731	4950	117.6%
Patuakhaliq (Kot.)	3500	2567	2716	2146	4089	116.8%
Barguna	3200	2645	3236	2672	4212	131.6%
Jessore (Kot.)	6500	22897	28445	20057	30407	467.8%
Jhenaidah	500	10870	7889	-	-	
Kaligonj	5500	12444	15847	17254	22143	402.6%
Magura	2200	5128	9460	9677	10545	479.3%
Narail	1500	8644	7339	5960	5627	375.1%
Kushtia (Sadar)	5300	25394	32339	28872	33497	632.0%
Chuadanga	7000	17987	24240	25874	27263	389.4%
Meherpur	400	7745	3550	-	-	

Source: BADC
Note: Capacity includes BADC owned plus hired godowns

BADC Warehouse Maintenance--Poor maintenance of existing facilities is a common phenomenon and BADC is no exception. The Corporation appears to have neglected regular maintenance though demands have so far been few, most godowns being new or recently-built. Problems encountered have included (a) leaking roof joints (b) roof cracks (c) floor subsidence and (d) wall cracks. The procedure involved in inspection of damage, quantification of work to be done and sanction of funds usually takes time and instances of prompt action are few. Expenditure on repair and maintenance in recent years is presented in Table F.3.

Table F.3: BADC Expenditures for Repairs and Maintenance of Godowns, 1981-1988

Year	Budget Provision	Expenditure
1980-81	2,080,000	570,431
1981-82	6,500,000	2,666,445
1982-83	10,877,000	1,767,623
1983-84	3,606,000	1,041,589
1984-85	6,604,000	63,443
1985-86	3,500,000	3,104,637
1986-87	7,880,000	5,383,329
1987-88	9,500,000	-

Source: BADC

What is necessary and important is that BADC should attach high priority to maintenance of existing facilities and evolve a system covering both financial and technical constraints. Requirement of funds will certainly be larger in future years; calculated at 1% of capital outlay, annual maintenance costs for all existing warehouses will be in excess of Tk 20 million per year. BADC can make provision for this under the head 'Repair and maintenance' of its fertilizer budget. Alternatively, and preferably, BADC should cost out total annual expenditure on warehousing (to include hire charges for rented godowns + repair/maintenance costs of own godowns + debt servicing liability on account of capital construction) and include it as 'warehousing expenses' under incidental costs. This will reflect true costs and at the same time generate funds for debt-servicing.

Table F.3 also shows that funds allocated for repair and maintenance was underspent in all years. In our judgment this reflects serious procedural and technical constraints in executing repair/maintenance work. BADC management should carefully analyze the problems involved and take remedial measures.

USAID Management of Project Implementation

USAID/Washington has provided $222 million ($190 million in grants, $32 in loans) in timely financial support of FDI-I. The Bangladesh Mission indicates that USAID/W support for the project has been sustained throughout the somewhat slow implementation period necessary for a policy reform project like FDI-I. Prompt decisions have been forthcoming from Washington when needed by the Mission on amendments and project extensions.

USAID/Dhaka has provided a full-time project officer and Foreign Service National assistant throughout FDI-I. There have been six different project officers assigned to FDI-I, a fairly high turnover rate which has not been helpful to implementation. However, these officers seem to have made competent contributions to project management. The FSN contribution seems to have been particularly beneficial to the project through monitoring of the fertilizer supply situation and during the policy reform implementation periods.

Project management appears to have been carried out in a consensus fashion within the Mission. The services of the legal advisor, the economist, the engineering office, the Food and Agriculture Office, and the Director have been utilized in a cooperative manner during implementation.

Although project implementation has been slow, especially for the NMS aspects of FDI-I, annual work and financial plans appear to have been complied with or revised to meet realistic schedules.

IFDC Technical Assistance

FDI-I has had a large component of technical assistance. The project was implemented over the period 1978-1987 and during the entire time the International Fertilizer Development Center (IFDC) was the primary technical assistance contractor. (Two other engineering consulting firms, IECO and A&W, provided assistance with the godown construction phases of the project). IFDC provided resident consultants for marketing, distribution, and dealer training. In addition, a large Host Country National staff was employed to complete special studies and other functions.

IFDC had ample time to study BADC management practices and suggest improvements. In particular, all aspects of fertilizer operation were reviewed in detail. Principal management assistance was provided for NMS evaluation, marketing system planning, organizational management, stock accounting and control, logistics, procurement planning and management, warehouse operation and management, dealer training, and management information. The major IFDC reports prepared under the technical assistance contract are included in Table F.4. Most of the IFDC recommendations on management and system improvement have been accepted and implemented, either partially or fully.

The IFDC technical assistance appears to have been technically sound, problem oriented, and timely. Both long-term and short-term consultants were utilized to respond to the BADC and USAID requests for technical assistance or special studies. The early IFDC fertilizer use survey research is technically very sound and is quoted by researchers and international agencies. However, the more recent joint USAID-IFDC farmer survey samples have been so attentuated (the 1987/88 sample was 71 farmers) that results are intended only for "indicators" and are not statistically reliable for broad generalization. IFDC survey research has also been expensive and not always completely responsive to the requested assistance.

The apparent good working relationships between the IFDC/Dhaka team and high Ministry and other BDG officials has been of particular importance to successful implementation of the policy phases of the project. While BADC as an organization has resisted policy changes, IFDC has been able to maintain a good working relationship at the highest levels with BDG and Ministry officials as well as the Chairmen of BADC.

Table F.4: Principal Reports Issued By IFDC Technical Assistance Team for FDI-I

Publication Date	Report Title
February 1979	A Preliminary Study of the Equity Impact of Fertilizer Use in Bangladesh
March 1979	First Evaluation of New Marketing System
July 1979	BADC Dealer Training Program as Proposed by IFDC
July 1979	A Review of BADC's 1979-80 Import Program
October 1979	The Cost Impact of the NMS in the Chittagong Division
March 1980	A Macro Study of Fertilizer Reuirement for the Second and Third Five-Year Plan Periods for Bangladesh
April 1980	A Macro Study of Fertilizer Requirement for the Second and Third Five-Year Plan Periods for Bangladesh
May 1980	Second Evaluation of the New Marketing System
May 1980	Equity Effects of Fertilizer Use in Bangladesh
January 1981	A Review of BADC's Marketing and Distribution Costs
February 1981	Procedure Manual for Stock Control and Accounting System
March 1981	Seminar on Bangladesh Fertilizer Supply and Use Policy
July 1981	Review of the Fertilizer Distribution and Handling System in Bangladesh
July 1981	Sinc-Sulphur Deficiency Strategy in Bangladesh
November 1981	Fertilizer Godown Operation and Maintenance Manual
April 1982	Third Evaluation of the NMS
April 1982	Agricultural Production, Fertilizer Use, and Equity Consideration--Results and Analysis of Farm Survey Data, 1979/80, Bangladesh
April 1982	Fertilizer Bulk Import Program for BADC
May 1982	A Guide to Process and Analyze the Bangladesh Fertilizer Equity Study Data

Table F.4
(continued)

Publication Date	Report Title
June, Aug.1982 May 1983	Statistical Summaries of Equity Study Data
July 1982	BADC Dealer Development Program for 1982-83
July 1982	Abbreviated BADC Supply Wing Marketing Plan, FY82/83
September 1982	Bangladesh Policy Options for Development of the Fertilizer Sector
September 1982	BADC Fertilizer Dealer Manual
October 1982	A Review of the Long-Term Fertilizer Storage and Transport Requirements
December 1982	Proposed BADC Fertilizer Division Reorganization
1982-1986	Annual Fertilizer Movement Plans and Least Cost Routing Guides
1982-1986	Monthly Farmers Survey Reports
January 1983	Fertilizer Procurement Policy
January 1983	Review of Alternatives and Recommendations for Using Phosphogypsum as an Agricultural Sulfur Source for Bangladesh
May 1983	BADC In-Kind Credit Program
May 1983	Fertilizer Association Bylaws--A Guide
June 1983	Fertilizer Dealer Credit Review and Recommendations
July 1983 August 1984 June 1985	Annual Fertilizer Year Marketing Plans
December 1983	Monitoring Fertilizer Price, Availability, and Quality in Developing Countries--The Case of Bangladesh
February 1984	Agricultural Production Salesmen
August 1984	Fertilizer Price Deregulation and Public Policy--The Case of Bangladesh
July 1985	Proceedings of National Workshop on Fertilizer N Deep Placement for Rice
September 1986	Banglasdesh Farmer Profile (draft)

APPENDICES

APPENDIX I

FDI-I FINAL EVALUATION SCOPE OF WORK

The evaluation will be divided into six parts which cut across all aspects of project activities. The following key questions will be addressed by the evaluation team:

A. Key Questions Related to Project Acitivities:

1. Has the project increased the availability of fertilizer as well as use by the small farmers? In addition, are the levels and rates of increase in fertilizer use by small farmers (less than 2.5 acres) consistent with equity of objectives and design projections?

2. As a result of the project is fertilizer being more efficiently used to increase production of basic food crops such as rice, wheat and vegetables?

3. Has the project resulted in improvements in supply, use and efficiency of the retail fertilizer distribution system? If so, can these improvements be sustained?

4. Where identifiable, what have been the direct and indirect costs and benefits of this project such as the cost of subsidies, availability of fertilizer materials in remote areas, increased employment opportunities in the private sector, etc.?

5. Under the New Marketing System, what major factors have influenced fertilizer sales? What have been the probable effects of each of these factors?

B. Specific Questions Relating to Outputs:

The inputs for this project include technical assistance, training, commodities, and construction. The central issue of this part of the evaluation concerns how well the project has performed oved the LOP and what needs to be carried out to further enhance the performance during implementation of FDI-II. With respect to achievements of project outputs, the evaluation team needs to address the following questions:

1. Assess project progress and impact since the last mid-term project evaluation in relation to project objectives and compliance with annual work and financial plans. Identify major implementation bottlenecks which have delayed execution and recommend actions necessary to project and the time frame required for implementing these actions.

2. Where the project's physical output targets (i.e. warehouse construction phase II and III and fertilizer and seed imports) achieved on time, within expected costs, and integrated in such a way as to increase the availability of fertilizer

necessary for the development of an effective private retail fertilizer distribution and supply system?

3. Was the management system for fertilizer procurement and distribution to PDP's adequate and responsive to supply and demand signals (assuming information regarding supply and demand signals is available)?

4. Does the crop/fertilizer pricing structure, distribution network, and regulatory system produce adequate incentives for private enterpreneurs to expand further the retail distribution subsystem?

5. Is there evidence to indicate that the inputs to the project have made a significant contribution to improvements in fertilizer consumption and distribution?

6. Has the system of private wholesaling and retailing of fertilizer continued to expand since 1982 (i.e. increase in the number of wholesale and retail dealers; volume of fertilizer handled by the private sector wholesalers and retailers; and the private sectors share of the total fertilizer market)?

7. Since the retail price has been decontrolled in the country, what has been the effect on the consumer price, service and availability of fertilizer to farmers? Is there evidence that the shift to private retailing has resulted in small-scale farmers, cash renters, and sharecroppers maintaining or improving their access and use of fertilizer at "equitable" costs.

8. Assess the effectiveness of BADC dealer development training supported by this project. Identify cases in which the dealer training program supported by this project has led to adoption of improved management/business practices by retail fertilizer dealers which has resulted in increased services to the farmer, increased private handling and storage of fertilizer, and increased dealer incomes.

9. What impact has the FDI-I project had on the fertilizer distribution and marketing system? What actions are necessary to address present contraints/weakness in the implementation of the FDI-II project?

C. Specific Questions Relating to Purpose Level Assessment:

The purpose of the FDI-I project is to increase fertilizer use on an equitable basis. Achievement of this purpose requires the removal of supply side have been inadequate fertilizer imports and low domestic production of urea; inefficient distribution system; availability of dealer credit and informational restraints on private fertilizer retailers; and the limited number of private fertilizer wholesalers. On the demand side inadequate incentives to the adoption of high yielding

varieties and irrigation technology (during the Boro season), inadequate input/output price ratios, fertilizer packaging and retail services, and the lack of appropriate production information have been major constraints to the increased use of fertilizer by small-scale farmers. The evaluation team is required to address the following questions:

1. Is there evidence that the increase in the national level supply of fertilizer has increased the quantity of supply, the timely availability of fertilizer to small-scale farmers and to the more remote areas of the country?

2. Is there evidence that the cost/benefit ratio of fertilizer encourages farmers to increase fertilizer use in a manner that is consistent with the targets set by the Bangladesh Government?

3. Are production costs such that the unsubsidized costs of fertilizer exceed the marginal value of production attributable to fertilizer use?

4. Is there evidence that the adoption of other agricultural inputs (i.e. HYVs, irrigation, pesticides, etc.) affected the consumption and/or use of fertilizer materials?

D. Specific Questions Related to Goal Level Assessment:

The FDI-I project goal is to increase domestic food grain production, especially by small-scale farmers. This is being brought about through the increased availability of HYV seeds, irrigation equipment, dealer credit, fertilizer materials, information on agriculture input use, improved policy environment, and favorable input/output price ratios. The evaluation team is required to address the following questions:

1. Is there evidence of a positive relationship between the project purpose (increased fertilizer availability) and expansion of food production (goal) for the various food crops?

2. Is there evidence that other constraints to increased food production, especially by small-scale farmers, such as the lack of irrigation facilities, and improved seeds and credit, have not cancelled out the positive effectives of increased fertilizer supplies?

E. Specific Questions Related to Long Term Objectives:

1. Is the BDG continuing to remove fertilizer subsidies and increase the private sector's role and market share in fertilizer distribution and marketing in a manner consistent with improving efficiency of resource allocation and market performance? How has this project influenced these policy changes?

2. Is there a reasonable probability that supply and management improvements introduced by this project will be sustained upon completion of the project?

F. Specific Questions Related to Project Management Effectiveness:

Assessment at this level will focus on project management, implementation, and support services to the fertilizer distribution and marketing system. This includes providing relevant and reliable support service to BADC's primary distribution points and private fertilizer retailers in servicing the farmers. A central issue is whether or not the support services provided through the Bangladesh Agricultural Development Corporation and Ministry of Agriculture and improving and strengthening the fertilizer distribution and marketing sector, in relation to increased agriculture productivity.

1. Did BADC, BDG, USAID/Dhaka and AID/W perform project management functions in a timely and supportive manner?

2. Assess BADC's role and performance in managing its fertilizer facilities (godowns), maintenance, and commodity procurement.

3. Did the technical assistance teams (i.e. IECO, A&W, IFDC perform as expected, with appropriate personnel and in a timely manner?

4. Is there evidence that adequate monitoring and evaluations were used to identify problems and issues? Were they used to make mid-course project corrections as need?

5. Describe and assess any innovative and effective management systems, practices or other interventions, either by A.I.D. or the BDG which were introduced in this project that might have application for development projects in Bangladesh or elsewhere.

APPENDIX II

FDI-I PROJECT PAPER AND AMENDMENT LOG FRAMES

AID 1020-28 (1-72)

ANNEX D, 1

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 78 to FY 80
Total U.S. Funding $150 Million
Date Prepared: May 26, 1978

Project Title & Number: Fertilizer Distribution Improvement Grant (388-0024)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: Increased foodgrain production, especially by small farmers.	Measures of Goal Achievement: Minimum 4 percent annual increases in foodgrain production on all land. Minimum 6 percent annual increases in foodgrain production on land holdings of 2 acres or less.	- Ministry of Agriculture production figures - Sample surveys	Assumptions for achieving goal targets: - HYV seed available for moderate expan - Plant disease and pest infection within normal bounds - Weather and flood conditions temperate throughout the year - Irrigation facilities available for more expansion
Project Purpose: Increased use of fertilizer on an equitable basis	Conditions that will indicate purpose has been achieved: End of project status. 15 percent annual increases in overall fertilizer sales Minimum 22 percent annual increases in fertilizer sales to cultivators of two acres or less	- BADC offtake data. - Sample surveys by consultant.	Assumptions for achieving purpose: - Crop/fertilizer price ratio encourages f use among non-owner cultivators - Institutional credit becomes available to significant ratio of non-owner cultivato - BDG and donors fully realize fertilizer's vital role and provide determined suppor
Outputs: 1. Adequate fertilizers stock in country 2. Increased fertilizer storage capacity 3. Fertilizer Bulk Handling and Bagging 4. New marketing system for private dealers adopted	Magnitude of Outputs: 1. Five months inventory 2. 173000 tons capacity constructed under USAID. 3. 500,000 tons annual bagging capacity installed. 4. By FY 79 for Chittagong Division and by FY 80 for entire country.	BADC, AID and dealer's records	Assumptions for achieving outputs: - Adequate other donor or BDG financing storage construction and fertilizer impor - Domestic fertilizer production at project levels. - Government counter-smuggling efforts continue to be effective.
Inputs: BDG - Budget to BADC to cover fertilizer production, salaries and other operating expenses. - Issuance of necessary implementing instructions. AID - Grant for systems improvements, storage construction and fertilizer imports. Other Donors Storage construction and fertilizer imports.	Implementation Target (Type and Quantity) BDG - Continuous arrivals of fertilizer sufficient to maintain 5 months stock. $350 million AID - Systems Improvements $2.5 million. Storage and Bulk Handling $26.5 million. Fertilizer purchase $121 million. Other Donors - $250 million	- BADC reports and instructions - AID procurement and disbursement records - BDG budget materials - Sample Surveys	Assumptions for providing inputs: - Undertaking of Government to provide re budgetary support to BADC - AID Grant funding made available - Other donor contributions materialize

AID 1020-28 (1-72)

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 1978 to FY 1982
Total U.S. Funding $235,000,000
Date Prepared: May 1981

Project Title & Number: Fertilizer Distribution Improvement Grant (388-0024)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: Increased foodgrain production, especially by small farmers.	Measures of Goal Achievement: Minimum 4 percent annual increases in foodgrain production on all land. Minimum 6 percent annual increases in foodgrain production on land holdings of 2 acres or less.	Ministry of Agriculture production figures. Bangladesh Bureau of Statistics. Sample surveys.	Assumptions for achieving goal targets: - HYV seed available for moderate expansion. - Plant disease and pest infestation within normal bounds. - Weather and flood conditions temperate. - Irrigation facilities available for moderate expansion.
Project Purpose: Increased use of fertilizer on an equitable basis	Conditions that will indicate purpose has been achieved: End of project status 15% annual increase in overall fertilizer sales 22% annual increase in fertilizer sales to cultivators of two or fewer acres.	- BADC offtake data - Sample surveys by consultant	Assumptions for achieving purpose: - Crop/fertilizer price ratio encourages fertilizer use among tenant farmers. - Credit for fertilizer purchases becomes available to a significant proportion of tenant farmers. - BDG and donors fully realize fertilizer's vital role and provide determined support.
Outputs: 1. Adequate fertilizer stocks in country 2. Increased fertilizer storage capacity 3. Fertilizer Bulk Handling and Bagging Capacity. 4. New Marketing System and Dealer Training and Credit Programs adopted. 5. BADC Management Training Program in place.	Magnitude of Outputs: 1. Five months inventory of phosphates 2. 300,000 tons capacity constructed under AID financing 3. 360,000 tons bagged annually in ports. 4. MMS implemented nationwide; 8,000 dealers trained and 8,000 purchasing fertilizer on credit. 5. 400 middle and upper level managers trained.	BADC, AID, dealers' records.	Assumptions for achieving outputs: - Adequate financing by BDG and other donors for storage construction and fertilizer imports. - Domestic fertilizer production at projected levels. - Government counter-smuggling efforts continue to be effective.
Inputs: BDG: - Budgetary allocation to cover fertilizer imports, BADC operating costs, and dealer credit program. - Issuance of necessary implementing instructions. AID: - Financing for marketing system improvements, storage construction, fertilizer imports, bulk handling facilities, and management training Other Donors - Storage Construction and fertilizer imports.	Implementation Target (Type and Quantity) BDG - $568 million AID - $203 million grant financing $32 million loan financing Other Donors - $756 million	- BADC reports and instructions - AID procurement and disbursement records. - BDG budget materials - Sample surveys	Assumptions for providing inputs: - Government budget support to BADC - AID appropriations as planned. - Other donor support continues.

APPENDIX II

APPENDIX III

EVALUATION METHODOLOGY

Final Evaluation of the Fertilizer Distribution Improvement-I Project (388-0024)

The purpose of this final evaluation of the Fertilizer Distribution Improvement Project, Phase I (FDI-I) is to assess the impact of the project on fertilizer availability and use in Bangladesh, determine if project performance to date is consistent with expectations, and identify actions necessary to sustain and carry forward the positive effects of the project in the successor project, FDI-II.

The evaluation was was conducted by two consultants from The Southeast Consortium for International Development, Dr. Craig L. Infanger (Team Leader) and Dr. Raymond W. Hooker, and Mr. A. Samad, private consultant in Dhaka. Unfortunately, during the term of the evaluation the original team leader, Dr. Hooker, was medically evacuated from Bangladesh. Dr. Infanger became Team Leader. The in-country portion of the evaluation took place from April 12-June 5, 1988.

The implementing agency, the Bangladesh Agricultural Development Corporation, designated four senior management officers to assist the Team in the evaluation: A.K.M. Shahjahan, Chief, Monitoring and Evaluation; Mofazzal Hossain, Manager, Purchasing Division; Giasuddin Ahmed, Manager, Dealer Development and Training; Atiqur Rahman, Joint Controller of Accounts, These officers assisted in field trip planning, participated in two field trips and interviews, collected requested data, and supplied the team with BADC comments and responses to evaluation scope of work questions.

In separate meetings the Team met with the Secretary of the Division of Agriculture, Mr. M. A. Syed, and with the Chairman of BADC, Mr. A.Z.M. Nasiruddin, as well as the lead BDG counterpart for FDI-I, Mr. Mannan Bhuiya, Member Director (Supply). The terms of reference and general approach were discussed and BADC input was solicited.

The 27-question terms of reference (Appendix I) supplied to the Team was discussed in length with the USAID project officer, Dr. Ray Renfro. Due to the limited available time, a priority scheme was developed which divided the questions into high, medium, and low priority. The bulk of the Team's time and effort was then devoted to the high priority (A.1, A.2, A.3, B.5, B.6, B.7, B.9, C.1, C.2. C.3, D.1) and medium priority (A.5, B.1, B.3, B.8, C.4, D.2, E.1, E.2, F.1, F.2, F.4, F.5) questions although every question was addressed in the final report.

The Team reviewed the pertinent USAID files, project documents, prior internal evaluations, published and unpublished studies produced by the project, and the mid-term evaluation. The Mission also provided primary farmer survey data collected in cooperation with IFDC for the most recent Rabi/Boro season (See Note #1). Prior to the arrival of the evaluation team, the Project Manager and Mission Evaluation Officer also requested additional detailed data tables from IFDC from farmer surveys done in 1985/86 in order to facilitate trend indications for fertilizer use (See Note #2). The Team also obtained several related studies completed by other BDG agencies, private consultants, and international agencies. These information sources covered the years 1978-1988 and are listed in Appendix IV.

The Team met with the resident technical assistance team for the project: Mr. Ken Moots (Chief of Party), Dr. Yao Chuang, and Dr. Ray Diamond, all from the International Fertilizer Development Center, Muscle Shoals, Alabama. The IFDC team supplied the Evaluation Team with data, relevant studies, and other materials from the IFDC library. In addition, IFDC cooperated fully in the evaluation and was kind enough to supply resource people and transportation for some of the field visits.

In order to assess the performance and impact of the project within the limited time available, the Team undertook the following activities:

(1) Preparation of a rapid reconnaissance survey (attached) for use during site visits and interviews of government officials and randomly selected fertilizer wholesalers and dealers;

(2) Site visits to observe different regions of Bangladesh and different aspects of the production and marketing channel for fertilizer. Ultimately, Team members were able to undertake four trips (map attached) including visits to the fertilizer production facility at Chittagong; the TDPs at Narayanganj, Shiromoni and Baghabari; PDPs at Comilla, Parbatipur, Dohazari, and Chittagong. At the special request of the Secretary of Agriculture and the Director of USAID/Dhaka, the Team also visited Khulna and Gopalganj to examine more closely the issue of fertilizer availability in remote areas. BADC and other government officials were interviewed during each trip. Interviews were conducted with over 40 randomly selected wholesalers, dealers and farmers from different locations;

(3) Interviews with all USAID/Dhaka agricultural officers having any experience with the project; the USAID/Dhaka chief engineer and assistant, all members of the TA Team including host country nationals, and senior BADC management;

(4) Analysis of farmer survey data from IFDC for 1979/80, 1980/81/82, and 1985/86; the additional data tables supplied by IFDC for the 1985/86 Boro season survey, and the primary data from survey of an attenuated sample of farmers in four districts undertaken by the Mission and IFDC/Dhaka during the most recent Boro season;

(5) Identification of key indicators for each of the high and medium priority questions in order to isolate, identify and evaluate the life-of-project impacts, progress, and constraints;

(6) Upon the basis of a preponderance of the evidence, the preparation of a written executive summary of findings, recommendations, and lessons learned and a main evaluation report and supporting appendices; and

(7) Presentation of the preliminary executive summary and draft report in an oral briefing for USAID, BADC, IFDC, and the Ministry of Agriculture (June 4);

(8) Revision of preliminary draft report subject to comments received at oral briefings and official BADC written comments (recieved June 30, copy attached). Preparation of final evaluation report.

NOTES ON SOURCES OF PRIMARY DATA

Note #1: Just prior to the arrival of the Evaluation Team, USAID implemented an attentuated farmer survey with the assistance of IFDC/Dhaka. The purpose was to obtain recent information on fertilizer use from farmers who had been surveyed in the previous IFDC surveys of 1979/80, 1980/81, 1982, and 1986/86. The sample was 71 farmers, drawn randomly by IFDC from the previous farmers in the earlier IFDC surveys of villages in four locations: Rangpur/Kurigram, Tangail/Madhupur, Cox's Bazar/Ramu, and Jessore/Jhikargacha. The distribution of sample farmers by farm size category (defined by the evaluation team) in this survey was:

	Farm Size a/			
District	Small	Medium	Large	Total
Rangpur	7	6	3	16
Tangail	4	5	9	18
Cox's Bazar	5	8	7	20
Jessore	7	6	4	17
TOTAL:	23	25	23	71

a/ Farm size classes are: Small=0-2.5 acres, Medium=2.6-5.0 acres, and Large, greater than 5.0 acres.

This survey was conducted during the 1987/88 Rabi/Boro season by enumerators trained and supervised by IFDC/Dhaka. The questionnaire (copy attached) was developed by the Mission Evaluation Officer and

the Project Manager and represents an adapted and slightly expanded version of the previous IFDC questionnaires.

The raw data were coded by the USAID Project Manager and made available to the Evaluation Team as raw primary data on diskette. The Team engaged Unidev Computer Solutions of Dhaka to create a data base and summarize selected portions of the data. When cited in the Evaluation, these survey results are referred to as "Unpublished USAID Survey Data".

Note #2: After a fertilizer sales decline in 1985/86, BADC requested that IFDC/Dhaka undertake a survey to update and expand on the previous IFDC-BARC studies (1982, 1984) on the equity effects of fertilizer use in Bangladesh. This survey collected data from eight regions, thirty-two villages, and 921 sample farmers. Results were published in the Bangladesh Farmer Profile (1986).

Results of this survey were reported in farm size categories of 0-1.5 acres, 1.51-3 acres, 3.01-5 acres, and 5.01 and above of land owned, operated or cropped. These farm size categories are slightly different from the previous categories used in earlier IFDC survey reports. Thus, a request was made to IFDC for print-outs of tables from the 1985/86 data base (1) based on the same farm size categories of 0-1 acre, 1-2.5 acres, 2.5-5 acres, and greater than 5 acres; and (2) for farmer data from the same areas included in the most recent 1987/88 USAID Boro season survey. Data tables arrived from IFDC during the term of the evaluation making some time trend comparisons possible for fertilizer use rates.

QUESTIONS FOR RAPID RECONNAISSANCE FIELD INTERVIEWS ON FDI-I EVALUATION

For BADC officials:

-How long have you been the person in charge here?

-How much Urea, TSP, and MP do you keep in inventory?

-Are you able to supply fertilizer to all the wholesalers or dealers who have come to your godown this year? Last year?

-How has your marketing changed in the last five years?

-Over the past 3-4 years, has the number of wholesalers increased? Number of dealers?

-Does BADC have adequate storage facilities? Excess capacity? Does BADC ever close godowns? If so, what happens to these godowns?

For fertilizer wholesalers:

-Where do you lift your fertilizer supplies?

-How much fertilizer do you normally lift each time you go to the PDP/TDP? How many times a year to do lift? How much time does it take you to lift at the PDP/TDP?

-Does the PDP always have as much fertilizer as you want to lift? Do they always have the kind of fertilizer you want?

-Have you ever attended a BADC dealer training meeting? What did you like/not like about that training?

-Do you prefer the TDP over the PDP?

-What are your biggest problems in fertilizer wholesaling?

-Over the past 3-4 years, has the number of wholesalers increased? Number of dealers?

For the fertilizer dealers:

-How long have you been a dealer? How many other dealers in your village?

-About how much fertilizer do you sell in Boro? All year?

-What is your price for urea? TSP? MP? Prices last year?

-Where do you buy your fertilizer supplies?

-Have you always been able to buy as much fertilizer as you need? Are you always able to get the kind of fertilizer you want?

-Would you rather buy your fertilizer from BADC or from a private wholesaler? Why?

-How do you pay for your fertilizer? Does your wholesaler provide credit? What nature?

-Do farmers ever ask you about what kind or what amount of fertilizer to use on paddy? What do you tell them?

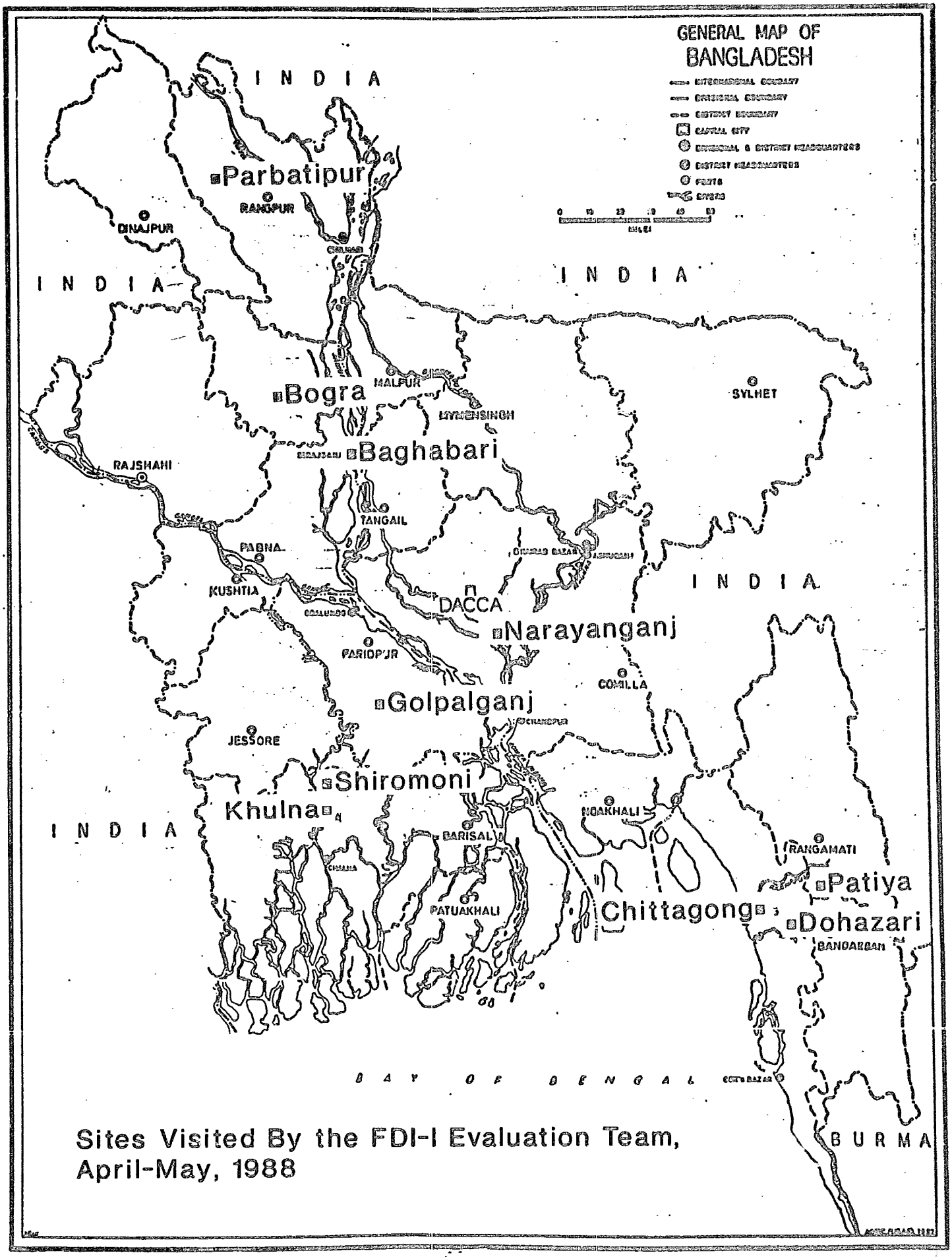
-Do you every sell fertilizer on credit to farmers? What is the nature of that credit?

-Have you ever attended any BADC dealer training? What did you like/not like about this training?

-Over the past 3-4 years has the number of wholesalers increased? Number of dealers?

-What is your opinion about the quality of services provided by wholesalers? Are they doing a better job meeting your needs <u>now</u> than 3-4 years ago?

-Are retail dealers doing a better job of meeting farmer needs than 3-4 years ago?



Sites Visited By the FDI-I Evaluation Team, April-May, 1988

COMMENTS OF BADC ON THE PRELIMINARY DRAFT REPORT OF THE FINAL EVALUATION OF BANGLADESH FERTILIZER DISTRIBUTION IMPROVEMENT PROJECT-I (USAID PROJECT NO. 388-0024)

We have gone through the findings and recommendations of the draft Preliminary Report very carefully and would like to offer our comments on the same which we think would be helpful to the evaluators in making amendments in the final report. Our comments are as follows:-

1. The timing of the evaluation was not ideal. Seven weeks' time (with Ramadan and almost 2 weeks of Eid holidays) was too short a period for an evaluation of a project of this type and magnitude. Carried out in a hurry, the evaluators is likely to fail in presenting full facts in their true perspective. It may be relevant to recall the views of a former Joint Secretary, Ministry of Agriculture on the mid-term Joint Evaluation (USG and GOB) of the New Marketing System (NMS) in 1982. He said,

> "the joint GOB and US Government evaluation was conducted only in four weeks time and mainly on secondary data generated by IFDC and from other sources. Therefore, the findings of the Evaluation Report were extremely limited and did not address many of the important issues contained in the Draft Follow-on Project FDI-II submitted by USAID."

The same is true in the case of this final evaluation also.

2. Methodology used was not appropriate to this type of project which embraces all aspects of fertilizer distribution and marketing. It is evident from the report (ref. appendix-III page 2, item-2) that the team members centered their visits to TDPs and few PDPs at Khulna, Baghabari, Parbatipur, Chittagong, Comilla & Dohazari. Except a trip to Gopalgonj, no visit was made to remote and inaccessible areas. Had the team visited such areas and interviewed the beneficiaries, specially the small farmers and retail dealers,

the findings would have been different from those reflected in the report. As admitted by the evaluators, the draft report has been prepared mainly basing on the secondary data of individual researchers, groups/agencies like IFDC and USAID whose participation in the evaluation was earlier opposed by AID authority on the ground of making the report an impartial one (Ref. USAID letter dated July 19, 1987). It would have been more reliable and pragmatic, if the required stress and emphasis were given on the primary data to be collected through interviews.

3. Most of the findings have been made directed towards TDP system introduced under the FDI-II which came into force with effect from July, 87. It was entirely outside the scope of FDI-I (Ref. para 6 and 12 of the principal findings and para 6 of the recommendation of the Executive Summary). Reference to the TDP system should not have been there.

4. We fully endorse the views of the evaluators when they appreciate the completion of the warehouses. However, numbers need be corrected. Godown capacity for Phase-II should be 1,62,000 MT in place of 1,65,000 MT. Nowhere the evaluators have specifically mentioned the unit cost of the godowns which was built on the recommendations of the consultants under National Fertilizer Storage Plan. The godowns have been built taking assistance from the Netherlands, borrowing from the IDA, ADB, etc.

5. The evaluators observed "little of the current storage capacity is suitable for long term storage of bagged fertilizers." The evaluators could have mentioned that these costly godowns were constructed under the guidance and supervision of consultants.

6. Some of the storages have not yet been put into operation fully. We cannot agree with the evaluators' suggestion for disposal of certain godowns constructed with the FDI fund. Statistical evidence provided under appendix table-IV of the draft report clearly indicates that the storage space in at least 12 PDPs need be increased to meet increased sales in the coming years. Godowns currently under utilized will shortly be utilized to the full capacity.

7. Findings would have been more acceptable to the readers, if the list of the persons interviewed and the questionnaire used could have been appended to the report.

8. We appreciate that the evaluators have described project purpose stating the project objectives, goals and policy reforms. It would have been more appropriate and purposeful, if the details of the planned financial outlay and actual expenditure could have been compared.

9. Key personnel in-charge of the execution of project have not been consulted or discussed. If the concerned personnel of the Corporation and other agencies involved in the project and the leaders of public opinion could have given the opportunity to express their opinion and had those been reflected in the report, that would have made the report a true reflection of facts.

10. The selection of expatriate and Bangladeshi consultants was made without the customary reference to the BADC. That was done without any reference to the earlier agreement between the USAID and BADC. (Ref. letter of Director, Food and Agriculture office of USAID dated July 19, 1987 addressed to Chairman, BADC and the discussion of the meeting with the Chairman dated April 26, 1988).

11. Availability of fertilizers has increased no doubt. But the goal has not been achieved. Surveys and market surveillance show that farmers in remote and inaccessible areas pay Tk. 8 and 11 more per maund for Urea and TSP respectively (Ref. page 21, last para).

12. Per acre use of fertilizers is still very low. There is extreme variation in different regions of the country. This variation is again because variation of crop variety. Farmers use fertilizers in almost in 100% of the HYV Boro and large percentage for HYV Aman and certain varieties of cash crop like tobacco. But they hardly use fertilizers in local Boro, Aus, rainfed Aman and Pulses. It may be noted here that, if fertilizer consumption throughout the country could be raised to the level of Bogra (1983-84) district, total consumption would increase to 2.83 m.t.

13. The evaluators have correctly assessed that the availability of fertilizers and the price paid by the farmers in the remote areas is a matter of concern to the BADC. It is so because the BADC has a mandatory responsibility in that respect.

14. Small farmers use more fertilizer than the rich/big farmers despite fertilizer price increase. This may be statistically correct. We do not understand how the FDI-I can be given credit for this. Under a subsistance economy like us, farmers being haunted by the dearth of foodgrains and have got no other alternative but to produce extra bushel of foodgrain through increased use of fertilizers. They have been doing so prior to introduction of FDI-I and they would be doing so even after the FDI-II. This has been amply proved by Dr.Mahboob in his research findings where he stated that the use of fertilizers by small farmers has been due to (i) necessity, (ii) diffusion, on the use of wheat and paddy crops, (iii) intensive use of land for vegetable, (iv) rapid increase in the proportion of area under highly fertilizer intensive crops such as

HYV paddy, wheat and mustard and finally (v) expansion of irrigation facilities. The evaluators could have cited these reasons while stating the status of use by small farmers.

15. The achievement of 2.63% annual growth of foodgrain production as shown in Table A.6 of the report has been worked out based on the estimates from USAID/Dhaka. This achievement cannot be attributed to FDI alone. Fertilizer consumption is greatly influenced by the variables like seed, irrigation water, acreage under HYV, improved cultural practices and weather.

16. It has been stated in the report that agricultural production levels have been achieved as per planned targets but the reasons for the slow growth have not been mentioned nor they have identified. The Agriculture Sector Review Team, under the leadership of Prof. Just Faaland, has been entrusted to identify the reasons for slow growth. In the opinion of the Team the withdrawal of fertilizer subsidy, to a great extent, has contributed to the sluggish growth of the agriculture sector. The researchers, economists, politicians, social scientists and journalists - majority of them holds the views that the wholesale privatisation of fertilizer, irrigation equipment and pesticides has resulted in the slow growth of the agriculture sector.

17. Only statistical numbers of imports without reference to prices are meaningless. In 1983-84 a quantity of 26,195 MT fertilizers was imported under FDI-I at a price of US $ 241.96 per MT under US Flag vessel when the prevalent international market price was only around US $ 185 per MT. This shows how costly the inputs had been under the FDI-I.

18. "A <u>free market system</u> of fertilizer wholesaling and retailing has slowly been established nationwide" (Ref.page 23) is not true. The report itself has admitted that no godown space has been constructed by the private sector nor they are capable of handling larger quantity of fertilizers without massive credit support from the public sector.

19. "<u>The New Marketing System represents an improvement over the OMS</u>." Consensus are not there on this point. Findings of Mr. A. Quashem, in this regard are relevant and reproduced below:

(i) BADC's reduction of sale centres with the introduction of NMS has adversely affected fertilizer sales in Bangladesh.

(ii) A new class of entrepreneurs has emerged at the cost of petty rural dealers depriving the rural sector of the benefit of fertilizer business, and

(iii) Market price is not in general lower than the official price and even after the introduction of NMS fertilizer price at growers level rise in the peak season and at times scarcity of supply.

20. Views of inspection team of the Ministry of Finance is relevant in this context. The report says that the efficacy of the NMS is yet to be tested particularly in a short supply situation as it has left no scope for price control at dealer's level who may resort to hoarding taking advantage of the short supply position in the market. The NMS has also not worked well in wider developed and remote areas where transportation and communication facilities are inadequate. In such areas, BADC will have to retain their Thana Sale Centres to ensure supply of fertilizer to the farmers at controlled price.

21. The cost comparison under the NMS and OMS to BADC for 1980-81 as evaluated by IFDC is given below:

	NMS (long tons)	Cost per long tons (Tk.)	OMS (long tons)	Cost per long ton (Tk.)
Sale projects 1980-81	1,150,000		1,150,000	
	Total cost (Tk.)		Total cost (Tk.)	
Commissions paid	2,43,650,000	211	1,62,150,000	141
District transport and handling costs	10,350,000	9	62,100,000	54
Storage costs	16,100,000	14	18,400,000	16
Inventory losses	33,350,000	29	39,100,000	34
District total staff costs	8,050,000	7	09,200,000	8
Misc. costs	1,150,000	1	1,725,000	1.5
Inventory interest costs	1,06,950,000	93	1,25,350,000	109
	4,18,600,000	364	4,18,025,000	363.5

From the above, it may be seen that from the consideration of cost also, there is little improvement in the NMS.

22. "Farmers prefer NMS over OMS" is an overenthusiastic statement. Farmers buy from the retailers. The retailing system has been in operation since BADC took over fertilizer programme in 1961. The NMS has not changed this character of retailing excepting the induction of the wholesalers with higher commission and limiting the lifting quota.

23. Nowhere in the report, the <u>disadvantage</u> of the NMS has been referred to. Closure of many (Thana) Upazila Sale Centres has resulted in making many experienced BADC staff surplus. Large number of retailers has gone out of business. Upazila Central Co-operative Associations who used to retail fertilizer have to face unhealthy and unfair competition with the private sector traders who have made no investment in logistics and price decontrol mechanism has opened the door for exploitation of the farmers and users through formation of local cartel.

24. It has not been considered at any level whether the increasing load of more than 400 sale centres can be handled by 75 PDPs and 10 TDPs. If that was possible, the Food Department in Bangladesh would have operated from Silos or Central Storage Depots (CSD) only. It need be remembered that food is an essential item requiring no sales promotion activities. Still the Food Department operates through :

(a) 5 nos. of Silos of total 227,300 M.T. capacity.

(b) 12 nos. CSDs of total 467,330 M.T. capacity.

(c) 622 nos. LSDs of total 1,247,070 M.T. capacity, located all over the country.

} Located at strategic points.

Fertilizer requires continuous promotion (items changes, doses vary from one area to other).

25. Reference has been made to 1984 but with erroneous conclusions. There has been no acute shortage at the macro level. Micro level crisis was created by the traders which have been evident from the facts that fertilizer sale in that year exceeded the target quantity.

26. The FDI-I project has made little provision for meeting such periodic crises which occurs due to (a) unschedule closure of local factories , (b) non-availability of adequate number of transport vehicles, specially railway wagons etc.

27. It cannot be agreed with evaluators that <u>there is no evidence from that serious constraints on complementory inputs</u> have cancelled the positive effects of increased fertilizer use in Bangladesh. There is a definite positive co-relation between all agreed agri. inputs. Any changes (negative or positive) in the availability of complimentory inputs effects foodgrains production as well as fertilizer consumption.

28. The evaluator's observed that the <u>retail price had gradually been de-controlled</u> and fertilizer <u>subsidy had been substantially removed</u> and that in neither case, had there been a serious negative impact of expansion of fertilizer use. This statement is <u>not factually correct</u>. The promotion of technical package combining subsidy, fertilizer improvement, seeds, and sometime concessional credit was the centre price of Green Revolution in Asia. Inputs subsidy were the integral part of agri. price policy in many countries as shown by 37 developing countries subsidising the cost of inputs was as follows:

1.	Fertilizer	--	26
2.	Irrigation	--	15
3.	Credit	--	25
4.	Posticides	--	9

and 19 other countries subsidised other inputs.

The negative impact of fertilizer price increased due to reduction of subsidy can only compensate the expansion of irrigation facilities and HYV acreage.

29. "Private marketing costs as a percent of total fertilizer costs are low" is to be viewed from a different angle on the ground that operational pattern and objectivity of fertilizer distribution by BADC and private sector are absolutely different. Two unequals cannot be compared.

30. Elimination of subsidy keeping other things constant affects paddy fertilizer price ratio and in turn adversely affect fertilizer consumption is a fact. Some of the findings of the evaluators have not, however, been based on this assumption.

The evaluators' remark that"while BADC asserts that its social responsibility is to supply fertilizer to farmers is paramount, further expansion of free market distribution of fertilizer may continue to be resisted in the absence of clear policy directives from the highest level" is unwarranted and uncalled for.

31. The FDI-I document was prepared as a precursor to the development of a more comprehensive follow-on-project of FDI-II. The former project has been based on a number of hypothesis, assumptions and speculations that immediate and total privatisation and elimination of subsidy is the only panacea for the agricultural growth and removing all difficulties on that way was aimed at.

32. It can be concluded from the details of the report and their observation in the relevant pages that something is wrong with the system. Fertilizer sale as well as food production have not been rising as expected. This is to be found out through an impartial enquiry.

33. The evaluation would have been complete if the evaluators could identify the factors for success or failure of the project from the commercial considerations, social desirability and political acceptability points of view.

34. The point on commercial viability would have been clear if the evalkators could analyse the reasons that led to extension of the execution period to 10 years in place of 3 years as originally stipulated.

35. From social desirability point of view, the evaluators could have formulated views through interviewing different groups of people. To provide information on political acceptability, it was essential that the leaders of public opinion should have been discussed.

36. The purpose of the project was to help Bangladeshi farmers with easy access to fertilizers at reasonable prices. The report has admitted that access of the farmers in remote areas has not improved and the farmers there paid more. Besides that, the small farmers paying higher prices. So equity purposes were defeated.

Concluded

20/6/88

(A. K. M. SHAHJAHAN)
CHIEF
Monitoring & Evaluation Division
BADC, Dhaka.

APPENDIX IV

INFORMATION RESOURCES

BANGLADESH AGRICULTURAL DEVELOPMENT CORPORATION

Annual Report, Dealer Development & Training Program, 1985-86, Dhaka, May 1987.

Fertilizer Newsletter (Monthly), MSS. Division, Dhaka (various issues).

INTERNATIONAL FERTILIZER DEVELOPMENT CENTER

First Evaluation of the New Marketing System in the Chittagong Division, IFDC, February 28, 1979.

Second Evaluation of the Bangladesh New Marketing System, IFDC, July 1980.

Third Evaluation of the Bangladesh New Marketing System, IFDC, March 1982.

Assessment of Fertilizer Marketing From Bagharbari TDP, February and March, 1988, FDI-II Contract No. 388-0060-HCC-8701-01, IFDC, May 1988.

BADC/IFDC Fertilizer Distribution and Marketing Consultancy Services Contract, January 5, 1979-February 28, 1987 End of Project Report, IFDC/Dhaka, April 1987.

Bangladesh Policy Options for the Development of the Fertilizer Sector, IFDC/Muscle Shoals, May 1983.

Diamond, Ray, "Assessment of Fertilizer Marketing from Baghabari TDP, February and March, 1988", IFDC/Dhaka, (no date)

Fertilizer Marketing in Bangladesh--The Past, Present and Future, IFDC, June 1987.

Management Information System for the Bangladesh Fertilizer Sector, Final Report, IFDC and Management Systems International, March 1988.

Moots, Kenneth L., Bangladesh Farmer Profile, IFDC/Dhaka, September, 1986.

Mudahar, Mohinder S., Fertilizer Price Deregulation and Public Policy: The Case of Bangladesh, IFDC, August 1984.

Mudahar, Mohinder S. and Edwin C.Kapusta, Fertilizer Marketing Systems and Policies in the Developing World, IFDC Technical Bulletin #33, April 1987.

Sidhu, Surjit S., Carlos A. Baanante, and Ekramul Ahsan, Agricultural Production, Fertilizer Use, and Equity Considerations--Results and Analysis of Farm Survey Data, 1979/80, Bangladesh, IFDC/Muscle Shoals, April 1982.

Sidhu, Surjit S. Carlos A. Baanante, and Ekramul Ahsan, Agricultural Production, fertilizer Use, and Equity Considerations--Results and Analysis of Farm Survey Data, 1980/82, Bangladesh, IFDC/Muscle Shoals, February 1984.

Study on Further Reduction of Primary Distribution Points and Opening of Transportation Discount Point Program, IFDC, April 1987.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

IFPRI/ Bangladesh Institute of Development Studies Fertilizer Pricing Policy Study Team, Fertilizer Pricing Policy and Foodgrain Production Strategy in Bangladesh, Volume 1 (Summary Report) and Volume 2 (Technical Report), IFPRI, Washington, D.C., March 11, 1985.

USAID DOCUMENTS

Project Paper, Bangladesh--Fertilizer Distribution Improvement I, (with Annexes) Washington, D.C. June 23, 1978

Project Paper Amendment, Fertilizer Distribution Improvement I (388-0024), Washington, D.C., August 1981.

Project Paper, Bangladesh Fertilizer Distribution Improvement II, Project No. 388-0060, Washington, D.C., August 1984.

Evaluation [of] Fertilizer Distribution Improvement-I, Grant Project 388-0024, USAID, Dacca, March 8, 1979.

Joint Bangladesh and U.S. Government Evaluation of the Fertilizer Distribution Improvement Project (388-0024), Bangladesh Ministry of Agriculture--Agriculture and Forest Division and U.S. Agency for International Development, Dhaka, November, 1982.

Final Report, Engineering Consultancy Services Contract for Bagged Product Fertilizer Warehouses Project, International Engineering Company, July, 1984.

Final Completion Report, Engineer Consultant Services for Construction of Bagged Product Fertilizer Warehouses in Bangladesh--Phase III, Ammann & Whitney Consulting Engineers, June, 1986.

UNITED NATIONS DEVELOPMENT PROGRAMME

Crops: Performance and Policies--A Preliminary Report, UNDP Bangladesh Agricultural Sector Review, Dhaka, March 1988.

WORLD BANK

Bangladesh Adjustment in the Eighties and Short-term Prospects, Vol. 1: Executive Summary and Main Report, Report N. 7105-BD, Washington, D.C., March 1988.

Bangladesh--Promoting Higher Growth and Human Development, A World Bank Country Study, Washington, D.C., October 1987.

OTHER RELATED STUDIES

Bangladesh Agricultural Research Council, "Fertilizer Equity Study Project--Statistical Summary of Farm Survey Data for the 1981 Aman Season", Agricultural Economics and Social Science Programmes, BARC Complex, January 1983.

Barker, Randolph, Robert W. Herdt with Beth Rose, The Rice Economy of Asia, Resources for the Future, Washington, D.C., 1985.

Center for Development Science, "Fertilizer Price Decontrol Study," Bangladesh Unnayan Parishad, Dhaka, May 1984.

Engineering and Planning Consultants, Evaluation of the Impacts of New Marketing System for Distribution of Fertilizer: Final Report, Dhaka, June 1984.

Hossain, Mahabub, Green Revolution in Bangladesh: Its Nature and Impact on Income Distribution, Working Paper #4, Bangladesh Institute of Development Studies, October 1987.

Samad, A., "An Evaluation of the Dealer Development and Training Program", Dhaka, March 1985.

Quasem, Md. Abul, Impact of the New System of Distribution of Fertilizer and Irrigation Machines in Bangladesh--Survey Findings, Bangladesh Institute of Develoment Studies, August 1987.

Quasem, M.A. and M. Hossein, "Fertilizer Use in Two Selected Areas of Bangladesh", Bangladesh Development Studies, No. 4, 1979.

Quibria, M.G., The Role of Fertilizer Subsidies in Agricultural Production: A Review of Selected Issues, Asian Development Bank Economic Paper No. 38, October 1987.

APPENDIX V

Appendix Table V.1
Chronological Table of Important Activities Under the DD&T Program

	1977	BADC establishes a committee to develop a dealer training program and holds preliminary discussions with USAID/FAO. The idea accepted as sound by USAID and agreement reached on funding on a matching basis during negotiations for Ag Inputs III.
June/ July	1979	Visit of IFDC Training Coordinator. Two-day Training seminar for trainers at BADC Hq.
28-30 Dec.	1981	Combined Fertilizer dealer Training Seminar at STI Madhupur.
Jan-April	1982	BADC Board of Directors approve program in principle and a separate Dealer Development and Training Unit set up in MSS Division
23-25 Feb	1982	Second Combined Fertilizer Dealer Training Seminar at BARI, Joydevpur
Mar/Apr.	1982	Visit to India by concerned officials to see program there.
1-10 Sep	1982	First 'Train the Trainer' workshop at BARI
1982-83		Dealer Training in districts (regions)
16-24 Mar	1983	Training Planning Workshop for trainers and fertilizer marketing personnel organized by BADC/FADINAP/IFDC
19-27 Oct	1983	Second 'Train the Trainer' Workshop at BARI
1983/84		Dealer Training in regions
1984/85		Dealer Training in regions
5-26 Apr	1985	Third 'Train the Trainer' Workshop at BADC Hq.
1985/86		Dealer Training in regions
19-30 Nov	1986	In-country Fertilizer Marketing Management Training at Planning and Development Academy
1986/87		Dealer Training in regions
1987/88		Dealer Training in regions

Source: BADC documents

Appendix Table V.2

List of Publications and Films of DD&T Unit

Title	Type of Publication	Number
Dealers' Manual	Manual	80,000
District Soil Maps	Soil map	48,000
Flip Chart	Teaching aid	15,000
Brochure on zinc deficiency	Information brochure	796,000
Brochure on sulphur deficiency	Information brochure	796,000
Brochure on Wheat	Information brochure	800,000
Brochure on Balanced Fertilizer for Rice	Information brochure	547,000
Brochure on Soil Fertility and Fertilizer use	Information brochure	100,000
Brochure on Fertilizer Use for Better Crops	Information brochure	460,000
Film 'Making The Most Of a Miracle'	Educational film	3
Film 'Dhan Sabuj Swapna'	Educational/ publicity film	16 mm :25 35 mm : 5
Film 'Bhalo Fashal Ashal Katha'	Educational/ publicity film	16 mm :25 35 mm : 5
Posters on (a) Organic manure (b) Nitrogen fertilizer (c) Phosphates (d) Zinc/Sulphur	Sales promotion /display	330,000

Source: DD&T Unit, BADC

Appendix Table V.3

List of training and other equipment of DD&T Unit

Type of equipment	Number	Location
16 mm movie projector	2	DD&T Office 1 IFDC Office 1
Slide projector	14	DD&T Office 1 IFDC Office 1 Regional Managers 12
Overhead projector	5	IFDC office 1 Divisional Managers 4
Tape recorder* with megaphone	1	DD&T office
Camera*	1	DD&T office
Motor cycles	20	For DTOs

Source: DD&T office, BADC

* Purchased with BADC funds