Agribusiness Development Centre (ADC)
Uganda's Investment in Developing Export Agriculture (IDEA) Project

Final Report on Impact Assessment of the

ADC/IDEA PROJECT INTERVENTIONS IN THE MAIZE AND BEAN INDUSTRY IN UGANDA

VOLUME I : MAIN REPORT

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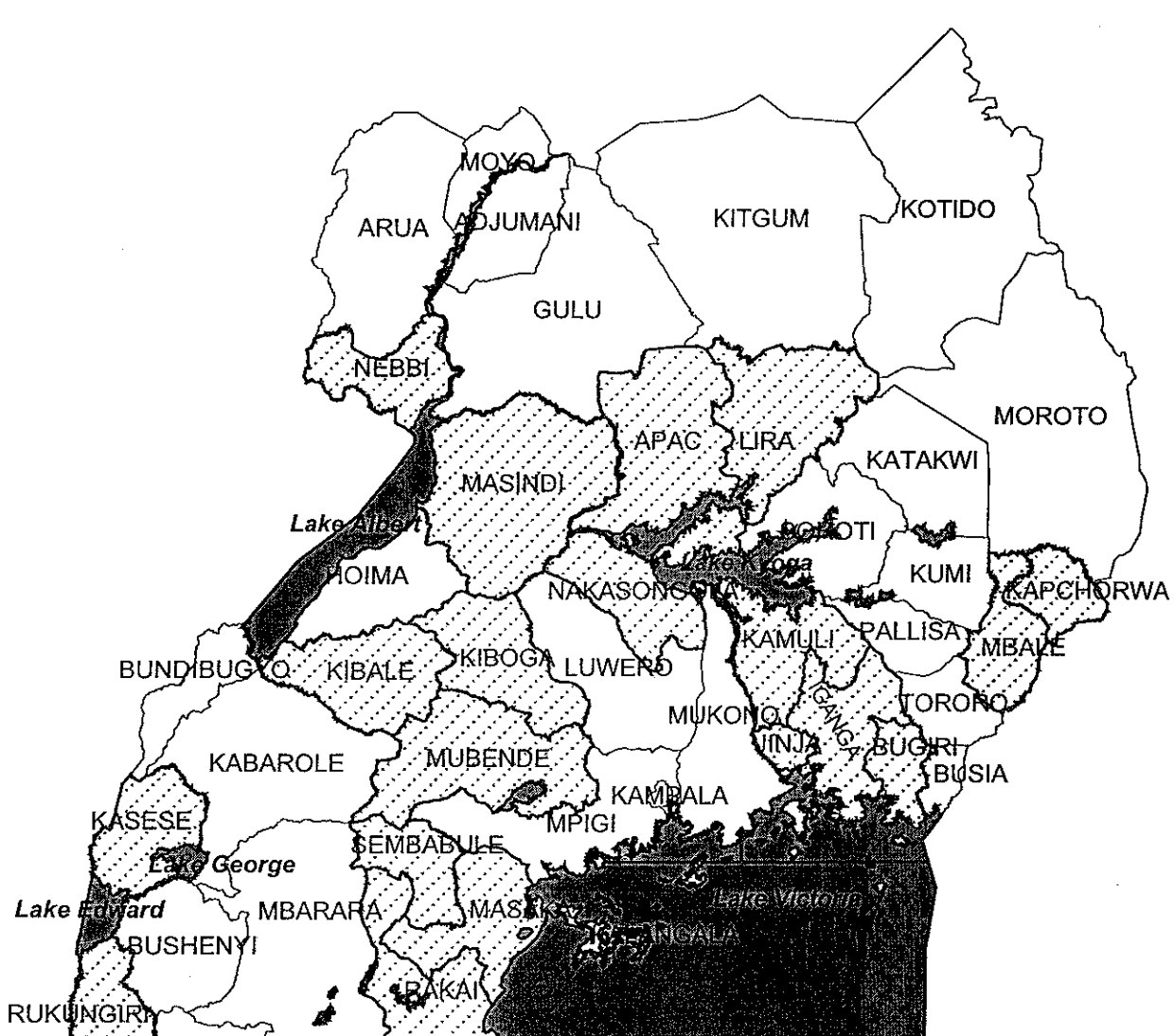
February 2000

ADC/IDEA Bean and Maize Project Area



Note: The extent of project intervention varies by district. However, demonstration plots are located in all districts.

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LIST OF ACRONYMS

ADC	Agribusiness Development Center
ATAIN	Agribusiness Training and Input Network
AT (U)	Appropriate Technology, Uganda
BUFA	Bugangaizi Farmers Association
CBMS	Community Based Marketing System
CEI	Commodity Exports International Limited
CERUDEB	Centenary Rural Development Bank
EU	European Union
FEWS	Famine Early Warning System
HV	High Value
IDEA	Investment in Developing Export Agriculture
IFCD	Irish Foundation for Cooperative Development
IITA	International Institute for Tropical Agriculture
KADIFA	Kasese District Farmers Association
kg	Kilograms
LIWODA	Luuka Iganga Women Development Association
LV	Low Value
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MASGGA	Masindi Seed and Grain Growers Association
M&E	Monitoring and Evaluation
MFA	Mbale Farmers Association
MKIS	Market Information Services
mt	Metric tones
MTEA	Multi-purpose Training and Employment Association

MTTI	Ministry of Tourism, Trade and Industry
MNS	Market News Service
NAARI	Namulonge Agricultural and Animal Research Institute
NARO	National Agricultural Research Organization
NASECO	Nalweyo Seed Company
NEMA	National Environment Management Authority
NGO	Non Governmental Organisation
NTAE	Non-Traditional Agricultural Export
PHHS	Post Harvest Handling and Storage
PCVs	Peace Corps Volunteers
RDFA	Rakai District Farmers Association
RFS	Rakai Farm Supplies
SAS	Sukura Agro Supplies
Shs	Shillings
SO 1	Strategic Objective Number One
TA	Technical Assistance
TOR	Terms of Reference
UCA	Uganda Cooperative Alliance
UCFA	Uganda Commercial Farmers Association
UEPB	Uganda Export Promotion Board
UNFA	Uganda National Farmers Association
UPE	Universal Primary Education
USAID	United States Agency for International Development
USP	Uganda Seed Project
WFP	World Food Program

EXECUTIVE SUMMARY

1.0 INTRODUCTION

This report presents findings and analysis of the commodity study on maize and beans commissioned by the ADC towards the end of 1999. Based on the study terms of reference, the main aim of IDEA Project is to increase production and marketing of maize and beans. In order to achieve this, the ADC has over the last four and half years assisted and worked with a cross section of key participants. These include producers (both small and large), associations, input dealers, marketing companies, NARO (Maize and Bean Programs), Non Governmental Organisations (NGOs) and other projects such as PL-480, USP, AT (U), etc. Considerable amounts of resources have been put in by the project by ways of technical assistance, research, financial intermediation and market linkages.

In order to measure the impacts of the IDEA project on its clients and the maize and bean industry at large, the ADC commissioned a commodity study for maize and beans. The study focused on the socio-economic impact at the farm level, successes, lessons learned and the way forward. It was carried out in six districts, namely; Kasese, Rakai, Masindi, Iganga, Mbale and Kapchorwa and assessed the following aspects:

- the total number of clients/beneficiaries reached and levels of technology adoptions,
- benefits in terms of net annual returns,
- measures of incomes attributed to technology adoption,
- the general economic and social betterment of the clients/beneficiaries,
- levels of production, productivity and economics of producing the selected NTAEs,
- income levels and expenditure patterns of men and women,
- quantity and value of maize and beans produced and exported, and
- extent of ADC contribution and effects on the environment caused by the promotion of maize and beans.

Other aspects covered were: women participation, income utilisation (including extent to which income generated is re-invested), differences between male and female beneficiaries, forward and backward linkages in the NTAE sector, multiplier effects and sustainability.

The primary data source were the maize and bean producers in the six districts mentioned above. Over 370 producers were interviewed in the 6 districts. Apart from individual farmers, data were obtained from seven other types of respondents, namely; the ADC LV team, collaborating projects, food aid agencies, grain buyers, input dealers, ADC District Coordinators and NGOs/associations/groups.

2.0 EXTENT OF IDEA PROJECT INVOLVEMENT IN MAIZE AND BEANS

2.1 The ADC/IDEA Project Operating Environment for Maize and Beans

The Low Value (LV) component of the IDEA Project is responsible for increasing the production and marketing of maize and beans. It has four basic outputs, namely:

- the development and demonstration of high and low input technology packages;
- assisting exporters to initiate or expand maize and bean activities;
- establishing and improving market information systems; and
- ensuring that the private and public entities multiply and distribute maize and bean seeds.

In view of this mandate, the LV component has supported the maize and bean industry in a number of ways as summarised in section 2.2 below.

2.2 Commodity Interventions Undertaken

The key areas of interventions have centred on technology transfer, research, input distribution, commercial farming, seed multiplication and marketing. These are highlighted below:

- **Technology Transfer:** As a first step towards increasing rural incomes, the LV component identified technology transfer as the key pillar. Accordingly, the LV component has to-date established over 5,000 demonstration sites in 20 districts. The basic objectives of the demonstration activity were to demonstrate at farm level, suitable technology packages that are affordable and profitable and encourage farmers to adopt the technology packages on their own fields.

- **Support to Maize and Bean Research Programs at NARO:** ADC/IDEA Project has supported aspects of the maize and bean research program at Namulonge Agricultural and Animal Research Institute (NAARI). Specific interventions have focused on the following: supporting screening, on-farm testing, multiplication and distribution of improved maize and bean varieties.

- **Support Towards the Development of ATAIN Program:** Agribusiness Training and Input Network (ATAIN) was developed by ADC in response to the growing demand by smallholder farmers for agricultural inputs, and the need to make such inputs accessible and affordable at the village level. The main inputs are seeds (maize, beans, vegetables), fertilizers (DAP, CAN, UREA) and crop chemicals (Ambush, Furadan, Dimethoate, Dithane M-45, Round-up, etc).

- **Provision of Support for the Marketing of Maize and Beans:** Under the marketing arrangements, ADC/IDEA has collaborated mainly with private companies. The ADC has played a key role in linking these private firms to product sources, especially by commercial farmers and outgrowers. The ADC/IDEA has continued to provide market information on international prices and service a large group of clientele with regular industry-related information.

- **Provision of Assistance to Outgrower Program and Clients:** The ADC has continued to provide support to outgrower clients. At present, 2 active outgrower groups, namely BUFA in Kibaale and IFCD in Rakai are receiving ADC support.

- **Support to Commercial Farming Activity:** Commercial farming has received increasing attention from the ADC. The LV component has been systematically working to develop catalyst farmers in at least 10 districts. Work with the banking sector continues in order to avail credit to these emerging farmers. At present ADC is working with 2 banks: Standard Chartered and Centenary Rural Development Bank (CERUDEB).

- **Support to Seed Multiplication Activities:** The ADC has supported the Uganda Seed Project (USP), private firms and outgrower groups with the intent to develop a high quality seed bank. Most of the assistance at the outgrower level has involved the provision of initial seed for multiplication. At the firm level, assistance provided by the ADC has centred on identifying seed source and coordination of seed procurement and distribution.

3.0 KEY FINDINGS

3.1 Macro Level

The past three years have been characterised by significant rainfall abnormalities, with *El Nino* (prologed rains) being witnessed in the second half of 1997 and first half of 1998. This was followed by the *La Nina* (prolonged dry spell) phenomenon, which was witnessed in most of the major maize and bean producing districts. In both instances, yields were affected and outputs greatly reduced.

Although no accurate data exist, discussions with a cross section of people (including food aid agencies, exporters, produce buyers, ADC District Coordinators, administrators, farmers and the technical staff) showed that the national outputs of maize and beans of the past three years have been less than 500,000 mt and 300,000 mt respectively. Similarly, Uganda's export volumes and values of maize and beans have generally shown a downward trend as can be seen from Table (i).

Table (i): Uganda's Export Volume and Value for Maize and Beans (1995-99)

Year	Maize		Beans	
	Vol (mt)	Val (US$ mill)	Vol (mt)	Val (US$ mill)
1995	85,000	23.05	38,000	16.15
1996	82,000	17.82	40,000	16.10
1997	55,000	15.09	23,000	11.89
1998	58,500	15.92	26,000	12.70
1999 (estimate)	70,000	16.20	29,000	12.93

Source: Background to the Budget Publications, UEPB and Consultants' estimates.

3.2 Assessment of ADC Interventions:

Study findings and analyses reveal the following successes arising out of ADC interventions:

- **Research Activities:** With support from the ADC, research has continued to emphasize the screening and release of new varieties of both maize and beans suited to local production as well as regional export markets. The newly released varieties (1999) include Uganda maize hybrids (UH1 and UH2), Zimbabwe hybrids (Sc625 and Sc627); bush beans (POA, SUG 73, UBR (92)) and climbing beans (Vinikingi, Ngwinurare, Umubano). These varieties yield at least two times the local varieties.

- **Technology Transfer:** Field demonstrations continue to be utilized as a means of promoting new technologies, especially with the addition of new varieties. In terms of reach, 2,558 standard demonstration sites were established in 1999 A season. These demonstrations exposed some 80,000 farmers directly to new income-enhancing technologies. While the number of standard demonstrations was reduced from around 2,600 to 2,300 during 1999 B season, nearly 2,000 adopting farmers' fields were used as technology transfer centres. This brought the total number of demonstration centres to 5,300. Total exposure in all the 20 districts was estimated in the region of 175,000-190,000 farmers by end of 1999 B season, implying an average exposure of 35 producers per demonstration site.

- **Outgrower Programs:** The ADC continues to provide assistance to outgrower programs. Two active outgrower groups {Table (ii)} are currently receiving ADC support in addition to other PL-480 partner groups.

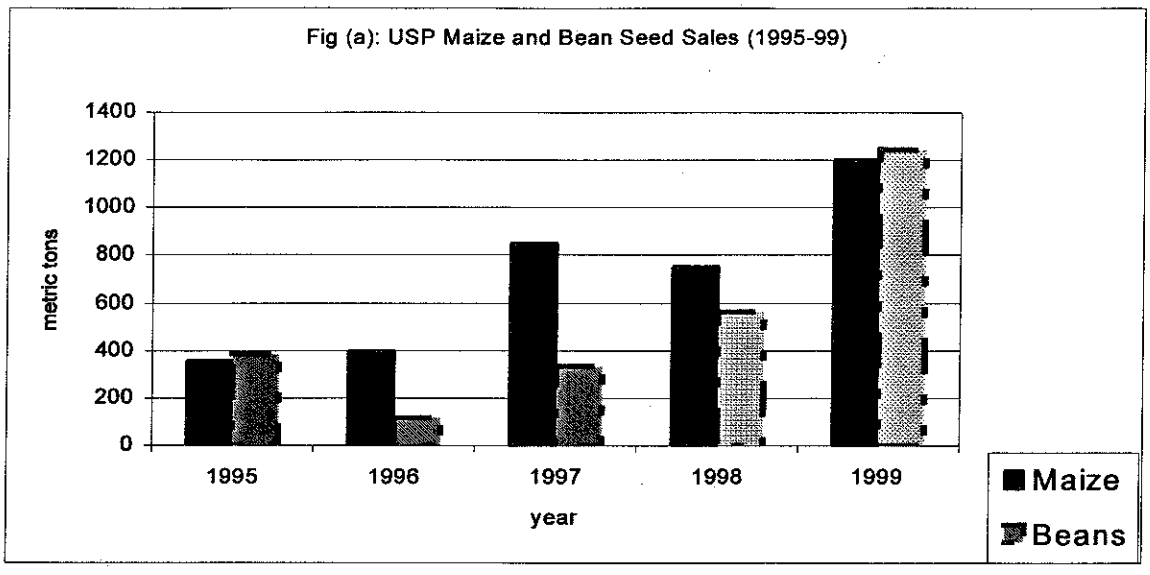
Table (ii): Support to Outgrower Programs

Program and location	Activity	Outputs
BUFA – Kibaale	Multiplication of white alubia, white pea beans and red kidney	1,403 mt of the various varieties under multiplication produced and marketed into the local market. A total of 5,190 farmers effectively coordinated by the BUFA extension network.
IFCD - Rakai	Production of beans for seed and food	400 mt of seed grade K132 produced and sold through commercial seed traders as well as informal offtake into local and regional (western) markets.

Source: ADC LV Component.

- **Provision of Market Information:** Regular national forecast meetings continue to be held at the ADC on a monthly basis, and one-on-one market linkages are made where possible. The ADC Market Knowledge Information Systems (MKIS) has been revitalized with the position of MKIS officer having been filled and LV weekly bulletins have been revived. To-date the LV component services over 60 clients with weekly price bulletins.

- **Seed Multiplication and Distribution:** Seed multiplication activity has continued to focus at the rural seed production mechanism for beans through outgrowers. NASECO has been encouraged to become a producer of registered materials for the emerging private sector participants in certified production. At the industry level, USP has continued to dominate the seed supply sector, with satisfactory production of the composite Longe 1. Trends in USP seed sales for the period 1995 to 1999 are shown in Figure (a). As can be seen from the figure, annual sales of maize and bean seeds by USP increased by more than 59% and 55% respectively over the past 4 years.



- **Commercial Farming Operations:** The ADC LV component continues to work with a portfolio of over 40 commercial firms/individuals with over 3,000 ha under maize production. The involvement of ADC in commercial farming has spread to over 12 districts. Work with the banking sector continues in order to avail credit to these emerging farmers. Currently the ADC is working with CERUDEB and Standard Chartered Bank. CERUDEB is currently working with the PL-480 risk fund and recent meetings with bank management have led to their developing a new lending window for this facility.

- **Input Supply:** Through the ATAIN program, 3 district distributors and over 70 rural stockist are involved in input trade. Through this set-up, nearly 10,000 producers have been reached and input sales now reach over Shs 200 million per annum. Stockist numbers directly linked to the program remain higher than initial targets. Additionally and perhaps more importantly, stockists that are being taken on by ATAIN distributors without a credit guarantee continue to rise.

3.3 Farmer Level Findings

The following are the key findings at the farmer level. Farmers were categorised into 3 groups, depending on their level of technology adoption: non adopters, partial adopters and full adopter.

- Area under both maize and beans increased for all the three categories of producers. The annual average increases in area under maize and beans for non-adopters were 12.5% and 6% respectively. In case of partial adopters, area under maize and beans per producer increased by 25% and 12.5% per annum respectively. The corresponding increases for full adopters were similar to those of partial adopters (i.e 20-25% for maize and 10-15% for beans).

- Yields for adopters were significantly higher than those of non adopters. It was observed that on average, use of improved husbandry coupled with use of improved seed, increases maize and bean yields by about 30-60% and 45-65% respectively. With application of fertilizers, yields may increase by a further 60-80% and 30-45% for maize and beans respectively.

- The proportion of produce sold has over the past 4 years increased for maize and beans by 10-15% and 20-30% respectively. The increase has been higher for adopters than non adopters.

- Cost of production increases with the level of technology adoption. However, this increase is more than offset by the higher yields, resulting in lower unit costs. Thus for instance, for non-adopters, the

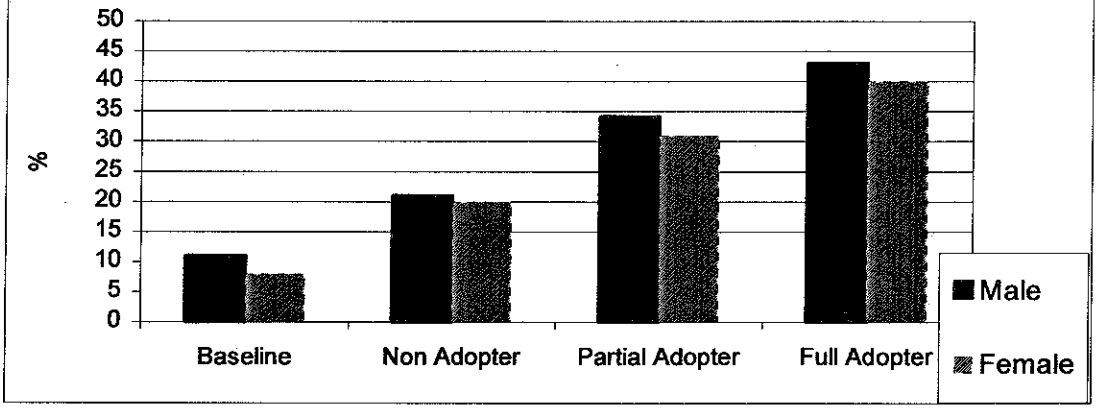
estimated costs of production of maize and beans per hectare are respectively Shs. 204,000 and 177,000. In the case of partial adopters, the costs are respectively higher by about 25-40% and 35-50%. With high input technology the costs increase by a further 50-75% and 25-40% for maize and beans respectively. The increases are mainly attributed to increased cost of improved seed, increased number of operations resulting from better management and cost of fertilizers.

- The unit cost of production (Shs/kg) of maize ranges between 90-120 for full adopters, 120-135 for partial adopters and 130-175 for non adopters. In the case of beans, the unit cost ranges between 200-240 for full adopters, 230-265 for partial adpoters and 270-320 for non adopters. In some cases unit costs of Shs 65-85 per kg were realised by farmers who planted hybrid varieties.

- Purchased inputs accounts for less than 5% of total cost in the case of non adopters. However, with increased level of adoption, the share of purchased inputs to total costs increases to about 10-20% for partial adopters and to over 30% for full adopters.

- There was general increase in income levels for the three categories of producers. The increase in incomes was attributed to a number of factors, such as; the general increase in prices of most agricultural produce (including maize and beans), increased quantities of agricultural produce sold-off by producers and the general increase in wages. Furthermore, the contribution of maize and beans to total income was highest among full adopters, followed by partial adopters and lastly non adopters. Compared to the baseline, shares of maize and beans to total income increased for all categories of producers {Figure (b)}.

Fig (b): Contribution of Maize and Beans to Total Farm Household Income



- Expenditures on consumer goods (such as food, beverages, clothing and essential household items) are highest, accounting for 38-45%. Expenditures on other items (including transport, construction, school fees, medical, etc) account for between 32 and 42%.

- The rates of re-investment from incomes were generally low. Expenditures on farm inputs accounted for only 10% for non adopters and close to 20% for partial adopters. In the case of full adopters, farm inputs accounted for about 27% of total expenditure.

- Compared to the baseline, the social status of both partial and full adopters has improved, while those of non adopters have worsened. The improved social status is attributed to the general increase in incomes, the Universal Primary Education (UPE) program and increased community awareness on the need to maintain hygiene.

3.4 Commercial Farming:

This section presents highlights of commercial farming operation in the 6 districts studied. For the purpose of this study, commercial farming is defined in terms of area under crop. Generally, a farmer with over 2 ha of maize was considered a commercial farmer. In the case of beans, over 0.5 ha was considered commercial. According to the farmers, the need to increase their income levels and the realization that large-scale farming pays, where the motivating factors. Some of the farmers had attended demonstration activities and some had hosted one-acre demonstrations. Key findings include:

- Average area under commercial farming was highest in Masindi (over 8.0 ha) and lowest in Iganga (about 2.0-4.0 ha). In the case of beans, area per farmer was generally low, at 0.6 – 1.0 ha.

- Typical maize yields per commercial farmer were in the range of 2.0 – 3.25 mt/ha in the lowlands and 4.0 – 5.25 mt/ha in the highlands. Yields for beans generally ranged between 0.8 and 1.5 mt/ha.

- On average, a commercial farmer employed about 12 people (30% of whom were females) on a continuous basis.

- Between 90-95% of the maize crop and 65-90% of the bean crop were sold.

- The most common means of opening up land was the tractor, with the exception of Kapchorwa and Mbale, where ox-ploughs were also used. The subsequent field operations were basically done manually (i.e. human labour).

- The unit cost of production ranged between Shs. 105 to 230 per kg of maize and Shs. 225 to 275 per kg of beans depending on the technology in use.

- On average, a commercial farmer earned about Shs. 1.80-5.5 million from the sales of maize and Shs. 0.2-0.5 million from the sale beans per annum. The contribution of maize and beans to total income accounted for between 45 and 60%.

- In terms of expenditure patterns, 25-35% were spent on farm inputs, 30-40% on consumer goods and the remainder on other items (such as education, health, transport, construction, etc).

- About 25-30% of the commercial farmers interviewed lived in permanent houses and 70-75% in semi-permanent houses. Nearly all the households reported having 3 meals a day, none had any malnutrition-related diseases and all were able to send their children to school. None reported inability to receive treatment due to cost consideration.

3.5 Private Sector Participation

Like in other sub-sectors and indeed in the overall economy of Uganda, private individuals/firms play a crucial role in promoting maize and bean production and marketing. In the course of the study, the key participants were found to include: food aid agencies, exporters/produce buyers, NGOs, input distributors/stockists and grain millers. A summary of findings and extent of participation are highlighted in the sub-sections that follow.

- **Food Aid Agencies:** In terms of volume, it is estimated that, annually about 15,000 to 40,000 mt of maize and 5,000 to 15,000 mt of beans are procured by food aid agencies in Uganda. The level of procurement by the food aid agencies are influenced in parts by their internal policies and political and security situations in the region.

- **Maize and Bean Exporters/Buyers:** Trade in maize and beans, provides business and a living for hundreds of local traders. The market linkage between the district-based traders and the centre (Kampala and major urban centres) is through a series of agents/dealers and middlemen who operate in fixed places or through traveling licenses. On average, a produce buyer procures about 300-600 mt of maize and 50-150 mt of beans annually. All the major produce exporters are based in Kampala and there are hardly any up-country. The major exporters on average procured about 5,000-10,000 mt of maize and 3,000-6,000 mt of beans per annum.

- **NGO Participation:** Findings show that, both local and international NGOs have played a major role in promoting maize and beans at the district level. In the 6 districts studies, the following NGOs and associations were found to be active:

District	NGO/Association
Kasese	KADIFA
Rakai	IFCD, RDFA, CONCERN
Masindi	MASGGA, UCA, FOSEM
Iganga	MTEA
Mbale	MFA, BUYAGA
Kapchorwa	KAFA, Sukura Agro Supplies

- **Input Distributors/Stockists:** Arising from the perceived benefits of adopting improved technologies, there has been an increase in demand for inputs. The key inputs demanded by farmers are seeds, fertilizers and agro-chemicals. In the 6 districts studied, 2 input distributors emerged as key players in the agricultural modernization drive. These are RFS in Rakai and Sukura Agro Supplies covering the districts of Kapchorwa, Mbale and Iganga. At the stockist level, sales levels have varied from about Shs 760,000 to Shs 33,392,000 worth of inputs per season. The good performing stockists serve about 150-200 farmers per season, with repeat sales to some of the farmers.

3.6 Environmental Issues

In the 6 districts covered by this study, current farming practice by the majority of households is oriented towards subsistence production. Basic inputs used for production include the hoe, panga and slasher. Mechanisation is quite limited and the use of agro-chemicals and other high tech inputs is very low, if any. Under these circumstances the promotion of maize and beans in these districts would not be expected to pose environmental hazards. Overall, the major factors found to be affecting the environment in the districts studies were:

- Loss of soil fertility due to over cultivation without leaving the land to rest.
- Soil erosion due to poor management and lack of appropriate conservation measures, coupled with continued use of traditional methods of farming.

On a positive note, the growing of maize and beans enriches the soils, while the use of maize stalks and cobs for fuel reduces on deforestation. The remains left to decompose in the field acts as manure. It is also worth pointing out that, maize and beans do not perform well in wetlands and other reclaimed land.

It can be concluded, therefore, that at the present time there are no serious environmental problems associated with growing and processing maize and beans. The areas to watch, however, are the effects of **acreage expansion, land degradation** and the **growing of maize continuously on the same fields** without allowing for adequate soil nutrition.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

The rationale for adopting the vertically integrated commodity systems approach was to create favourable conditions, by first of all allowing for a wider multiplier effect in the production-marketing chain and secondly ensuring future sustainability of the production and marketing systems. ADC has involved participatory methodologies to strengthen the capacity of farmers and other actors to adapt to changing needs and conditions and make agriculture sustainable.

This strategic perspective is important in the context of the current government's efforts and search for policies and strategies to modernise Uganda's agriculture, and has been well noted and appreciated by a large section of respondents during the course of this evaluation. According to most of the respondents, the ADC intervention in maize and beans has had several positive outcomes. In particular, the following landmarks are worth noting:

- Beginning with a few sub-counties in a few districts, the program has spread rapidly to 20 districts. As a result, many farmers, companies and associations have benefited individually and collectively, both directly (through demonstrations, seed supply, training and financial assistance and indirectly (through the multiplier effects and linkages especially in input supply and marketing).

- Records available at the ADC indicate that since the establishment of demonstration program in these districts, the number of farmers exposed to improved farming methods has increased from about 700 by early 1995 to over 185,000 by the end of 1999. The number of adopters has similarly increased. Based on ADC surveys and contact visits by the extension agents, the extent of adoption at the district level range between 20-55% for low input and 1-15% for high input technologies. At the industry level, it is estimated that over 200,000 farmers have been reached (both directly through field day attendance, seed multiplication program, PL-480 supported activity, outgrower schemes and indirectly through multiplier effects).

- A number of firms dealing in produce trade and input distribution have been able to kick-start their business partly with ADC/IDEA Project assistance. Some of these companies now receive regular market knowledge bulletins, which are issued on a regular basis by the ADC, and some have received financial as well as technical support.

- Institutions such as UNFA, Agriculture Departments in some districts, USP and NARO have also benefited from their linkage to ADC/IDEA Project. These organisations' profiles have been enhanced through association with the ADC.

- Enthusiasm of a large number of farmers in several districts has been harnessed, in a situation where other public services have declined through budgetary cuts and retrenchment of government extension workers.

- Through the ATAIN program, farmers have been reached with inputs such as seeds, fertilizers and crop chemicals. Stronger ties now exist between the farmer and the stockist as the latter has taken on the roles of both an input dealer and extension agent.

- Commercial demonstrations have also had a significant effect, especially in terms of what can be done with modern technology on a medium scale. Yields achieved in these demonstrations have been impressive, with maize varieties performing at between 3.5 and 5 mt per ha.

- Increased yields have resulted in increased marketable surplus. As a result, the shares of maize and beans to total income have increased. The increased rural incomes have helped producers meet their domestic requirements and a few have invested inland and housing.

- Growers have been exposed to modern production practices, initially by being shown the activities at Kinoni Farm in Nakasongola. Arising out of farmers' interest, a commercial training school has been established at Kinoni Farm, where larger scale operators spend a week participating in the activities essential to good and profitable farming.

- A key contribution of the ADC on maize and bean marketing has been the provision of market knowledge information services (MKIS). The current number of regular users served by the MKIS office averages 60. The information provided by MKIS has enhanced the marketing decision process at both regional and international levels.

4.2 Key Issues

Despite the above positive achievements, there are still a number of constraints the Low Value (LV) component will have to contend with. A few of these are cited below.

- The implementation of an intergrated commodity systems model (which encompasses technology transfer, input supply and market linkage) calls for an effective private sector participation. Furthermore, institutional linkages were found to be important pre-requisites for a successful introduction and adoption of new innovations. The issue is therefore strengthening the involvement of the private sector and creation of a stronger linkage among different institutions in order to ensure sustainability.

- Based on figures provided by the ADC District Coordinators, the percent of producers reached with technology ranges from 35 to 55%. This is a good achievement in a spell of less than 5 years. On the input side, however, less than 10% of the households have access to inputs. The issue is how to increase access to improved technology and the use of inputs such as seeds and fertilizers.

- Sustained adoption of improved technology was not always evident. Even farmers who had seen and acknowledged the benefits of such inputs as fertilizers were not consistently using them- citing lack of funds. The issue here is what ought to be done to orient producers' attitude towards re-investing on the farm.

- The majority of maize and bean producers are subsistence farmers, who produce mainly for home consumption and rely on low input/low output technologies. The issue here is how to transform farmers into "commercially-oriented" producers so as to realise surpluses for the market.
- There was a general complaint within the ADC project districts that during periods of good harvest, marketing was a problem. The main issue here is what can be done to ensure that the market handles the surplus at the producer level.

- The inability of producers to adopt low and high input technologies was partly due to lack of funds. Even at the commercial farmer level, the need for working capital to allow for timely field operation was quite great. Credit is therefore an issue that requires some consideration.

- The ADC has continued to support both the National Maize and Bean Programs, accounting for about 80% of their financial requirements. Is the ADC able to continue supporting research for a long time? The issue of research becoming self-sustaining beyond IDEA is the case in point.

- The promotion of maize and beans (like any other development activity) could have adverse impacts on the environment. This is in regard to bush clearing, deforestation and use of environmentally fragile areas such as hill slopes. The issue is how to ensure that project activities do not adversely impact on the environment through adequate monitoring of key variables.

4.3 Recommendations

From the foregone, the key issues, which emerge from the impact study revolve around the need to sustain achievements and translate them into tangible results and lasting impacts. Based on the study findings, observations, beneficiaries' perceptions and with a view to ensuring sustained and progressive gains, the following sets of recommendations are proposed.

- **Enhancing Integrated Commodity Systems Model and Institutional Linkages:** With a view to ensuring sustained gains, the ADC should identify key players in its areas of operation and cultivate a spirit of togetherness among the key players. Both the private (e.g input duistributors/stockist) and public (such as extension agents) sectors should be encouraged to work for a common vision.

- **Reaching the Rural Producers:** For more effective outreach and sustained adoption, the ADC should continue placing more emphasis on the use of adopters and commercial farmers. Input supply network should be encouraged and supported as much as possible, so that more farmers are reached with basic inputs such as seeds and fertilizers.

- **Re-investing on the Farm:** The ADC should through its training and extension, encourage farmers to re-invest part of their earnings. For instance, farmers could be encouraged to deposit some money with the input distributors/stockists prior to the season.

- **Improving Farm-Level Efficiency:** The ADC should continue highlighting in its training program, the need for efficiency. It should explore and introduce cost-saving measures such as use of herbicides even for small-scale farmers. There is also a need to encourage farmers to own proper storage (such as cribs) in order to reduce on the high post-harvest losses.

- **Commercial Farming:** The ADC should continue with its commercial farming activity and intensify it to embrace a wider spectrum of clients. The ADC should, however, select commercial farmers on the basis of past production performance and ability to sustain increased market demand and where possible select farming associations like women groups.

- **Marketing:** The ADC should refocus its market interventions by providing direct support to traders/exporters. There is a need to support traders/exporters to improve their marketing skills and to increase efficiency in the market chain, through business training, post-harvest and quality control, etc and to provide market information and processing and handling/packaging technology. Workshops and seminars could be such avenues through which such support could be channeled. There is also a need to improve the national food storage situation through the use of hitherto unutilised silos.

- **Provision of Credit:** The ADC should consider facilitating some kind of financial support to commercial farmers and major buyers/exporters. Of particular note is the need to link farmers and produce buyers to affordable lines of funding. The current undertaking by the ADC in working with the banking sector should continue and even expanded.

- **Research Considerations:** The ADC should continue supporting the Maize and Bean Programs with focus on short duration varieties as well as those with export market potential. However as this is being done, there is a need to identify ways through which research activities would continue beyond the life if IDEA. Sustainability of research activity should be reviewed and appropriate steps taken to unsure that the Maize and Bean Programs will still be active even after IDEA project has closed.

- **Environmental Considerations:** The ADC should, in its training program, emphasize improved environmental practices. These should include contour farming, planting grass strips, returning organic matter to areas suitable for cultivation, crop rotation, proper use and disposal of chemicals, fertilizers and pesticides, and other soil conservation through financially viable alternative farming system that encourages conservation. Furthermore, the ADC should regularly monitor the extent of encroachment on the sensitive areas, agronomic and soil conservation practices and agrochemical usage. ADC should continue working closely with NEMA.

1.0 INTRODUCTION

Maize and beans are important crops grown in virtually all parts of Uganda. Maize forms an important source of carbohydrates while beans are a major source of protein. These crops also provide farm households and produce buyers with incomes. Maize and beans are therefore important crops from both the food security and income-generation points of view. It is probably on these premises that the Uganda's Investment in Developing Export Agriculture (IDEA) Project identified maize and beans as commodities to promote.

Uganda's Investment in Developing Export Agriculture (IDEA) is a Project funded by the United States Agency for International Development (USAID). The Project, whose goal is to ***increase the incomes of rural men and women***, is intended to assist Uganda promote and diversify non-traditional agricultural exports (NTAEs), thereby creating rural employment, increasing incomes for NTAE producers, traders and exporters, and increasing foreign exchange earnings for the country. This is to be achieved through promoting production and marketing of selected non-traditional agricultural exports (NTAEs). The Project is implemented by the Agribusiness Development Centre (ADC), and provides direct assistance to producers, traders and exporters.

The low value (LV) component is responsible for promoting the production and marketing of maize, beans, and other selected field crops; while the high value (HV) component is entrusted with the promotion of cut flowers, fruits and vegetables, and spices and essential oils.

The ADC through the LV component has since 1995 supported the production and marketing of maize and beans in Uganda. The basic elements or pillars of the LV intervention strategy have been:

(a) supporting or undertaking demonstrations and transfer of appropriate technology;
(b) creating or supporting input supply networks; and
(c) supporting marketing improvements.

In order to establish an effective and sustainable linkage in the production and marketing chain, these elements are combined into an *integrated commodity systems* approach, which is the cornerstone of the strategy. Through this approach, constraints in the marketing and production systems are identified and commodities promoted on the basis of their market prospects.

The ADC/IDEA LV component policy has been to play a catalytic role, and to act as the driving force behind the existing and new institutions/firms that are responsible for providing research, extension, input supply and marketing services. The basic elements and catalytic activities were designed to accomplish the following outputs:

- Producers of selected commodities would have improved knowledge of techniques to increase crop yields and quality;
- Exporters would be able to initiate or expand NTAE activities;
- NTAE exporters and producers would have improved knowledge of agribusiness planning and management and access to sources of financing;
- Sustainable commodity specific market information systems would be established or improved;
- Private and public sector entities would be multiplying and distributing improved maize and bean seeds; and
- Associations would be facilitating growth of NTAEs and acting as effective advocates for a better NTAE policy and regulatory environment.

2.0 PURPOSE AND SCOPE OF THE STUDY

2.1 Purpose and Scope

One of the major aims of IDEA Project is to expand production of maize and beans so that the surplus can be sold in the East and Central African regional market. In order to achieve the above aim, the ADC has over the last four and half years assisted and worked with a cross section of key participants. These include producers (both small and large), associations, input dealers, marketing companies, NARO (Maize and Bean Programs), Non Governmental Organisations (NGOs) and other projects such as PL-480, USP, AT (U), etc. Considerable amounts of resources have been put in by the project by ways of technical assistance, research, financial intermediation and market linkages.

In order to measure the impacts of the IDEA project on its clients and the maize and bean industry at large, the ADC commissioned a commodity study for maize and beans. The study covered a wide spectrum of ADC clients, namely producers, input traders, produce buyers, exporters and researchers. The study focused on the socio-economic impact at the farm level, successes, lessons learned and the way forward. It assessed the impact of ADC intervention on maize and bean production and marketing, focusing on people-level impacts with particular reference to changes in annual returns from these crops and the general economic and social improvements of rural households who have participated in or have been exposed to the program. The study was carried out in six districts, namely; Kasese, Rakai, Masindi, Iganga, Mbale and Kapchorwa.

2.2 Study Objectives

The purpose of the study, as detailed in the Terms of Reference (Annex 1) was to measure people-level impacts resulting from IDEA Project interventions in maize and beans. The study assessed the following aspects:

- the total number of clients/beneficiaries reached,
- levels of technology adoptions,
- benefits in terms of net annual returns,
- measures of incomes attributed to technology adoption,
- the general economic and social betterment of the clients/beneficiaries,
- levels of production, productivity and economics of producing the selected NTAEs,
- income levels and expenditure patterns of men and women,
- quantity and value of maize and beans produced and exported, and
- extent of ADC contribution and effects on the environment caused by the promotion of maize and beans.

Other aspects covered were: women participation, income utilisation (including extent to which income generated is re-invested), differences between male and female beneficiaries, forward and backward linkages in the NTAE sector, multiplier effects and sustainability. Overall therefore, the study measured progress towards achieving USAID's Strategic Objective One (SO1), namely that of increasing rural men and women's incomes.

2.3 Study Methodology

2.3.1 Study Strategy: In order to assess the impact of the Project within the stipulated period, rapid assessment methods (RAM) were employed. The approach involved holding discussions with the ADC Low Value staff and the Monitoring and Evaluation Specialist. Following this, discussions were held with collaborators, major buyers (both international and local), input suppliers, distributors and stockists, District Coordinators, NGOs at the district level, Associations/Groups assisted by the ADC/PL-480, and a cross section of farmers (both subsistence and commercial). The findings from these interviews were then compared and contrasted with the baseline and a control.

2.3.2 Data Types and Sources: Three sets of data were collected. The first related to the industry performance at the macro level. This was obtained from IDEA Project documents and interviews with ADC LV team, collaborating projects and Government publications. The second set related to private sector performance and was collected from major produce buyers/traders, agricultural input dealers, NGOs, associations and groups. The third set covered farm-level data and socio-economic impact. This was collected through interviewing farmers (both subsistence and commercial).

Data were obtained from eight types of respondents, namely; the ADC LV team, collaborating projects, food aid agencies, grain buyers, input dealers, ADC District Coordinators, NGOs/associations/groups and farmers. The data collection instruments used comprised checklists and questionnaires as shown in Annex 2. Additionally, observational methods were employed and relevant variables in the field estimated. The different data types and sources are shown in Table 1.

Table 1: Summary of Data Types by Source

Variables to be Measured	Measurement	Source Levels
Extent of ADC/IDEA Project involvement: - Intended impacts and objectives pursued. - Annual work plan output targets. - Implemented annual activities.	Objectively verifiable indicators in units of numbers, percentages or narrative descriptions.	- Annual work plans and progress reports. - Interview with ADC/IDEA Project LV team.
- Output of maize and beans. - Average yield levels	- Production data - Productivity	- National statistics. - Structured interviews at farm level.
- Incomes attributed to maize and beans. - Decision making in income utilization. - Social and nutritional status of producers.	- Maize/beans income as a % of total household income. - Expenditure patterns. - Dwelling units, incidence of malnutrition related diseases.	Structured interviews and observation at household level.
Labour utilization by gender.	Number of men, women and children employed.	Farm-household level.
- Employees by firm and gender. - Wages by firm and gender.	Number of men and women employed as managers, skilled or unskilled workers.	Buyer and exporter levels.
Maize and bean exports: - Volumes by year. - Values by year.	- Annual metric tons - US$ million.	Industry (or national), firm (or exporter) levels.
Perceived constraints and opportunities for sustainability.	Problems, failures, prospects and threats.	Exporter, buyer and farmer levels.
Rating of ADC contribution.	Relevance, effectiveness, impact and sustainability.	

Source: Derived from TOR

2.3.3 Sampling Procedure: The primary data sources were the maize and bean producers in the six districts of Kasese, Rakai, Masindi, Iganga, Mbale and Kapchorwa. Samples of over 370 producers were interviewed in the 6 districts. A listing of the respondents was obtained from the ADC District Coordinators in the selected districts. From the given listing, producers were put into three main strata: non-adopters, partial adopters and complete adopters. The number of producers in each stratum was proportionately determined based on the results of the *Adopter Survey* conducted by the ADC during the first season of 1999. For each stratum, farmers were randomly selected in such a way as to get a representative cross section of men and women. Thirty of the farmers selected/interviewed were PL-480 beneficiaries (Table 2).

Table 2: Number of Farmers Sampled by District and Category of Producer

District	Non Adopters		Partial Adopters		Full adopters		PL-480 Beneficiaries		Commercial Farmers		Total	
	M	F	M	F	M	F	M	F	M	F	M	F
Kasese	6	4	22	8	8	2	6	4	5	1	**47**	**19**
Rakai	10	6	16	8	6	4	2	8	1	2	**35**	**28**
Masindi	10	8	18	7	5	2	0	0	9	1	**42**	**18**
Iganga	10	7	16	9	6	2	0	0	4	1	**36**	**19**
Mbale	6	5	18	8	9	4	6	4	9	1	**48**	**22**
Kapchorwa	5	5	16	4	14	6	0	0	9	1	**44**	**16**
Total	**47**	**35**	**106**	**44**	**48**	**20**	**14**	**16**	**37**	**7**	**252**	**122**
Total by category	**82**		**150**		**68**		**30**		**44**		**374**	

Source: Derived from Sampling Frame

Apart from individual farmers, producer groups/associations, which had been supported by the ADC and a sample of emerging commercial farmers were interviewed. The World Food Programme (WFP) and 3 private exporter firms were also interviewed.

2.3.4 Data Analysis and Presentation of Results: Analysis was made using spreadsheets to generate descriptive tables. Results were presented in both tabular and graphical illustrations. Analysis of Project's impact involved the following scenarios: female versus male; and adopters/beneficiaries versus non-adopters/non-beneficiaries.

2.4 Report Outline

This report presents findings and analysis of the commodity study carried out by a group of independent consultants led by Mr Edward Mwesigwa. The report is divided into two volumes; the Main Report and Statistical Annexes. The main report is itself divided into 5 chapters. The first two preceding chapters have presented the overview of the study, highlighting purpose, scope, study objectives and methodology. The chapter that follows (Chapter 3) brings out major ADC/IDEA project activities and interventions in the maize and bean industry. Chapter 4 brings out major findings at the industry, firm and farmer levels. A summary of major findings, highlighting perspectives, challenges and opportunities and recommended course of actions is brought out in Chapter 5.

Volume II of the report comprises relevant attachments and analysis emanating from the 6 districts covered during the study, namely; Kasese, Rakai, Masindi, Iganga, Mbale and Kapchorwa.

3.0 EXTENT OF IDEA PROJECT INVOLVEMENT IN MAIZE AND BEANS

3.1 The ADC/IDEA Project Operating Environment for Maize and Beans

The Low Value (LV) component of the IDEA Project is responsible for increasing the production and marketing of maize and beans. It has four basic outputs, namely:

- the development and demonstration of high and low input technology packages;
- assisting exporters to initiate or expand maize and bean activities;
- establishing and improving market information systems; and
- ensuring that the private and public entities multiply and distribute maize and bean seeds.

Against these, the following life of project (LOP) targets (shown in Table 3) were to be achieved by February 2000 (when IDEA I will end).

Table 3: LV LOP Indicators and Targets

Indicators	Baseline (Mar 1995)	Target (Feb 2000)
• Export value of maize and beans • Farm gate value of maize and beans	US$ 6.6 million US$ 2.5 million	US$ 20.0 million US$ 7.5 million
• Technology packages developed and demonstrated: - No of sites - Farmers reached	n.a n.a	6 9,000
• Exporters assisted over LOP	n.a	25
• Market Information Systems established or improved upon	n.a	—
• Private & public entities multiplying & distributing improved seed: - Annual increase in volume of seed sold	n.a	5-10%

Source: IDEA Project Document *Note: n.a implies not available.*

Operationally, the LV component is supported by other components within the project. Outside the ADC, the institutional environment of the IDEA project allows LV to work with USAID, NARO, MAAIF, PCVs, VOCA, projects such as PL-480, FEWS, PHHS, financial institutions and the private sector. All these set-ups are geared towards the attainment of overall project goal of increasing incomes of rural men and women and the purpose of increasing production and marketing of maize and beans. Whilst the primary aim of the component is on increasing exports of maize and beans, meeting the food security needs of farm households has become an important focus. Another area of equal importance is rural employment. The IDEA project through its LV component is therefore expected to act as a driving force behind existing and new firms/organisations. In view of this mandate, the LV component has supported the maize and bean industry in a number of ways as highlighted in section 3.2 that follows.

3.2 Commodity Interventions Undertaken

3.2.1 Technology Transfer: As a first step towards increasing rural incomes, the LV component identified technology transfer as the key pillar. By demonstrating and encouraging more efficient production practices, the LV component hoped to raise output levels thereby enabling producers to realise surpluses, which they would sell. Accordingly, the LV component has to-date established demonstration sites in 20 districts. While in most of the districts there was one demonstration site per parish, the number of demonstration sites was based on the level of production as well as the availability and creativity of field participants. According to the LV team, the basic objectives of the demonstration activity were to:

- Demonstrate at farm level, suitable technology packages that are affordable and profitable.
- Utilize extension resources in order to reach the maximum number of farmers.
- Encourage farmer participation through demo plot maintenance and field day attendance.
- Train extension agents, individuals and farmer groups in appropriate technology application.
- Encourage farmers to adopt the technology packages on their own fields.

In undertaking the demonstration activity, the ADC LV component has maintained close working relations with extension agents, farmers and district authorities. Cooperating field teams included NGOs, UNFA and MAAIF extension workers. Peace Corps Volunteers (PCVs) have until recently, also been an integral part of this process. The ADC trained site supervisors in site layout, extension methods and field day activities. Technology kits (such as seeds, fertilizers, crop chemicals) needed to prepare and to conduct demonstrations were also provided by the ADC.

Operationally, the District Coordinators are responsible for ensuring that demo kits were delivered in time, demo plots established, site supervisors regularly visited demo sites, field days were held, and reports to ADC were submitted in a timely. Under the demonstration activity, farmers are invited to each site three times in a season; at planting time, mid-season and at harvest time.

At each field day, farmers are shown the appropriate technology and share views with the extension workers and the host farmers on common farming problems. The key knowledge passed on to farmers has centred on: new high yielding variety seeds of both maize and beans, appropriate agricultural inputs like fertilizers, proper crop husbandry and post-harvest management. Over the years, emphasis has shifted to use of commercial one-acre demonstration plots and adopter fields for holding field days. The extension agents have increasingly taken on greater responsibilities. These officers ensure that kits are delivered to participating farmers, carry out training/demonstration of planting techniques and general extension support as outlined in the technology demonstration program. This includes amongst

others seedbed preparation, row planting, proper spacing, weeding, harvesting and post-harvest handling, and quality control both at production and marketing levels. New releases from within and outside the country have also been incorporated in the demonstration packages.

3.2.2 Support to Maize and Bean Research Programs at NARO: ADC/IDEA Project has supported aspects of the maize and bean research program at Namulonge Agricultural and Animal Research Institute (NAARI). Specific interventions have focused on the following:

- Supporting screening, on-farm testing, multiplication and distribution of improved maize and bean varieties. To this effect, the ADC has emphasized the screening and release of new varieties of both maize and beans suited to local production as well as regional export markets.

- Identifying pests and disease control measures and techniques to reduce post-harvest losses. The ADC has supported work with bean pests and diseases, notably bean fly and root rots. Following from this, important conclusions have been reached and recommendations made in the form of field leaflets and publications.

(A) **Maize Research Program:** The maize research program at Namulonge is basically for development and screening of maize varieties. Specific interventions have included:

(a) new varieties and their performance;
(b) yield improvements;
(c) production technology; and
(d) gearing efforts towards the production of varieties that have market prospects.

IDEA project has provided considerable funding which include the development and on-farm testing of varieties. ADC/IDEA Project has incorporated newly released varieties in its demonstrations in over 15 districts. The ADC has also facilitated workshops for the interaction of researchers and stakeholders.

(B) **Bean Research Program:** The objective of the bean research program is to increase productivity, and through this contribute to the goal of food security. The ADC has provided research materials, office equipment and has sponsored Workshops for bean researchers (both scientist and technicians) on improved bean production systems. IDEA project has funded variety breeding through technology transfer, focusing on multi-locational trials using different varieties in selected districts.

This program has several components including variety introduction and screening, preliminary yield trials (PYT), intermediate yield trials (IYT) and advanced yield trials (AYT). These trials are being carried in 18 sites involving 99 different lines.

3.2.3 Support Towards the Development of ATAIN Program: Agribusiness Training and Input Network (ATAIN) was developed by ADC in response to the growing demand by smallholder farmers for agricultural inputs, and the need to make such inputs accessible and affordable at the village level.

The idea behind the ATAIN program was to build on the growing demand for improved seeds, fertilizers and crop chemicals, particularly at the village level, while at the same time overcoming some of the drawbacks in the input supply chain. Under the ATAIN program, rural stockists collect inputs from the distributor and bear the transportation and handling costs. To this effect, prices offered to the stockists are about 15- 20% lower than the sales prices to other buyers.

The main inputs are seeds (maize, beans, vegetables), fertilizers (DAP, CAN, UREA) and crop chemicals (Ambush, Furadan, Dimethoate, Dithane M-45, Round-up, etc).

To realise the aims and objectives of the ATAIN program, the ADC undertook the following activities:

- Putting in place a **credit guarantee mechanism** that allows distributors to develop a rural stockist network and to extend consignment facilities to rural stockists which in turn enables them to carry adequate inventory of select inputs.

- Developing **training materials** and carrying out training of trainers for stockists in record-keeping, credit documentation and management, inventory control, product handling and storage, product knowledge, and marketing and promotion techniques.

- **Linking** stockists with distributors, allowing inputs to be made available with relatively short turnover, and also assisting distributors, where possible, to access trade credit from suppliers.

- Continuing **farmer production** training through demonstration activities, by stimulating demonstration activity at the stockist level.

- Providing **oversight and coordination** of the implementation of the program by selecting distributors, regular monitoring through field visits in order to mitigate the potential problems that may impair the program and carrying out end of season audits to determine ATAIN exposure.

3.2.4 Provision of Support for the Marketing of Maize and Beans: Under the marketing arrangements, ADC/IDEA has collaborated mainly with private companies. The ADC has played a key role in linking these private firms to product sources, especially by commercial farmers and outgrowers. The ADC/IDEA has continued to provide market information on international prices and service a large group of clientele with regular industry-related information.

The ADC has supported the replacement of the defunct MNS service operated by the Ministry of Tourism, Trade and Industry (MTTI) with an IITA/PL-480 partnership. Regular national forecast meetings continue to be held on a monthly basis, and one-on-one market linkages are made where possible.

3.2.5 Provision of Assistance to Outgrower Program and Clients: The ADC has continued to provide support to outgrower clients. At present, 2 active outgrower groups, namely BUFA in Kibaale and IFCD in Rakai are receiving ADC support. However, dedicated outgrower support for export as a goal in itself is entirely dependant on the price in the local market at the time.

Since internal prices have remained significantly high throughout the project life, the implication is that all sales from the supported activities go into local consumption and some informal export sales, particularly to Rwanda.

3.2.6 Support to Commercial Farming Activity: Commercial farming has received increasing attention from the ADC. The LV component has been systematically working to develop catalyst farmers in at least 10 districts. This culminated in a contact commercial farmer workshop held in Jinja in September 1999, where 15 contact farmers were facilitated to begin the work of bringing other competent commercializing farmers for ADC support.

Work with the banking sector continues in order to avail credit to these emerging farmers. At present ADC is working with 2 banks: Standard Chartered and Centenary Rural Development Bank (CERUDEB). CERUDEB is currently working with the PL-480 risk fund and recent meetings with bank management have led to their developing a new lending window for this facility rather than attempting to push these clients through their present convoluted and expensive system.

It is the intention of the LV component to have at least 40 clients screened as to their credit worthiness before the end of the work plan period prior to the start up of the 2000 A season. Over 60 prospective commercial farmers from 12 maize growing districts recently underwent a one-week training at the ADC training school at Katugo in Nakasongola district.

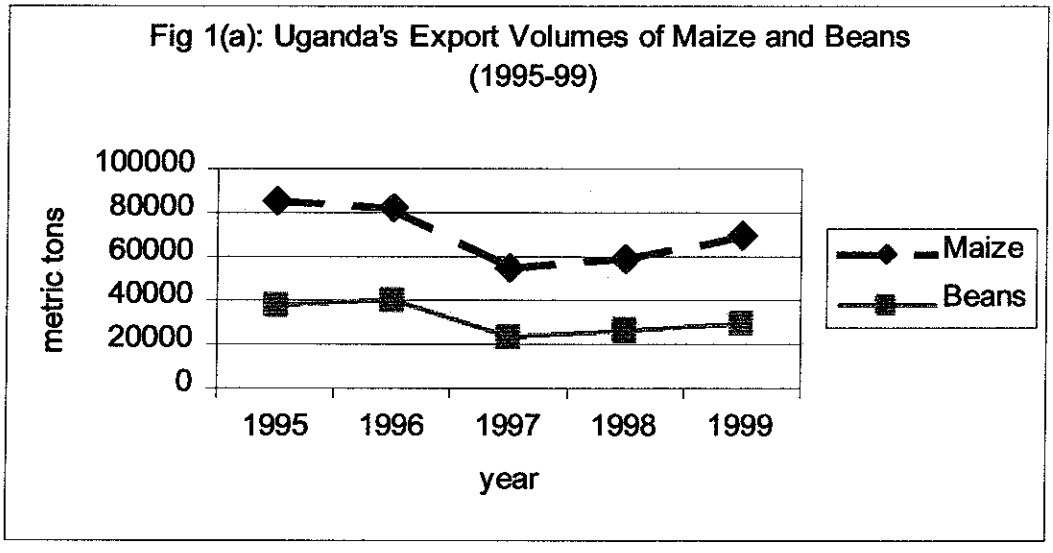
3.2.7 Support to Seed Multiplication Activities: The ADC has supported both the Uganda Seed Project (USP), private firms and outgrower groups with the intent to develop a high quality seed bank. Most of the assistance at the outgrower level has involved the provision of initial seed for multiplication. At the firm level, assistance provided by the ADC has centred on identifying seed source and coordination of seed procurement and distribution.

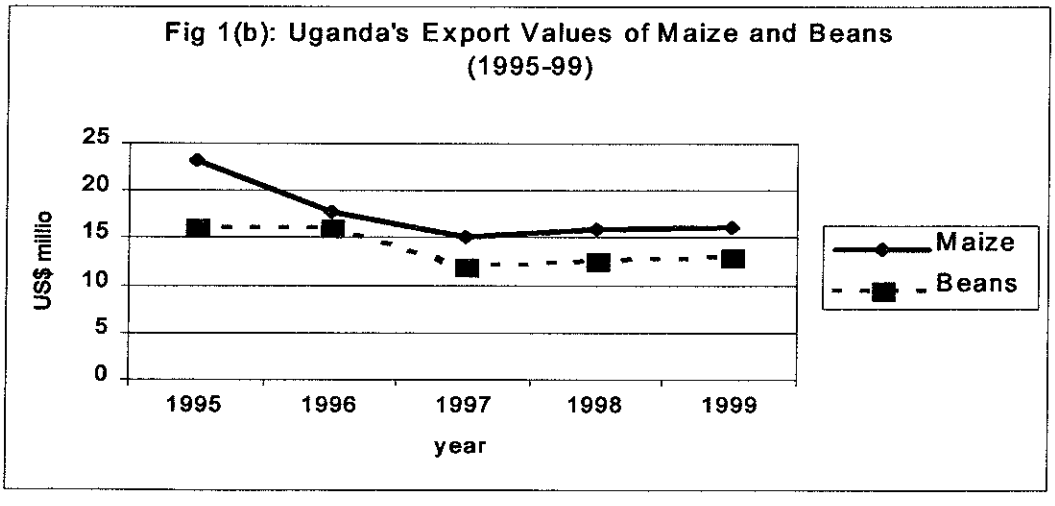
4.0 SUMMARY OF FINDINGS AND ANALYSIS

4.1 Macro Level

The past three years have been characterised by significant rainfall abnormalities, with *El Nino* (prologed rains) being witnessed in the second half of 1997 and first half of 1998. This was followed by the *La Nina* (prolonged dry spell) phenomenon, which was witnessed in most of the major maize and bean producing districts. In both instances, yields were affected and outputs greatly reduced.

Although no accurate data exist, discussions with a cross section of people (including food aid agencies, exporters, produce buyers, ADC District Coordinators, administrators, farmers and the technical staff) showed that the national outputs of maize and beans of the past three years have been less than 500,000 mt and 300,000 mt respectively. Consequently, internal prices for most agricultural commodities have remained generally high, except for 1999. According to official figures, Uganda's export volumes and values of maize and beans have generally shown a downward trend as can be seen from Figure 1{(a) and (b)} below.





Source: Background to the Budget Publications, UEPB and ADC.

The above trends may be explained by one or combinations of the following factors:

- Low production levels, resulting into low surplus for exports. This has been caused by the unfavourable weather such as prolonged drought or prolonged rains, which have affected yield levels.
- Poor quality of produce that do not meet external market requirements.
- High informal exports which are not recorded. A recent study by the ADC shows that informal (unrecorded) cross border trade in maize and beans accounts for about 45-60% and 35-50% respectively.
- Lack of organised export market.
- Better prices received internally compared to prices outside, thereby discouraging exports.
- Reduction in demand by food aid agencies who are the main buyers. For instance, in 1994/95, food aid agencies procured around 100,000 mt of maize to feed the displaced people in the region. However, over the years and following relative stability, their procurement level has steadily reduced to around 20,000 mt p.a.

4.2 Assessment of ADC Interventions

Since mid-1995, the ADC has worked with a cross section of clients with a view to promoting maize and bean production and marketing. These included among others exporters/traders, food aid agencies, NARO, input suppliers/distributors/stockists, the seed industry, NGOs, MAAIF through the district department offices, commercial farmers, subsistence farmers and extension agents. At the district level, ADC maize and bean program gained momentum in the early part of 1997.

To-date the ADC maize and bean program is being implemented in 20 districts and are at different stages of advancement. At the output level, the Project has met most of its life of project (LOP) targets. In a number of cases, the targets have been exceeded. This section reviews progress made and results arising out of ADC interventions in maize and beans.

4.2.1 Research Activities: With support from the ADC, research has continued to emphasize the screening and release of new varieties of both maize and beans suited to local production as well as regional export markets. Formal approval for release has been given for two imported hybrids from Zimbabwe. Table 4 highlights the yield potentials under varying conditions as summarized in the variety release data presented by the National Maize Program. Table 5 gives the corresponding yields for beans as released by the National Bean Program.

One key observation that may be made from the two tables is that suitable varieties with high yielding potentials have been released in the recent past. Besides a number of the newly released varieties still perform better even under stress.

Table 4: Yield Potentials for Current Official Maize Varieties and Upcoming Releases

Variety	Date of release	Maximum Yield Potential (kg per ha)		
		High Rainfall	Medium rainfall	Low rainfall
Longe 1	1993	6,800	3,500	3,300
UH1	1999	7,500	5,500	4,500
UH2	1999	8,400	5,500	4,300
Sc625 *	1999	9,300	5,300	4,000
Sc627 *	1999	10,200	5,900	4,000
Pan 67#	—	8,300	5,450	4,200
Pan 5195#	—	6,000	5,000	4,500
LP16#	—	6,000	4,000	3,000

Source: ADC Ninth Semi-Annual Progress Report (October 1999) and NARO.
* Restricted release pending farmer comments through National Maize Program
# Varieties in pre-release season due for presentation early in 2000

Table 5: Bean Varieties Available Through Official Release

Bean Variety	Date of release	Yield (kg/ha)	Comments
Released:			
K132	1994	1,315	Current popular large seeded
K131	1994	2,085	Small seeded - not popular
OBA	1994	1,462	
MCM 1015 and MCM 20001	1995		
New releases : (Bush)			
POA 2	1999	1,605	Replacement for K132
SUG 73	1999	1,317	Southern Africa Universal type
UBR (92) 25 M2	1999	2,500	White haricot canning type
New releases : (Climbing)			
Vunikingi	1999	3,875	}
Ngwinurare	1999	3,861	}Climbers suited to high altitudes
Umubano	1999	3,000	}
Pending :			Release postponed pending emergence of
DRK 57		1,111	stability in colour

Source: ADC Ninth Semi-Annual Progress Report (October 1999) and NARO.

4.2.2 Technology Transfer: Field demonstrations continue to be utilized as a means of promoting new technologies, especially with the addition of new varieties. All demonstration sites carry K132 bean seed, Longe 1 seed, new maize hybrid (Sc625) and Uganda maize Hybrid. At the same time, a shift in approach has been made in line with the objectives set for the proposed project extension. In terms of reach, 2,558 standard demonstration sites were established in 1999 A season. These demonstrations exposed some 80,000 farmers directly to new income-enhancing technologies.

While the number of standard demonstrations was reduced from around 2,600 to 2,300 during 1999 B season, nearly 2,000 adopting farmers' fields were used as technology transfer centres. This brought the total number of demonstration centres to 5,300. Total exposure in all the 20 districts was estimated in the region of 175,000-190,000 farmers by end of 1999 B season, implying an average exposure of 35 producers per demonstration site.

As can be observed in Table 6, there has been tremendous progress towards reaching producers with appropriate technology. Starting with only 8 demonstration sites and reaching less than 700 producers, the ADC demonstration activity has within a period of only 4 years expanded, reaching nearly 200,000 farmers in 1999.

Table 6: ADC LV Demonstration Activity (1995-99)

Particulars	1995	1996	1997	1998	1999
Number of districts	6	9	14	18	20
Total number of demonstrations	8	415	1,050	3,890	5,300
Number of standard demonstrations	8	355	775	3,000	4,070
Number of commercial demonstrations*	0	60	275	890	1,230
Number of farmers exposed	670	14,000	32,000	116,000	185,000

Source: ADC LV Demonstration Records.

*Note: * Number of commercial demonstrations refers only to those funded by the ADC. It excludes adopter fields.*

4.2.3 Outgrower Programs: The ADC continues to provide assistance to outgrower programs. Two active outgrower groups (Table 7) are currently receiving ADC support in addition to other PL-480 partner groups. As highlighted in section 4.1, internal prices for most agricultural commodities have been fairly high. The implication is that all sales from the supported activities go into local consumption and some informal export sales. As a result, the market linkage component has not been fully exploited and only the seed production schemes still require assistance in this area.

Table 7: Support to Outgrower Programs

Program and location	Activity	Outputs
BUFA – Kibaale	Multiplication of white alubia, white pea beans and red kidney	1,403 mt of the various varieties under multiplication produced and marketed into the local market. A total of 5,190 farmers effectively coordinated by the BUFA extension network.
IFCD - Rakai	Production of beans for seed and food	400 mt of seed grade K132 produced and sold through commercial seed traders as well as informal offtake into local and regional (western) markets.

Source: ADC LV Component.

4.2.4 Provision of Market Information: The ADC has continued to support the replacement of the defunct MNS under MTTI with an IITA/PL-480 partnership. Regular national forecast meetings continue to be held at the ADC on a monthly basis, and one-on-one market linkages are made where possible. The ADC Market Knowledge Information Systems (MKIS) has been revitalized with the position of MKIS officer having been filled and LV weekly bulletins being revived. To-date the LV component services over 60 clients with weekly price bulletins.

4.2.5 Seed Multiplication and Distribution: Seed multiplication activity has continued to focus at the rural seed production mechanism for beans through outgrowers. NASECO has been encouraged to become a producer of registered materials for the emerging private sector participants in certified production. According to records available at the ADC, both the number of firms and quantity of seed multiplied and distributed have increased significantly as shown in Table 8.

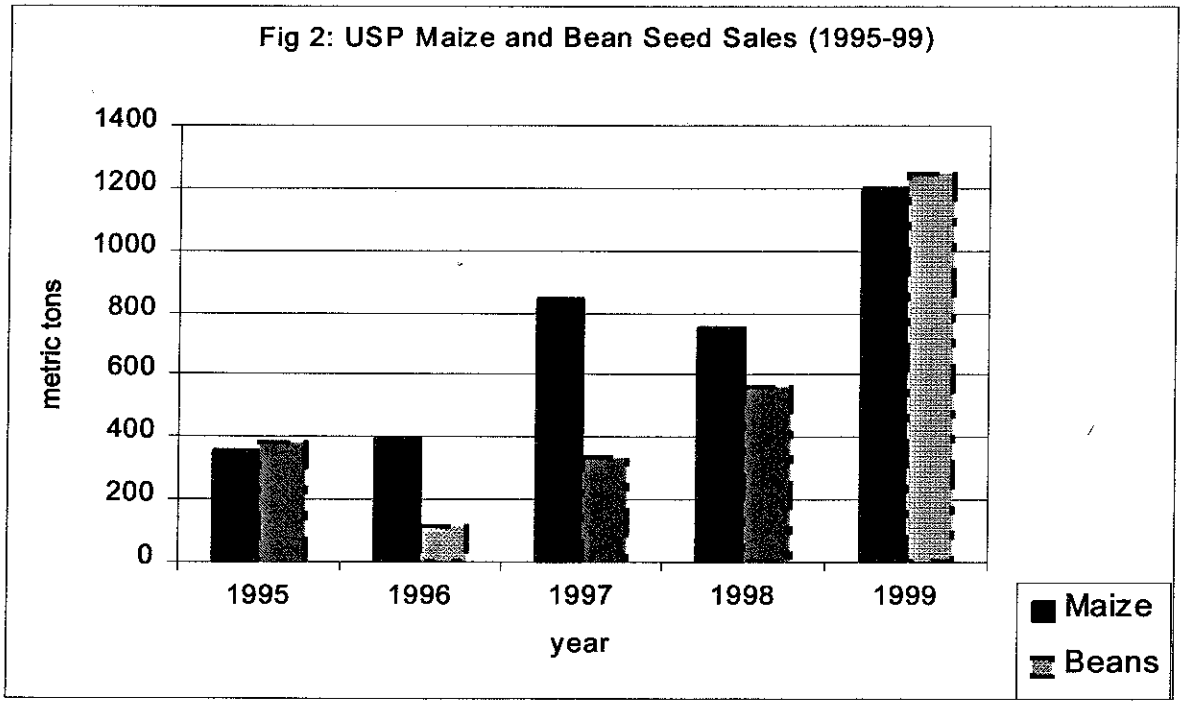
Table 8: Number of Firms and Quantities of Seed Multiplied and Distributed

Particular	Baseline position (1995)	Progress to-date (1999)
Number of firms multiplying improved seeds	1	11
Number of firms distributing improved seeds	1	11
Quantity of maize seed multiplied (mt)	800	5,390
Quantity of maize seed distributed (mt)	120	3,480
Quantity of bean seed multiplied (mt)	250	3,490
Quantity of bean seed distributed (mt)	30	2,220

Source: ADC Ninth Semi-Annual Progress Report (October 1999).

At the industry level, USP has continued to dominate the seed supply sector, with satisfactory production of the composite Longe 1. Hybrid production has, however, remained stagnant at approximately 20 mt per season over seasons A and B of 1999. Trends in USP seed sales for the period 1995 to 1999 are shown in Figure 2. As can be seen from the figure, annual sales of maize and bean seeds by USP increased by more than 59% and 55% respectively over the past 4 years. According to USP, most of the seeds have been marketed through input distributors, projects, outgrowers, and the ADC.

Fig 2: USP Maize and Bean Seed Sales (1995-99)



Source: Uganda Seed Project

Table 9 highlight producer groups assisted by the ADC under the seed multiplication support program.

Table 9: ADC Seed Multiplication Support Program

Producer group/Individual	Product	Large/small scale	Target Company	Support
Masindi Seed and Grain Growers Association	Maize (Longe/hybrid)	Large	USP	TA
Kinoni Farm	Maize (Longe)	Large	USP/Harvest/ 99 B to NASECO	TA
Mubuku Growers Association	Maize (Longe)	Large	Harvest	TA/PL-480
Naseco Seed Co.	Maize/Beans	Large	NASECO Seed/ all private sector seed houses	Market
IFCD coop activity	Beans	Small	USP/Harvest/ Magric	TA/PL-480/ Market
SAFAD Kamuli	Beans	Small	Harvest/ internal sales/Magric	TA/PL-480/ Market
Kabale Farmers Association (KADFA)	Climbing Beans	Small	KADFA internal sales	TA/Basic seed

Source: ADC Ninth Semi-Annual Progress Report (October 1999).

4.2.6 Commercial Farming Operations: The ADC LV component continues to work with a portfolio of over 40 commercial firms/individuals with over 3,000 ha under maize production. The involvement of ADC in commercial farming has spread to over 12 districts. Work with the banking sector continues in order to avail credit to these emerging farmers. Currently the ADC is working with CERUDEB and Standard Chartered Bank. CERUDEB is currently working with the PL-480 risk fund and recent meetings with bank management have led to their developing a new lending window for this facility. It is the intention of the LV component to have at least 40 clients screened as to their credit worthiness before the end of the work plan period prior to the start up of the 2000 A season.

4.2.7 Input Supply: Agribusiness Training and Input Network (ATAIN) which was started in 1998 continues to generate significant interest from both the local stockist networks and from members of the donor community and the MAAIF. ATAIN continues as the principal mechanism for input supply intervention and continues to receive encouraging response from the trade and other development agencies. Stockist numbers directly linked to the program remain higher than initial targets. Additionally and perhaps more importantly, stockists that are being taken on by ATAIN distributors without a credit guarantee continue to rise. The technical knowledge gained from the ongoing and now effectively on the job training still remains an important component of the success of the program.

The lack of backward financial support from distributor to wholesaler still remains a hindrance in many cases, especially where liquidity was severely hampered by a general tightening up in the banking sector following the closure of the several banks. This resulted in lower stock advances from wholesaler to distributor, and many distributors with reduced liquidity made the rational decision to maximize their limited resources by trading for cash at the district level. Through the ATAIN program, 3 district distributors and over 70 rural stockist are involved in input trade. Through this set-up, nearly 10,000 producers have been reached and input sales now reach over Shs 200 million per annum.

4.3 Farmer Level Findings

This section presents farmer-level findings in the 6 districts studied. The results are presented for three categories of farmers namely, non-adopters, partial-adopters and full-adopters. These are defined as follows:

- **Non adopters** refer to those farmers who were practicing traditional methods (i.e chop and plant, use of home saved seed and inadequate attention to their fields).

- **Partial adopters** refer to those farmers who had adopted low input technology (i.e good husbandry practices, timeliness, proper spacing/row planting and use of improved seed).

- **Full adopters** on the other hand refer to those farmers who had adopted high input technology (i.e low input technology plus use of fertilizers and some herbicides).

The key findings are grouped under 4 sub-sections as presented below.

4.3.1 Crop Production and Disposal: Annex 3 shows average area, output and yield by category of producer interviewed. Quantities retained for home consumption, reserved as seed and quantities sold are given in Annex 4. A summary of the key aspects is presented in Tables 10(a) and 10(b). From the tables and annex, the following observations may be made:

- Area under both maize and beans increased for all the three categories of producers. The annual average increases in area under maize and beans for non-adopters were 12.5% and 6% respectively. In case of partial adopters, area under maize and beans per producer increased by 25% and 12.5% per annum respectively. The corresponding increases for full adopters were similar to those of partial adopters (i.e 20-25% for maize and 10-15% for beans).

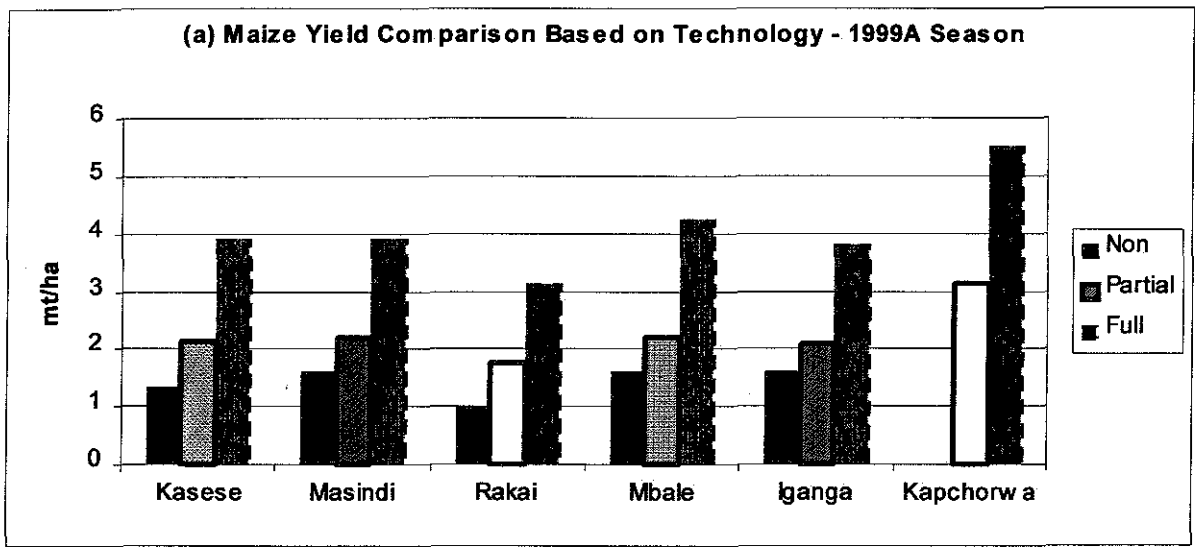
  The greater increase in area, particularly under maize by both partial and full adopters compared to non adopters was mainly due to economic reasons. Thus whereas adopters were observing positive returns and were therefore motivated to cultivate more land, the non adopters were on the other hand seeing no sense in expanding due to low output per unit area.

- Yields for adopters were significantly higher than those of non adopters as show in Figures 3 (a) and (b). From the figures, it may be observed that on average, use of improved husbandry coupled with use of improved seed, increases maize and bean yields by about 30-60% and 45-65% respectively. With application of fertilizers, yields may increase by a further 60-80% and 30-45% for maize and beans respectively.

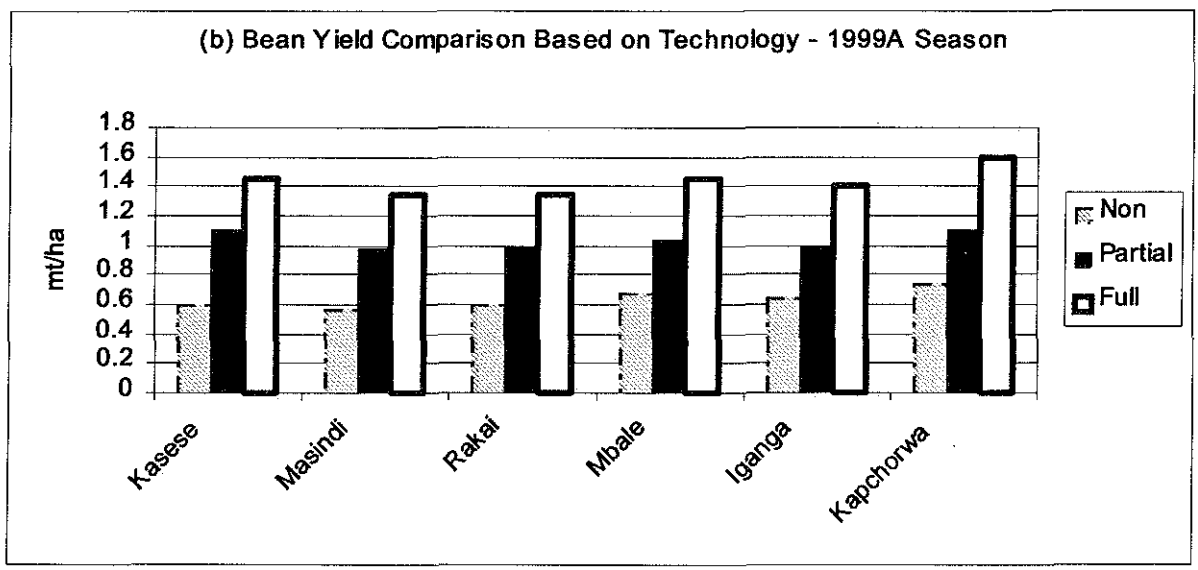
  This can be summarised in the form of ratios as follows:

Crop	Traditional	Partial Adoption	Full Adoption
Maize	1.00	1.30 - 1.60	1.90 – 2.40
Beans	1.00	1.45 – 1.65	1.75 – 2.10

Figure 3: Yield comparison by Levels of Technology



Note: The team did not find any non adopter in Kapchorwa as farmers interviewed all planted hybrid seed. There was, however, concern that some farmers could be planting "numberless" seed from Kenya. These are hybrid seeds, which are not certified.



Note: The team did not find no full adopters in Masindi and Iganga as farmers interviewed hardly used fertilizers on beans in these districts. The full adopter figures used are from one-acre demo farmers.

- The proportion of produce sold has over the past 4 years increased for maize and beans respectively by 10-15% and 20-30%. The increase has been higher for adopters than non adopters. The increase in proportion of both maize and beans sold shows that producers now consider maize and beans as major income earners compared to say 4 years ago. Furthermore, the fact that adopters sell a higher portion of their maize and beans implies that by investing in these crops, farmers expect to earn incomes, which would help in meeting their household needs. The drastic decline in use of home-saved seed is also an illustration of the fact that farmers have realised the benefits associated with improved seed and hence the wish to earn higher incomes.

Table 10(a): Average Maize Area, Output and Disposal by Category of Producer

Particular	Non-Adopter		Partial Adopter		Full Adopter	
	'95	'99	'95	'99	'95	'99
Area (ha)	0.4	0.6	0.3	0.8	0.4	0.8
Output (mt)	0.64	0.90	0.54	1.68	1.20	3.20
Yield (mt/ha)	1.6	1.5	1.8	2.1	3.0	3.5
% consumed	26	15	24	13	20	8
% as seed	2	2	2	0	0	0
% sold	72	83	74	87	80	92

Source: Impact Assessment Survey (1999).

Table 10(b): Average Bean Area, Output and Disposal by Category of Producer

Particular	Non-Adopter		Partial Adopter		Full Adopter	
	'95	'99	'95	'99	'95	'99
Area (ha)	0.2	0.2	0.2	0.4	0.2	0.4
Output (mt)	0.10	0.13	0.16	0.4	0.25	0.56
Yield (mt/ha)	0.60	0.63	0.80	1.00	1.25	1.40
% consumed	54	66	53	48	52	36
% as seed	17	18	13	0	5	0
% sold	29	16	34	52	43	64

Source: Impact Assessment Survey (1999).

4.3.2 Economics of Crop Production: An analysis of cost of production for the three categories of producers, using partial budget approach is given in Annex 5(a) and 5(b). The average situation by category of producer is summarised in Table 11. In the analysis, inputs have been valued at ongoing market rates and labour has been valued based on prevailing contract rates for the various activities. Since time taken for the various activities are normally not kept by farmers, the traditional approach to calculating cost of production using person days and wage rates has not been adopted. Instead analysis is based on costs incurred for each input/activity and net returns worked out. From the table and annex it may be observed that:

- Cost of production increases with the level of technology adoption. However, this increase is more than offset by the higher yields, resulting in lower unit costs. Thus for instance, for non-adopters, the estimated costs of production of maize and beans per hectare are respectively Shs. 204,000 and 177,000. In the case of partial adopters, the costs are respectively higher by about 25-40% and 35-50%. With high input technology the costs increase by a further 50-75% and 25-40% for maize and beans respectively. The increases are mainly attributed to increased cost of improved seed, increased number of operations resulting from better management and cost of fertilizers.

- Purchased inputs accounts for less than 5% of total cost in the case of non adopters. However, with increased level of adoption, the share of purchased inputs to total costs increases to about 10-20% for partial adopters and to over 30% for full adopters.

- Unit cost of production was lowest for full adopter and highest for non adopter. As a result, farm level profitability was lowest for non adopter and in some cases losses were observed. However, since to the producer the cost of production is actual costs incurred, many farmers (particularly where family labour involvement is high), do not realise that they are making losses.

- The unit cost of production (Shs/kg) of maize ranges between 90-120 for full adopters, 120-135 for partial adopters and 130-175 for non adopters. In the case of beans, the unit cost ranges between 200-240 for full adopters, 230-265 for partial adpoters and 270-320 for non adopters. In some cases unit costs of Shs 65-85 per kg were realised by farmers who planted hybrid varieties.

Table 11: Economics of Maize and Bean Production by Category of Producer

Particular	Non-Adopter	Partial Adopter	Full adopter
Cost of production ('000Shs/ha):			
- Maize	204	258	430
- Beans	177	251	340
Purchased inputs as % of cost:			
- Maize	3	12	43
- Beans	20	38	50
Yield (mt/ha):			
- Maize	1.50	2.10	3.85
- Beans	0.63	1.00	1.45
Unit cost of production (Shs/kg):			
- Maize	136	123	112
- Beans	283	252	234
Output:input ratio:			
- Maize	1.47	1.63	1.79
- Beans	1.06	1.19	1.28
Net profit ('000Shs/ha):			
- Maize	96	163	340
- Beans	11	49	95
Incremental income ('000Shs/ha):			
- Maize	0	67	177
- Beans	0	38	46

Source: Impact Assessment Survey (1999).

4.3.3 Income Levels and Expenditure Patterns: Table 12 shows income levels for the three categories of producers interviewed. These are compared with the baseline situation of 1995 and detailed in Annex 6. From the table and annex, the following observations may be made:

- There was general increase in income levels for the three categories of producers. Overall, males earned higher incomes than females. The increase in incomes was attributed to a number of factors, such as; the general increase in prices of most agricultural produce (including maize and beans), increased quantities of agricultural produce sold-off by producers and the general increase in wages. The higher increase in incomes of males than females may be explained by the fact that males have more avenues to earn incomes than females. While males may be involved in a number of income generating activities, the females are more pre-occupied with household chores which are usually not monetised. Besides, in terms of land resources, males have more say and are at advantage of utilising the land to generate incomes.

Table 12: Summary of 1999 Income Levels by Category of Producer (Shs '000)

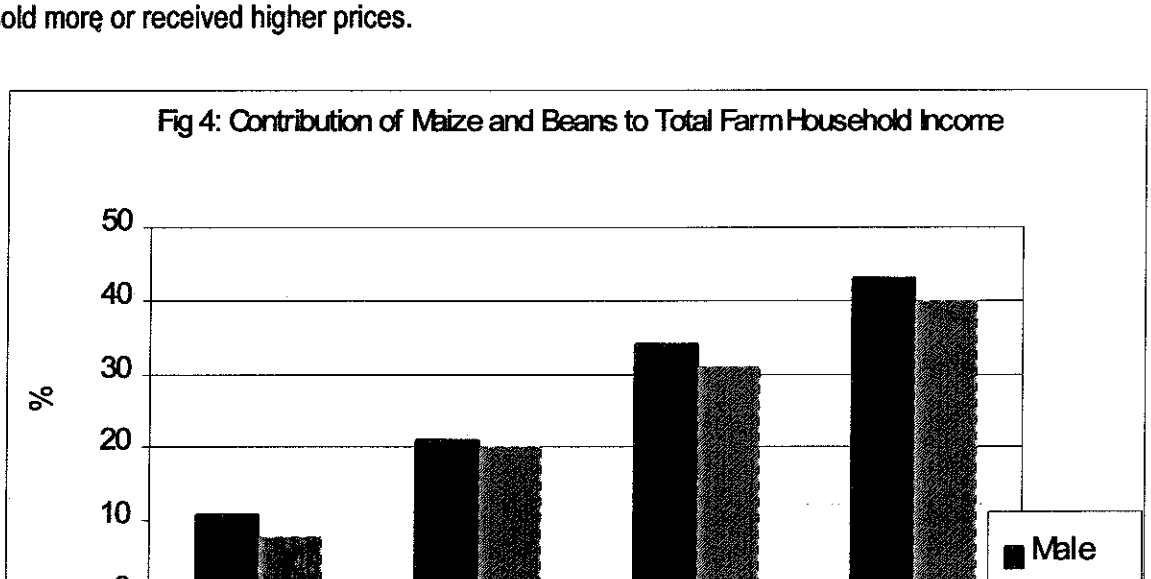
Income Source	Baseline		Non-Adopter		Partial Adopter		Full Adopter	
	M	F	M	F	M	F	M	F
Maize	77	35	187	139	336	240	533	385
Beans	26	17	20	24	62	58	86	84
Other sources	833	623	760	645	789	660	812	697
Total income	936	675	967	808	1,188	957	1,431	1,166
Maize & beans as % of total income	**11**	**8**	**21**	**20**	**34**	**31**	**43**	**40**

Source: Impact Assessment Survey (1999).

Note: M implies male-headed households and F implies female-headed households.
Other sources include other crops, livestock and by-products, and off-farm activities such as wages, trade, etc.

- The contribution of maize and beans to total income was highest among full adopters, followed by partial adopters and lastly non adopters. Compared to the baseline, shares of maize and beans to total income increased for all categories of producers (Figure 4). This would mean that maize and beans have become important dietary intake in institutions such as schools, hospitals, prisons, army, etc. and among the urban dwellers. This has had an impact in that producers have either sold more or received higher prices.

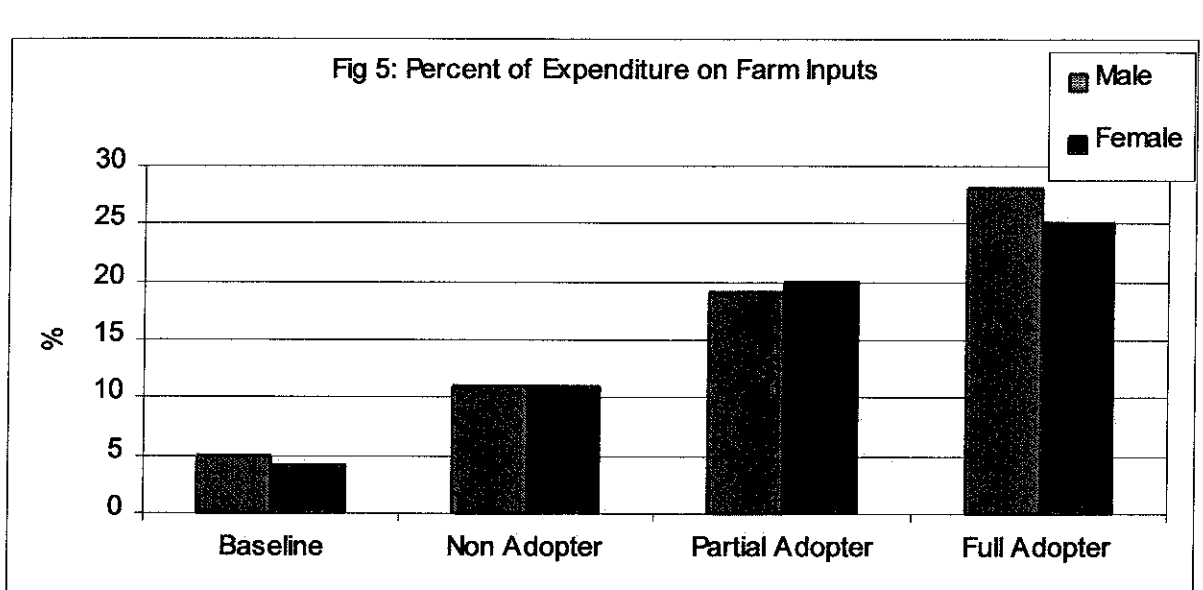
Fig 4: Contribution of Maize and Beans to Total Farm Household Income



Expenditure patterns for the different categories of producers are given in Table 13 and detailed in Annex 6. From the table and annex, it may be observed that:

- Expenditures on consumer goods (such as food, beverages, clothing and essential household items) are highest, accounting for 38-45%. Expenditures on other items (including transport, construction, school fees, medical, etc) account for between 32 and 42%.

- The rates of re-investment from incomes were generally low. As may be seen from Figure 5, expenditures on farm inputs accounted for 10% for non adopters and close to 20% for partial adopters. In the case of full adopters, farm inputs accounted for about 27% of total expenditure.



- Level of savings increased with the extent of technology adoption. In all the categories of producers, savings were higher for males than females.

Table 13: Summary of Expenditure Patterns by Category of Producer (Shs '000 per annum)

Income Source	Baseline		Non-Adopter		Partial Adopter		Full Adopter	
	M	F	M	F	M	F	M	F
Farm inputs	38	28	96	85	201	167	331	258
Consumer goods	409	288	395	333	420	351	454	394
Other expenditure	445	328	388	323	418	338	409	364
Total expenditure	892	644	879	740	1,038	856	1,194	1,015
Farm inputs as % of total expenditure	**4**	**5**	**11**	**11**	**19**	**20**	**28**	**25**
Saving	44	31	87	68	149	102	237	151

Source: Impact Assessment Survey (1999).

Note: M implies male-headed households and F implies female-headed households.
Other expenditures include health care, education, travel/transport, construction, purchase of hardware, etc.
Consumer goods include food, beverages and basic household items.

4.3.4 Social Status: Table 14 summarises key social status of the different categories of producers interviewed. The findings are compared with the baseline position established by Vinlaw Associates in 1996.

Table 14: Social Status by Category of Producer (as % of respondents)

Particular	Baseline		Non Adopter		Partial Adopter		Full adopter	
	M	F	M	F	M	F	M	F
Dwelling units								
- Good	13	8	14	9	20	18	26	22
- Fair	44	43	49	47	57	48	63	59
- Poor	43	49	37	44	23	34	11	19
No of meals								
- one	5	7	7	7	3	3	0	0
- two	30	38	35	38	33	33	13	19
- three	65	55	58	55	64	64	87	81
% of h/holds reporting incidence of malnutrition	5	5	7	8	3	2	0	0
% of children in school	85	83	93	93	100	100	100	100
% unable to attend treatment	7	7	7	8	2	4	0	1

Source: Impact Assessment Survey (1999).

From the above table and Annex 7, it may be observed that:

- Overall, the social status of both partial and full adopters has improved, while those of non adopters have worsened. The improved social status is attributed to the general increase in incomes, the Universal Primary Education (UPE) program and increased community awareness on the need to maintain hygiene.

- The general impression drawn from the table is that adopters have better living conditions, higher levels of nutrition and are more able to meet their medical bills. All these can be explained by the higher incomes and savings realised by adopters.

In summary, this section on farmer-level findings has shown that with every level of adoption, there is increased profitability of maize and beans. Yields are not only higher, but unit costs of production are lower, making the enterprise more profitable. Related to this are the associated socio-economic benefits resulting from increased incomes. These include improved living conditions, better nutrition and increased investments in other capital expenditures such as land and improved farm structures.

The study has also shown that adopters are more appreciative of the need to maintain quality of product. To this effect, the percent of adopters having improved storage (notably granaries, stores and cribs) was about 40-50% as opposed to non adopters (who mostly used part of their living rooms for storage). Accordingly, crop losses were observed to be higher among non adopters than adopters.

4.4 PL-480 Beneficiaries

This section presents findings on 30 PL-480 beneficiary farmers interviewed during the course of the study. The farmers represent a cross-section of other PL-480 beneficiaries. Out of the 30 interviewed, 16 were females and 14 were males.

4.4.1 Overview of PL-480 Assistance: In the districts visited, PL-480 was using NGO's as the channel for reaching producers. PL-480 assistance included mainly the provision of improved seed, fertilizers and supporting the extension system. The rationale for supporting and facilitating the extension system was to ensure that farmers received regular technical assistance.

4.4.2 Characteristics of PL-480 Beneficiaries: Most of the PL-480 beneficiary farmers interviewed may be classified as small-scale producers. They own hardly 3.0 hectares of land, while area under maize and bean production were 0.2-0.5 ha and 0.1-0.3 ha respectively. Over 80% were partial adopters and less than 20% were found to be using fertilizers (i.e full adopters). Yield levels were similar to those obtained by partial adopters discussed in section 4.3. Yields ranged between 1.75 and 2.50 mt/ha for maize and between 0.75 and 1.00 mt/ha for beans. In the case of full adopters, yield levels were 3.35-4.0 mt/ha and 1.15-1.35 mt/ha for maize and beans respectively.

Like in the case of partial adopters, PL-480 beneficiaries were found to incur between Shs.230,000 and 260,000 per ha for maize and Shs.230,000 and 270,000 per ha for beans. The unit cost of production for maize and beans worked out at Shs.120-150 per kg and Shs.240-275 per kg respectively. Close to 12% and 25% of the maize and bean costs were incurred on farm inputs (notably purchase of seed and hiring of labour). Table 15 summarises the basic farm particulars and profitability of maize and beans.

Table 15: Summary of Farm Particulars and Profitability of Maize and Beans

Particulars	Unit	Maize	Beans
Partial Adopters:			
Average are under crop	ha	0.2 –0.5	0.1– 0.3
Average output per holder	mt	0.35 – 1.25	0.075 – 0.30
Average yield	Mt/ha	1.75 – 2.50	0.75 – 1.0
% of output sold	%	65 – 80	40 – 60
% of output consumed	%	20 – 35	37 – 55
% of output reserved for seed	%	0	3 – 5
Cost of production	'000 Shs./ha	230 – 260	230-270
Purchased inputs as % of cost	%	9 – 12	18 – 28
Unit cost of production	'000 Shs/ha	120 – 150	240 – 275
Output: input ratio		1.45 – 1.73	1.15 – 1.35
Net profits	'000 Shs/ha	115-175	50 - 95
Full Adopters:			
Average are under crop	ha	0.2 –0.4	0.2– 0.3
Average output per holder	mt	0.65 – 1.60	0.23 – 0.40
Average yield	Mt/ha	3.25 - 4.00	1.15-1.35
% of output sold	%	70 – 80	50 – 65
% of output consumed	%	20 – 30	35-50
% of output reserved for seed	%	0	0
Cost of production	'000 Shs./ha	375 – 420	290-340
Purchased inputs as % of cost	%	30 – 45	40-50
Unit cost of production	'000 Shs/ha	105 – 125	220 – 250
Output: input ratio		1.79 – 1.98	1.25 – 1.50
Net profits	'000 Shs/ha	252-350	85-1640

Source: Impact Assessment Study (1999).

4.4.3 Farm Assets and Labor Utilization: Like most other farmers, the PL-480 beneficiaries mostly use hand hoes for opening land, with less than 30% being able to hire tractors. Other farm assets owned included pangas, slashers, axes and gunny bags. The most common form of labour was found to be family labour (accounting for between 60-80%) of total labour. In terms of gender, females tended to dominate farm activities, with males participating mainly in activities such as land cultivation, planting, weeding, harvesting and marketing. Table 16 summaries basic farm assets and labour utilization by male and female beneficiary.

Table 16: Farm Assets and Labour Utilization by Gender

Particulars	Male	Female
A: Farm Assets (Nos.)		
Hoes	5	3
Pangas	2	1
Slashers	1	1
Wheel barrow	1	0
Bicycle	1	0
Gunny bags	4	3
B: Labour Utilization (%)		
Family Labour	50 – 75	60 – 85
Hired labour	25 – 50	15 – 40
Male	30 – 40	20 – 25
Female	50 – 60	60 – 70
Children	10 - 20	5 - 15

Source: Impact Assessment Study (1999).

4.4.4 Major Production and Marketing Constraints: Table 17 presents major production and marketing problems as cited by the farmers.

Table 17: Major Production and Marketing Constraints by Gender

Production and Marketing constraints	Male		Female	
	Number	%(out of 14)	Number	%(out of 16)
Limited Land	5	36	8	50
Lack of capital	13	93	12	75
Expensive farm inputs	12	86	10	63
Low and fluctuating prices	10	71	11	69
Pests and diseases	5	36	7	44
Poor/lack of extension services	2	14	2	13
Poor storage	8	57	3	19
High crop losses	4	29	8	50
Lack of organized markets	11	79	10	63
Unfavourable weather	7	50	10	63
Lack of /expensive labour	8	57	5	31
Poor road network/expensive transport	8	21	4	25

Source: Impact Assessment Study (1999).

From the above, it may be observed that:

- Limited land and high crop losses were considered as major problems by the females.
- Lack of capital, low and fluctuating prices, expensive farm inputs and lack of organised markets were considered the major production and marketing constraints.
- Males considered poor storage and lack of labour as major problems.
- Lack of transport and lack of extension services were rated as less pronounced constraints.

4.4.5 Socio-economic Status: Analysis of income levels showed that on average, male and female beneficiaries earned total annual incomes of about Shs.1,150,000 and Shs.975,000 respectively in 1999. Out of this maize and beans accounted for 37% and 31% of the total incomes for male and female beneficiaries respectively.

In terms of expenditures, consumer goods accounted for 42% and 45% for male and female beneficiaries respectively. The corresponding percent on farm inputs and other expenditures were 18% and 40% for male and 15% and 40% female respectively.

Income sources and expenditure patterns for male and female beneficiaries are shown in Table 18 below.

Table 18: Summary of Incomes and Expenditures by Gender
(Incomes, expenditures and savings are in '000 Shs/annum/household)

Particulars	Male	Female
A: Incomes:		
Maize	350	225
Beans	80	75
Other Sources	720	675
Total income	1,150	975
Maize and beans as % of total income	37	31
B: Expenditures:		
Farm inputs	185	135
Consumer Goods	420	395
Other Expenditure	400	350
Total expenditure	1,005	880
Farm inputs as % of total expenditure	18	15
C: Annual Net Savings	**145**	**95**

Source: Impact Assessment Study (1999).

Table 19 summarises key social status of both male and female beneficiaries. The results are presented both in terms of the number of respondents and as percent of the total interviewed (i.e. 14 for males and 16 for females). From the table it may be observed that:

- About 20% of PL-480 beneficiaries live in permanent houses. Nearly two thirds of the males and about half the females live in semi-permanent structures. The percent of male and female beneficiaries living in temporary structures are 15% and 31% respectively. Compared to the baseline, there is a marked improvement.

- In terms of meals, nearly 80% of male and 63% of female beneficiaries acknowledged that they had 3 meals a day. About 20% of male and 31% of female beneficiaries had 2 meals a day. As a result rates of malnutrition was very low, at about 6-7% of the beneficiaries. Compared to the baseline, the PL-480 beneficiaries were again better off.

- In line with UPE, virtually all beneficiaries were able to send their children to school. In a few cases, farmers who had realised increased incomes had opted to take their children to private schools.

Table 19: Social Status by Gender

Particular	Male		Female	
	Number	% out of 14	Number	%(out of 16)
A: Dwelling Units				
Good	3	21	3	19
Fair	9	64	8	50
Poor	2	15	5	31
B: Number of Meals				
One	0	0	1	6
Two	3	21	5	31
Three	11	79	10	63
C: Households Reporting incidence of malnutrition	1	7	2	12
D: Households That are able to send all school age children to school	14	100	15	94
E: Households Unable to receive treatment due to cost consideration	1	7	1	6

Source: Impact Assessment Study (1999).

Note: Good implies permanent house with bricks wall, iron sheet and cemented floor
Fair implies semi permanent courses, usually with used wall, uncemented floor but roofed with iron sheets.
Poor implies temporary structures, sometimes grass thatched or old iron sheets which are leaking, uncemented floor and need walls.

4.4.6 Perception of Producers: The farmers interviewed expressed satisfaction with the support of PL-480. To them, without PL-480 support, they would not have been able to attain high yields. They acknowledged the good intentions of the participating NGOs. They expressed satisfaction with arrangement for distributing inputs to the producers. They observed that as a result of good performance in the field, other farmers were also either trying to become members of their local association or attempting to obtain improved seed and fertilizers.

Mrs. Jennifer Masaba in Mbale, one of the PL-480 beneficiaries had this to say: "I have been growing beans for all those years, but I have never achieved yields exceeding 3 bags per acre. With the support I received through PL-480 funding, I obtained 7 bags from one acre during the first season of 1999. This is indeed very encouraging and I hope to maintain the practice."

The farmers, however, expressed the wish that:

- Loans be availed to them and organized markets be in place.
- Since inputs were observed to be expensive, farmers were of the view that the PL-480 programme considers the possibility of linking farmers to some credit sources.
- Tractors should be in place to allow for ploughing of land on credit. Other inputs should also be made available within the vicinity of the producers.
- Training on quality and post-harvest aspects should be intensified.

4.5 Commercial Farming:

This section presents highlights of commercial farming operation in the 6 districts studied. For the purpose of this study, commercial farming is defined in terms of area under crop. Generally, a farmer with over 2 ha of maize was considered a commercial farmer. In the case of beans, over 0.5 ha was considered commercial. The rationale for this definition was dictated by the fact that a farmer cultivating in excess of the above was most likely to be market-oriented than subsistence. Besides, with average land holding of less than 3 a per household, a farmer cultivating over 2 ha of maize would certainly do it because of market forces.

4.5.1 Overview of Commercial Farming Operations: In the 6 districts, studied, most of the farmers interviewed went into commercial farming from mid 1990s. According to the farmers, the need to increase their income levels and the realization that large-scale farming pays, where the motivating factors. Some of the farmers had attended demonstration activities and some had hosted one-acre demonstrations. Arising from these exposures and the realization that there was huge demand for produce, a number of the farmers decided to venture into commercial farming.

Out of the 44 commercial farmers interviewed, 18 observed that results of demonstrations encouraged them to start commercial farming. Four observed that, they had actually hosted one-acre demonstration and this encouraged them. Thirteen went into commercial farming through loans from institutions and projects. Nine received initial inputs (seed, fertilizers) through groups. In summary the following factors motivated producers into commercial farming.

	Factor	Number
(a)	Demonstration field days	18
(b)	Hosting Commercial demonstration	4
(c)	Loans through institution/project	13
(d)	Inputs through groups	9

4.5.2 Area, Yield, Output and Common Varieties: Table 20 Summarizes, by district, average area under maize and beans, common varieties planted, yields, output obtained and number of people employed per commercial farmer. The table also gives types of technologies used in opening land, weeding, harvesting, shelling, drying and storage.

From the table, the following observations may be made:

- Average area under commercial farming was highest in Masindi (over 8.0 ha) and lowest in Iganga (2.0-4.0 ha). In the case of beans, area per farmer was generally low, at 0.6 – 1.0 ha.
- Typical maize yields per commercial farmer were in the range of 2.0 – 3.25 mt/ha in the lowlands and 4.0 – 5.25 mt/ha in the highlands. Yields for beans generally ranged between 0.8 and 1.5 mt/ha.
- On average, a commercial farmer employed about 12 people (30% of whom were females) on a continuous basis.
- Between 90-95% of the maize crop and 65-90% of the bean crop were sold.
- The most common means of opening up land was the tractor, with the exception of Kapchorwa and Mbale, where ox-ploughs were also used. The subsequent field operations were basically done manually (i.e. human labor). Drying was generally done on the floor or mats. Most of the commercial producers stored their produce either in the cribs or stores.
- The unit cost of production ranged between Shs. 105 to 230 per kg of maize and Shs. 225 to 275 per kg of beans depending on the technology in use.

Table 20: Summary of Commercial Farming Enterprises by District

Particulars		Kasese	Rakai	Masindi	Iganga	Mbale	Kapchorwa
Area (ha):							
Maize:	range	2.0-12.0	—	8.0-40	2.0-4.0	2.0-8.0	4.0-13.0
	average	4.00	—	16.00	2.20	3.00	5.00
Beans:	range	0.6-1.4	0.4-1.5	—	0.4-0.8	0.8-3	0.4-1.0
	average	0.80	0.60	—	0.60	1.00	0.60
Varieties:							
Maize		Longe 1	—	Longe 1	Longe 1	Longe 1, Hybrid	Hybrid
Beans		K132, White kidney	K132	—	K132	K132	K132
Output (mt)							
Maize:	range	3.5-25.0	—	14.0-101	4.5-15	5.5-30	20-50
	average	9.00	—	32.00	6.00	9.50	25.00
Beans:	range	0.6-1.75	0.3-1.50	—	0.4-1	0.8-4.5	0.6-2
	average	0.90	0.60	—	0.60	1.25	0.90
Yield (mt/ha):							
Maize:	range	1.75-3	—	1.8-2.75	2.0-3.25	2.50-4	5.0-7.5
	average	2.25	—	2.00	2.75	3.13	5.25
Beans:	range	0.9-1.25	0.75-1.125	—	0.8-1.2	1.0-2.0	1.25-2.0
	average	1.13	1.00	—	1.00	1.25	1.50
% of output sold							
Maize		95.00	—	90.00	90.00	90.00	95.00
Beans		90.00	65.00	—	80.00	85.00	85.00
Employment:							
Total		10	5	21	5	10	23
of which females		2	2	8	1	4	10
Technologies in use:							
Opening land		Tractor	Hand hoe	Tractor	Tractor	Tractor	Tractor, oxen
Weeding		Manual	Manual	Manual	Manual	Manual	Manual
Harvesting		Manual	Manual	Manual	Manual	Manual	Manual
Shelling		Manual	Manual	Manual	Manual	Manual	Manual
Drying		Ground	Ground	Crib	Ground	Mats/tarpaulins	Crib
Storage		Store	House	Crib	House	Store	Crib

4.5.3 Socio-Economic Status: On average, a commercial farmer earned about Shs. 1.80-5.5 million from the sales of maize and Shs. 0.2-0.5 million from the sale beans per annum. The contribution of maize and beans to total income account for between 45 and 60%. In terms of expenditure patterns, 25-35% were spent on farm inputs, 30-40% on consumer goods and the remainder on other items (such as education, health, transport, construction, etc).

About 25-30% of the commercial farmers interviewed lived in permanent houses and 70-75% in semi-permanent houses. Nearly all the households reported having 3 meals a day, none had any malnutrition-related diseases and all were able to send their children to school. None reported inability to receive treatment due to cost consideration.

4.5.4 Perceptions: Overall, the farmers expressed satisfaction with outcomes of commercial farming operations. They all felt that commercial farming does pay. However, for one to be successful, management was observed as a key aspect. A commercial farmer with 15 acres under maize observed: "Commercial farming indeed pays. I went into commercial farming because I realized there was market. I now supply the nearby schools. The earnings have helped me educate my children and construct a permanent building."

When asked what they thought should be done to encourage/boost their operations, the following emerged as the key suggestions.

- There was a need to train farmers in aspects of commercial farming. The key topics identified were record keeping, financial management, disease/pest identification and post-harvest management.
- Link commercial farmers to affordable sources of finance to allow for adequate working capital and ensure timely operations in the field.
- Help set up and strengthen commercial farmer associations at the district level. This would help unite farmers and act as a means for lobbying assistance.
- Ways and means of improving the marketing of produce should be sought. Farmers usually get discouraged when they receive very low price for their produce.
- Information flow should be improved. In particular, farmers should be provided with information about the weather and potential markets for their products.
- Supply of inputs such as seeds and fertilizers should be improved upon. Commercial farmers should be linked to input sources that allows for timely availability of required inputs.
- In order for farmers to open up large area, it is essential that they are assisted to acquire tractors or ox-ploughs.
- There is a need for a continuous technical support to farmers. For instance, farmers need to be guided on how to cut down on cost and kept abreast of any new technological developments (i.e new seed varieties, herbicides, etc).

4.6 Private Sector Participation

Like in other sub-sectors and indeed in the overall economy of Uganda, private individuals/firms play a crucial role in promoting maize and bean production and marketing. In the course of the study, the key participants were found to include: food aid agencies, exporters/produce buyers, NGOs, input distributors/stockists and grain millers. A summary of findings and extent of participation are highlighted in the sub-sections that follow.

4.6.1 Food Aid Agencies: For quite sometime now, food aid agencies have been the major buyers/exporters of maize and beans. Most of their procurement has gone to support the displaced and the hungry. Their operations have provided business to Ugandan firms as well as income to the rural producer. According to WFP (which is the leading food aid agency in Uganda), potential exists for Uganda to supply the Eastern, Central and Southern African region with food. However, a lot still needs to be done to improve quality and farm level efficiency if Uganda is to be competitive.

In terms of volume, it is estimated that, annually about 15,000 to 40,000 mt of maize and 5,000 to 15,000 mt of beans are procured by food aid agencies in Uganda (Table 21). The level of procurement by the food aid agencies are influenced in parts by their internal policies and political and security situations in the region.

Table 21: Estimated Volumes of Maize and Beans Procured by Food Aid Agencies
(Figures are in mt)

Year	Maize	Beans
1995	18,000	6,000
1996	16,000	8,000
1997	37,000	15,000
1998	42,000	11,000
1999	20,000	5,000

Source: Consultants' estimates
Note: The Food Aid Agencies include WFP, EU, ICRC, and UNHCR.

4.6.2 Maize and Bean Exporters/Buyers: To the farmer, the produce buyer plays a crucial role. It is the produce buyer who influences the price the farmer receives and hence the impetus to produce more. Quite often, the farmer can not reach the end users (i.e the urban dwellers, institutions, neigbouring countries, etc).

Trade in maize and beans, provides business and a living for hundreds of local traders. The biggest proportion of these crops enter into inter-district trade. The market linkage between the district-based traders and the centre (Kampala and major urban centres) is through a series of agents/dealers and middlemen who operate in fixed places or through traveling licenses. On average, a produce buyer procures about 300-600 mt of maize and 50-150 mt of beans annually.

All the major produce exporters are based in Kampala and there are hardly any up-country. They buy maize and beans mainly from the following districts: Iganga, Kamuli, Masindi, Mbale, Kapchorwa, Kasese, Mubende, Kabale, Masaka, Mbarara, Mubende, Lira, Apac and Ntungamo. The major

exporters on average procured about 5,000-10,000 mt of maize and 3,000-6,000 mt of beans per annum. Discussions held with some of the exporters revealed that maize and beans are procured against contracts whereby purchase orders are issued to produce buyers. Most of the exporters prefer Kampala as the procurement centre. It is at Kampala that produce buyers are paid upon delivery.

According to the exporters, the key problems encountered in procurement include:

- Poor quality of produce due to improper post-harvest handling and unfavourable climatic conditions.
- Free entry of foreign buyers who are not registered. This is compounded by the fact that there is no protection by Government on local buyers against foreign buyers.
- Small producers scattered over large areas making it difficult to mobilise large amounts of produce at short notice of demand.
- High transport cost, which is linked to the poor feeder roads and high fuel costs.
- Lack of good storage facilities both at producer and buyer levels.
- Lack of enough capital stock for expected demand.
- Lack of accurate data on expected output, making it difficult to project financial requirements.
- At planting, most farmers do not sort home-saved bean seed. As a result, output is composed of mixed beans, which in a number of cases do not meet market standards.
- Lack of market information system.

4.6.3 NGO Participation: Findings show that, both local and international NGOs have played a major role in promoting maize and beans at the district level. In the 6 districts studies, the following NGOs and associations were found to be active:

District	NGO/Association
Kasese	KADIFA
Rakai	IFCD, RDFA, CONCERN
Masindi	MASGGA, UCA, FOSEM
Iganga	MTEA
Mbale	MFA, BUYAGA
Kapchorwa	KAFA, Sukura Agro Supplies

Through support from PL-480, the UNFA branches in Kasese and Mbale have introduced maize and bean production programs, benefiting about 1,500 and 900 farmers respectively. Records available at these offices reveal output levels of 1,500 to 2,500 mt of maize and 900 to 1,500 mt of beans per annum. In Rakai district, IFCD (also with PL-480 support) has reached over 4,000 farmers with improved bean seed.

4.6.4 Input Distributors/Stockists: Arising from the perceived benefits of adopting improved technologies, there has been an increase in demand for inputs. The key inputs demanded by farmers are seeds, fertilizers and agro-chemicals. In the 6 districts studied, 2 input distributors emerged as key players in the agricultural modernization drive. These are RFS in Rakai and Sukura Agro Supplies covering the districts of Kapchorwa, Mbale and Iganga. Total sales of selected inputs by the 2 distributors over the past 2 years are shown in Table 22.

Table 22: Input Sales by Distributors

Distributor	Unit	1998	1999
RFS:			
- Maize seed	Mt	51.5	50.9
- Bean seed	Mt	4.8	6.3
- Fertilizers	Mt	48.5	53.1
SAS:			
- Maize seed	Mt	124.5	213.5
- Bean seed	Mt	3.0	46.0
- Fertilizers	Mt	115.0	853.0

Source: Impact Assessment Survey (1999) and ADC.

At the stockist level, sales levels have varied from about Shs 760,000 to Shs 33,392,000 worth of inputs per season. The good performing stockists serve about 150-200 farmers per season, with repeat sales to some of the farmers.

4.7 Environmental Issues

In the 6 districts covered by this study, current farming practice by the majority of households is oriented towards subsistence production. Basic inputs used for production include the hoe, panga and slasher. Mechanisation is quite limited and the use of agro-chemicals and other high tech inputs is very low, if any. Under these circumstances the promotion of maize and beans in these districts would not be expected to pose environmental hazards.

Despite this, there was growing concern among district officials and producers over the deteriorating environment and its associated natural resources. The key environmental issue observed at the subsistence level was basically land degradation.

Land degradation in general includes:

- Soil degradation (soil erosion and fertility loss)
- Deforestation due to agricultural encroachment
- Drainage of wet lands
- Physical degradation due to changes in soil physical characteristics as a result of continuous cultivation/reduced fallow lengths combined with poor land management practices.

Under soil degradation, there was soil erosion due to poor land management and lack of conservation measures. These were mainly observed in the highland areas of Mbale and Kapchorwa. Soil fertility problems were widespread in the districts covered, but more serious in densely populated areas.

Deforestation on the other hand was observed to take various forms:

- Agricultural encroachment
- Overgrazing
- Wood resource harvesting (charcoal production, firewood collection, timber harvesting, etc)
- Use by tertiary industries (brick burning, beer brewing, tobacco curing, etc).

Under this type of degradation, agricultural encroachment in forest was not the major factor for forest degradation. The main cause of deforestation was found to be wood resource harvesting and use by tertiary industries. Overall, the major factors found to be affecting the environment in the districts studied were:

- Loss of soil fertility due to over cultivation without leaving the land to rest. The most affected areas were Kasese and Mbale.

- Soil erosion due to poor management and lack of appropriate conservation measures, coupled with continued use of traditional methods of farming.

When the different categories of farmers interviewed were asked what environmental impacts they were facing, the key ones were observed to include soil erosion, deforestation/woodland clearance and use of wetlands as shown in Table 23.

Table 23: Key Environmental Concerns by Category of Producer (as % of producers)

Environmental concern	Small-scale producers		Commercial farmers
	Non Adopter	Adopters	
Soil erosion	35-60	20-32	10-20
Deforestation/clearing woodland	5-10	5-15	30-50
Use of hill slopes/tops	2-5	–	–
Littering	–	–	5-10
Pollution	–	–	0-5
Human health hazards	–	–	0-5
Use of wetlands	5-10	5-10	10-20

Source: Impact Assessment Study (1999).

It was observed that soil erosion and deforestation/clearance of woodland was highest in the hilly districts of Kasese, Kapchorwa and Mbale. Use of wetlands (in the form of swamps) was more pronounced in Iganga and Kasese while use of hill slopes/tops was observed in Mbale and Kasese.

The processing and marketing of maize and beans did not involve the use of environmentally hazardous materials. Virtually all the crops were marketed as grain, with little value added. Only maize was processed into flour for consumption (as meal or brewed into local gin) and there are numerous hammer mills in the rural areas for this purpose. The residues from processing were not quantitatively significant, and were generally disposed off in ways that posed no health hazards to people or animals.

On a positive note, the growing of maize and beans enriches the soils, while the use of maize stalks and cobs for fuel reduces on deforestation. The remains left to decompose in the field acts as manure. A general assessment was that there are at present still adequate land resources to allow for expansion of area without use of environmentally sensitive areas. Besides, maize and beans do not perform well in wetlands and other reclaimed land.

It can be concluded, therefore, that at the present time there are no serious environmental problems associated with growing and processing maize and beans. The areas to watch, however, are the effects of **acreage expansion, land degradation** and the **growing of maize continuously on the same fields** without allowing for adequate soil nutrition.

4.8 The Marketing of Maize and Beans

The marketing of maize and beans takes place either on the farm, at the buyer's store, or in the rural market. The percent of crop sold at these points vary from district to district. Where the demand for the produce is high and effective agent-buyer linkage exists, the percent of produce sold on the farm is higher. On the other hand, where a buyer or agent has a monopoly in an area, the percent of produce taken to the buyer's store is higher. In circumstances where effective rural market set-up, which allows for fair competition is in place, most farmers prefer to take their produce to the rural market.

Primary marketing is basically at the sub-county headquarters or at major trading centres within a sub-county or at a border point. Here there are semi-permanent structures for stores with capacities of about 30 - 50 bags. Such markets operate on a daily basis with the exception of Sundays. Buyers are mostly from outside the sub-county especially middlemen representing major urban buyers from district headquarters or outside the district. However, produce is also bought by institutions and some households within the sub-county.

At the secondary markets, produce bought is sorted and re-bagged for urban market especially to district headquarters or outside the district. These markets are basically at district or sub-district headquarters. Basically the markets are composed of big stores of major buyers who receive maize and beans from all over the district delivered by agents. These buyers supply schools, hospitals, high institution of learning, and sell outside the districts.

Significant cross border trade was reported to be taking place mainly with Kenya. It is estimated that over 40,000 mt of maize and 20,000 mt of beans will this year be traded across Uganda's borders. The main export destination by district is summarised below:

District	Destinations
Kapchorwa	Kampala, Mbale, Moroto, Kumi, Kenya.
Mbale	Kampala, Tororo, Soroti, Kenya.
Iganga	Kampala, Jinja, Tororo, Kenya.
Masindi	Kampala, Luwero, Hoima.
Kasese	Kampala, Bushenyi, Kabale, Rwanda.
Rakai	Kampala, Mbarara, Masaka.

4.9 District-Specific Findings

Maize is considered as a major income earner in 5 out of the 6 districts covered, namely: Kapchorwa, Mbale, Iganga, Masindi and Kasese. In these districts, maize ranks either first, second, or third in regard to household incomes. Between 70 and 90% of the maize produced is sold off by the households to earn income. Beans, on the other hand, are mainly regarded as a main household sauce and only small quantities (between 25 and 50%) are sold. As a result, beans generally rank low (fourth to seventh) in as far as income generation at the household level is concerned.

Out of the 6 districts surveyed, 5 are believed to produce significant surplus of maize while 1 is deficient in maize. In the case of beans, only 2 districts have fairly large surplus, 2 just enough and 2 districts in deficit as presented in Table 24 below:

Table 24: Maize and Beans Supply Status (1999)

Status	Maize	Beans
Significant surpluses	Kapchorwa, Iganga, Masindi, Mbale, Kasese	Mbale, Kasese
Just enough to small surpluses	---	Kapchorwa, Rakai
Deficits	Rakai	Iganga, Masindi

Source: Impact Assessment Study (1999).

Annex 8 shows trend in maize and bean production and extent of ADC involvement in the 6 districts studied. From the annex and discussions held, the following district analysis can be made.

4.9.1 Kasese District: In Kasese, the ADC has since 1995, worked with the Uganda National Farmers' Association branch (now known as Kasese District Farmers' Association – KADIFA). ADC has provided assistance in the following areas:

- Establishment of demonstration sites, support to production data collection, outgrower scheme, and market linkage initiatives
- Training of site demonstration coordinators
- Facilitating and providing demonstration kits
- Meeting district supervisory costs
- Supervising the activities in the district and providing technical back-stopping.

With the help ADC/IDEA Project, UNFA Kasese branch has been able to initiate and maintain the outgrowers scheme. Close to 2,000 farmers have received direct support under the outgrower/seed multiplication activity. With the provision of good quality seed for planting, assured market at harvest time, good farmer - buyer linkage and improved farming knowledge, there has been improvement in the socio-economic well-being of the people.

Through the ADC, an extension service support and seed procurement program has been put in place funded by PL-480. The ADC is employing 27 persons as demonstration site coordinators. These coordinators, due to ADC's training have acquired knowledge and skills necessary to help farming households in the agricultural modernisation drive. The number of farmers reached with technology has increased from less than 230 by end of 1995 to now over 13,000.

Technology adoption is on the increase, particularly aspects related to line planting/proper spacing and use of improved seed. It is estimated that about 20% and 35% of households now use improved maize and bean seed as opposed to about 5% and 10% respectively in 1995. Similarly, nearly 50% and 20% of farmers now plant maize and beans in lines as opposed to less than 20% and 5% respectively in 1995. On the marketing side, attempts have been made to link the producers to major buyers such as CEI, USP, Magric, etc. Between 1997 B season and 1998 B season, it is estimated that over 850 mt of beans were procured from Kasese under marketing arrangements supported by the ADC. This raised an estimated Shs 325 million as incomes to the producers.

On the input side, however, little progress has been made. The ADC instituted the ATAIN program in the district during season A 1999. There are now 15 stockists in the district. Key constraints identified in input distribution revolve around the lack of ready capital to stock inputs, high transport costs and defaults by farmers. As such input sales have been low, with only 3 mt of Longe 1 and less than 30 mt of fertilizers sold during 1999 A and B seasons.

4.9.2 Rakai District: Agribusiness Development Centre (ADC) maize and bean activities in the district started at a low level with a modest expectation, knowing very well the district was a deficit producer of maize and beans. With a view to addressing the questions of low productivity and on-farm inefficiencies, the ADC identified three pillars - technology transfer, input supply and output marketing - as key intervention areas. The ADC has worked with the Department of Agriculture staff and in close collaboration with viable NGOs and the private sector.

Over the years, it became necessary that in order for farmers to fully visualize the benefits of these practices, there was a need to increase the sizes of the demonstration plots. Consequently, one-acre commercial plots were encouraged. The number of demonstration sites has increased from just 22 standard demos in 1996 B season to 100 standard and 150 commercial demonstrations by end of 1999. Similarly the number of farmers attending field days increased from 328 to nearly 3,000 during the same period.

In response to the growing demand by smallholder farmers for improved agricultural inputs, the ADC developed and supported an Agribusiness Training and Input Network (ATAIN) program. The idea behind the ATAIN program was to build on the growing interest and demand for improved inputs, particularly at the village level. The objective was to establish a network of viable village-based input stockists. The ATAIN program has taken root in the district with RFS as the distributor to 23 stockists.

Through collaboration with the Irish Fund for Cooperation and Development (IFCD), the ADC during season B 1997 introduced 1mt of K132 bean seed for multiplication. The basic objective of the support was to establish a seed bank from which farmers could obtain improved quality seed for planting as well as stimulating commercial seed production at the village level. Results were encouraging and subsequently support was solicited from other collaborators notably PL-480. With the support of PL-480, close to 4,000 farmers have benefited and over the years, the volume of high quality bean seed produced in the district has increased to over 500 mt per season.

As the number of adopters increased over the years and the seed multiplication activity gained momentum, it soon became apparent that a market linkage initiative was necessary. Through field collaborators such as IFCD, RFS, stockists and extension staff, high quality K 132 beans have been sold to the seed industry as well as major grain buyers.

The overall benefit arising out of ADC experience in Rakai district has been increased awareness for close cooperation. The key players in the district - administrators, NGOs, extension agents, stockists and farmers - have appreciated the fact that no one organization has the capacity to transform the lives of the population in the district. Working together to achieve a common vision appears to be the main factor behind some of the successes recorded in Rakai district over the past few years. Some of the notable successes attained through ADC's collaboration with the various agencies in Rakai district are highlighted below.

- An estimated 15,000 producers have been reached with improved technology messages. The key aspects include use of improved seed, spacing and improved crop husbandry and post-harvest handling practices.

- Demand for improved seed, fertilizers and agro-chemicals has increased. For instance, nearly 25, 70 and 100 mt of improved maize, beans and fertilizers respectively have been sold by RFS over the past 3 seasons. It is estimated that about 50% of the households in the district now plant improved bean

seed (either purchased directly through stockists, distributed by Donors, saved from crop of past two seasons, or bought from neighbours on the multiplication program).

- Favourable relationship now exists among the distributors, stockists and farmers. As a result of training, stockists' knowledge of input handling and product knowledge has increased. The stockists now play an advisory role as well as sourcing inputs for farmers.

- Through a concerted effort of the extension agents and results from the demonstration plots, a number of farmers have adopted improved farming practices. An adoption survey carried out during first season of 1999 showed that for beans, an estimated 45% of the households planted in lines, 50% used improved seed and 6% applied fertilizers. The corresponding percentages for maize were 40%, 6%, and 4%.

- IFCD has been able to build upon previously discredited cooperative societies by working with those having credible leadership and good organizational set-up. These have been the basis of joint marketing efforts, where training on quality and good post-harvest handling has been effected.

4.9.3 Masindi District: The main activity in the district continued to be technology transfer through the UNFA office. The number of demonstration sites as well as farmers exposed show modest increase in comparison to other districts. Between 1996 A season and 1999 A season, the number of demonstration sites increased only from 11 to 59 and the number of farmer exposed increased from 226 to 756.

In terms of adoption, just about 20% of the farmers grow maize as a mono crop and less than 10% grow beans as a mono crop. About 20% of the farmers plant maize in lines. The corresponding percent for beans is 8%. In regard to use of improved seed, 15% and 6% of the farming community use improved maize and bean seed respectively. Use of fertilizers is quite limited at less than 3% and 0.5% for maize and beans respectively. It is mainly contract farmers for USP and a few up-coming commercial farmers who use fertilizers

Commercial farming is being perceived by the ADC as one way of having tangible impact in the district. To this effect the ADC has supported and continues to promote commercial farming ventures. About 10 commercial farmers are expected to be supported by the ADC from 2000 A season. Masindi is perhaps the weakest of the 6 districts studied. Both the input supply and marketing components were not present, and there was no strong history of application of hybrids or yield raising inputs. Although the UNFA branch in the district collaborates with MAAIF and USP, there is no well-organised and coordinated program to promote input usage such as fertilizers in the districts. Also, input suppliers and distributors were not operating in the district.

Despite these shortcomings, the results obtained from the demonstration component so far shows the potential benefits that the program can generate. A considerable level of awareness has also been created among both the farmers and the trading community. Consequently, there is evident adoption of line planting and use of improved maize seed. Among the trading/private sector participants, the Masindi Seed and Grain Growers Association (MASGGA) has demonstrated some interest and is eager to take up the business challenge of input distribution and marketing. However, the organisation set-up of the association is weak and finance is lacking. If the association is to perform to expectation, there is need to provide some technical and financial support.

4.9.4 Iganga District: ADC maize and bean program in the district started on a promising note in 1995. Although the Department of Agriculture has the overall responsibility of coordinating project activities, the ADC has worked with several agencies or clients with a view to ensuring that all the basic elements of maize and bean production and marketing are present. The main collaborators/clients worked with are the following:

Client/Agency	*Type of Cooperation*
Department of Agriculture	*Coordination of IDEA Project*
LIWODA	*Outgrowers Scheme/Seed Supply*
Buwome Seb Foster Finance Association	*Maize and Bean Product*
MTEA/UJIMA	*Marketing high quality maize*
SUKURA	*Inputs distribution*
MDA	*Seed Multiplication (Navy Bean)*
Iganga Commercial	*Seed Production/Commercial*
Deutch Forst Consult	*Seed Production/Commercial*

Over the years, however, some of the clients did not perform according to expectation. As a result, some of the areas of cooperation alluded to above are no longer operational. For instance, under the marketing arrangement involving direct financing of MTEA purchases through UJIMA, farmers were organised in groups and delivered their maize to 25 stores located throughout the district. The marketing in Kampala was arranged through UJIMA agents, who secured prices and arranged for MTEA to deliver produce to the buyers in Kampala. This arrangement assured the Kampala buyers of the supply of high quality maize, and in turn the farmers earned premium prices. Unfortunately, a combination of factors (financial, mismanagement, lack of vision and coordination) resulted in the fading away of the marketing program. On the production side, LIWODA received initial assistance of K131 bean seed, which was supposed to be multiplied within Luuka county. All the basic ingredients were in place, save for the marketing aspect. As a result, farmers' enthusiasm waned and over the years, the K131 seed multiplication activity has become something of the past.

On a positive note, the number of demonstration sites has increased from only 1 standard demo in 1995 B season to 526 (out of which 20 were commercial demos) by 1999 A season. Similarly, the number of farmers reached increased from less than 2,750 to over 21,000 within the same period. It is estimated that the percent of farmers now planting maize and beans in line has increased from 10% and 3% in 1996 to 67% and 20% respectively in 1999. Use of improved seed has increased from less than 2% in 1996 to estimated 15% for maize and 4% for beans.

4.9.5 Mbale district: ADC maize and bean activity in the district started in 1997 A season with the establishment of 20 demonstration sites (10 standard and 10 commercial). Over the seasons the number of demonstrations has increased reaching a total of 199 (170 standard and 29 commercial). Similarly, the number of farmers exposed increased from 330 in 1997 A season to 6,895 by end of 1999 A season. Input distribution in the district has been supported by the ADC through the ATAIN program. Records available at SUKURA show marked increase in input sales.

In terms of adoption, about 25% and 15% of the farmers grow maize and beans as single crops respectively. Close to 35% of the farmers plant maize and bean in line. About 40% and 25% plant improved maize and bean seed respectively. Less than 5% and 2% apply fertilizers on maize and beans respectively.

With the recommendation of the ADC, Mbale Farmers' Association (MFA) received support from PL-480 to increase maize and bean production. Over 1,000 households from 2 sub-counties have benefited under the program.

4.9.6 Kapchorwa District: The district has the unique characteristic of being a producer of hybrid maize. To a large extent therefore, the ADC activity has not been on introducing but rather on ensuring sustainance and increased adoption of technology.

Both the technology transfer and input supply component were quite strong and well established in the district. The complementarily of the two components was also quite evident and reflected in the relatively high rate of adoption of improved farming methods and the achievement of high yields. This success has largely built upon the long history of usage of the Kenya maize hybrids, and the availability of tractors and draft animals (oxen) for cultivation. Adoption of improved seed usage is estimated at 85% for maize and 25% for beans. On the use of fertilizers, an estimated 30% and 5% of the farmers applied fertilizers on maize and beans respectively.

The ATAIN program has performed quite well with the active participation of Sukura Agro Supplies in close collaboration with the Department of Agriculture staff. According to records at the Sukura branch, annual input sales were in the region of 100 to 130 mt of hybrid maize seed, 2.5 to 3.5 mt of bean seeds and 100 to 200 mt of fertilizers. At the stockist level, some had reached sales levels of over Shs 20 million per annum. Commercially oriented farms were also significantly present, adding another dimension to the level of activity, and facilitated the introduction of larger scale demonstrations. With its proximity to Kenya, Kapchorwa has generally not faced major marketing problems. The marketing problem in the district is rather related to the poor road infrastructure, which during heavy rains can be impassable, forcing traders to route the maize via Kenya to Uganda through Malaba.

In summary, it can be concluded that the ADC intervention model has not been implemented as a complete package in any of the 6 districts. In all the districts studied, either one or more of the ingredients were lacking or were found to be weak. The extent of the presence and strength of the different elements of the strategy in the six districts are shown in Table 25.

Table 25: Extent of Existence and Strength of LV Activities by District

District	Technology Transfer	Input Supply	Market Linkage	Commercial Farming	Institutional Linkage
Kasese	Strong	Weak	Necessary	Weak	Strong
Rakai	Strong	Strong	Necessary	Weak	Strong
Masindi	Fairly Strong	Weak	Unnecessary	Fairly Strong	Weak
Iganga	Strong	Fairly Strong	Unnecessary	Fairly Strong	Fairly Strong
Mbale	Strong	Fairly Strong	Unnecessary	Fairly Strong	Weak
Kapchorwa	Strong	Strong	Unnecessary	Strong	Fairly Strong

Source: Impact Assessment Study (1999).

Note: i) Strong implies well established; Fairly strong means noticeable but not vivid; Weak implies not very noticeable

ii) Necessary implies there was problem and the ADC had to come in

iii) Unnecessary implies not a problem and hence no need for ADC intervention.

4.10 Perceptions of Beneficiaries

(A) According to the NARO Maize and Bean Programs, ADC's assistance has been to support research programs, both on the station and on farm. With ADC's support, a number of varieties have been developed and some released. Both programs rated IDEA highly, pointing out that ADC's assistance has accounted for between 60-80% of requirements.

However, while the management at both the Maize and Bean Programs acknowledged that without ADC's support, their work would have been difficult, they nevertheless observed that:

- ADC's funding should look at the long-term perspective as well, not just at quick results
- NARO has staff in some of the districts where ADC is operating. It would therefore be useful if there was closer coordination between the NARO staff and ADC coordinators. This would improve efficiency and enhance sharing of knowledge.

(B) Major maize and bean buyers/exporters did acknowledge ADC's assistance. They observed that ADC was interested in having closer working relationships with commodity buyers and improving relation between the buyer and the producer. ADC has continued to provide market information, identify product sources, train buyers in marketing and storage for improved quality and provide weather conditions and production estimates. These, to them were very valuable support, which the ADC should continue to render.

However, in their views the exporters/major buyers felt that:

- There was a need to continuously identify market outlets
- The ADC should try and see how funds could be availed to exporters for procurement and be able to have stocks which could be supplied against immediate demand
- The ADC should target some exporters and link them to commercial farmers, have an organised market and provide funding/capital injection.

(C) The input distributors/stockists did acknowledge that the ADC has supported input distribution network through establishment of the ATAIN program, regular supervision and encouragement. According to them and a cross-section of stockists interviewed, the following benefits have accrued:

- At the distributor level, the program has helped in creating a favourable relationship with suppliers, stockists, and financial institutions. As a result, suppliers had increased the volume of credit to distributors at district level and consequently the volume of business has increased.

- The stockists have increased their range of inputs and through the credit arrangement, even stockists with little capital have been assisted to start up business and make some profits. The stockists have gained increased technical know-how and are able to explain the use of inputs to farmers. This has greatly improved their confidence in dealing with the products. Record keeping knowledge has helped stockists to monitor performance and make reconciliations.

  Mr Godfrey Mwanje, a stockist at Bukunda in Rakai district observed: "The ATAIN program has not only increased our turnover, but more so cultivated a closer tie with the farmers and distributor. Stockists now have a better understanding of the products they are dealing in. To consolidate the achievements, it is still necessary to continue with the training program."

Both the distributors and stockists observed that at the farmer level, there has been an increase in the use of improved seeds, fertilizers and crop chemicals. This was due to the fact that with the establishment of rural stockists, inputs were now nearer the farmers, implying shorter distance covered. Arising from use of improved seed and fertilizers, some farmers have reported increased yields and consequently increased incomes.

According to the management of both Sukura Agro Supplies and Rakai Farm Supply, the ATAIN program has cultivated closer ties with suppliers and stockists. They observed that ADC's vision of reaching the farmer through the establishment of rural stockists was a good idea, which ought to be maintained and expanded. They also noted that prospects for expansion were great. They felt that with a positive attitude and self-motivation, it should be possible for a stockist to serve more than 300 farmers per season.

They, however, observed the following key constraints:

- Lack of adequate working capital to cater for the short duration of credit.
- High costs of monitoring, supervision and credit recovery.
- Low levels of income at the farm level hence lower demand than would have been expected.
- The issue of seasonality which calls for timelines in securing funds and inputs. Yet in a number of cases inputs are not on the market in time. This has affected sales levels.
- Poor/fake inputs in the market. Particularly mentioned was the "numberless" hybrid from Kenya.

(D) A number of producers did acknowledge that before ADC involvement in maize and beans, yields per hectare were very low (less than 2.0 mt and 0.7 mt per hectare for maize and beans respectively). Due to ADC's technology transfer activity through establishment of demonstration sites, training and providing support to site coordinators, farmers have realised tangible benefits. With the improved yields more farmers are adopting use of improved seeds, fertilisers and farm households. Increased income through increased output has enabled farmers to pay school fees, meet medical charges, invest into farming through purchases of fertilisers and improved seeds and meet other household requirements.

The benefits accruing to farmers was perhaps best summed up by Mr Ezra Namisi (in Sironko, Mbale district) who observed: "Before ADC intervention, I was growing unimproved maize seeds and not applying fertilizers. I used to get only between 4 - 6 bags per acre. When I started using improved seed I started getting between 8 - 12 bags per acre. Last season (1999 A season) I applied fertilizers and used improved seeds. I got between 18 - 21 bags per acre. Many farmers around me were impressed and now a good number of them are adopting the use of improved seed and a few would like to apply fertilisers."

(E) NGOs/Associations interviewed expressed satisfaction with PL-480 grants. Technical support provided by the ADC was also well appreciated. The beneficiaries, according to the officials, have been the rural producers, who had no means to buy improved seed and fertilizers. The key challenge was to move the producers from a seemingly "needy" situation to that of "self sustainance" without PL-480 support. There was general feeling that performance could be enhanced with increased mobilisation, training and supervision. To this effect, there was a need to strengthen the technical capacity of the NGOs/associations so that they could play effective extension roles.

(F) ADC District Coordinators noted that the ADC had assisted the districts in a number of ways, including establishing demonstrations, supporting input supply, supporting outgrower initiatives, training site demonstration coordinators, facilitating and providing demonstration kits, meeting district supervisory costs and supervising activities in the districts with a view to providing material, technical and financial support. With the help the ADC, various districts had been able to secure PL-480 grants to initiate and maintain the outgrower schemes. Annex 10 provides assessment of ADC's involvement in maize and beans as perceived by the District coordinators.

According to the District Coordinators, the key achievements arising out of ADC involvent were:

- Improved farming methods through adoption of improved seeds and line planting, resulting in increased productivity
- Strengthening market linkages, resulting in increased rural incomes
- Improved food security
- Increased presence of extension workers in the field, resulting in improved extension-farmer relationship
- Closer cooperation among different agencies
- Provision of market information on types of varieties and respective quantities in demand
- Expansion of the input distribution network
- Introduction of bean seed multiplication activity.

Despite the above achievements the coordinators felt that the ADC should focus more on the following:

- Post-harvest losses through training and encouraging farmers to construct storage/drying facilities
- Commercial maize production through encouraging farmers and increased demonstration with focus on commercial demos
- Ensuring increased adoption through increased training and farmer outreach through commercial demos
- Coordinating supply of certified seed
- Continued research on short duration varieties
- Establishment of market information network.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The rationale for adopting the vertically integrated commodity systems approach was to create favourable conditions, by first of all allowing for a wider multiplier effect in the production-marketing chain and secondly ensuring future sustainability of the production and marketing systems.

In the course of implementation, ADC/IDEA has increasingly placed emphasis on:

(a) Identifying and promoting commercial farming as an entry point for new technology and the use of new inputs;

(b) Encouraging production for profit, rather than the casual approach by most of the subsistence farmers;

(c) Graduating "today's" small-scale farmers into "tomorrow's" commercially oriented enterprises.

ADC has involved participatory methodologies to strengthen the capacity of farmers and other actors to adapt to changing needs and conditions and make agriculture sustainable. ADC's experience is combined with farmers' knowledge of their own localities generated from own and ancestors' experiences for purposes of agricultural development.

This strategic perspective is important in the context of the current government's efforts and search for policies and strategies to modernise Uganda's agriculture, and has been well noted and appreciated by a large section of respondents during the course of this evaluation. According to most of the respondents, the ADC intervention in maize and beans has had several positive outcomes. In particular, the following landmarks are worth noting:

- Beginning with a few sub-counties in a few districts, the program has spread rapidly to 20 districts. The spread has been demand-driven, as many farmers' associations and local leaders have realised the opportunities offered by the ADC and have sought the assistance of the program. As a result, many farmers, companies and associations have benefited individually and collectively, both directly (through demonstrations, seed supply, training and financial assistance) and indirectly (through the multiplier effects and linkages especially in input supply and marketing support);

- Records available at the ADC indicate that since the establishment of demonstration program in these districts, the number of farmers exposed to improved farming methods has increased from about 700 by early 1995 to over 185,000 by the end of 1999. Although these numbers include repeat visits and casual observers, they nonetheless show tremendous efforts towards reaching the rural farmer with improved farming practices. The number of adopters has similarly increased. Based on ADC surveys and contact visits by the extension agents, the extent of adoption at the district level range between 20-55% for low input and 1-15% for high input technologies (Annex 9). At the industry level, it is estimated that over 200,000 farmers have been reached (both directly through field day attendance, seed multiplication program, PL-480 supported activity, outgrower schemes and indirectly through multiplier effects).

- A number of firms dealing in produce trade and input distribution have been able to kick-start their business partly with ADC/IDEA Project assistance. Some of these companies now receive regular

market knowledge bulletins, which are issued on a regular basis by the ADC, and some have received financial as well as technical support. For some, business opportunities have been created through linking them to specific markets;

- Institutions such as UNFA, Agriculture Departments in some districts, USP and NARO have also benefited from their linkage to ADC/IDEA Project. These organisations' profiles have been enhanced through association with the ADC.

- Enthusiasm of a large number of farmers in several districts has been harnessed, in a situation where other public services have declined through budgetary cuts and retrenchment of government extension workers. The new form of collaboration involving the project, farmers, local companies, associations and public sector institutions has created new opportunities and direction for the producers.

- Through the ATAIN program, farmers have been reached with inputs such as seeds, fertilizers and crop chemicals. Stronger ties now exist between the farmer and the stockist as the latter has taken on the roles of both an input dealer and extension agent.

- Commercial demonstrations have also had a significant effect, especially in terms of what can be done with modern technology on a medium scale. Yields achieved in these demonstrations have been impressive, with maize varieties performing at between 3.5 and 5 mt per ha.

- Increased yields have resulted in increased marketable surplus. As a result, the shares of maize and beans to total income have increased. The increased rural incomes have helped producers meet their domestic requirements and a few have invested inland and housing.

- Growers have been exposed to modern production practices, initially by being shown the activities at Kinoni Farm in Nakasongola. Arising out of farmers' interest, a commercial training school has been established at Kinoni Farm, where larger scale operators spend a week participating in the activities essential to good and profitable farming.

- A key contribution of the ADC on maize and bean marketing has been the provision of market knowledge information services (MKIS). The MKIS office has sourced information from both regional and local sources. This information has been analysed by MKIS and disseminated to ADC clientele and the number of users has been increasing since its inception in June 1996. The current number of regular users served by the MKIS office averages 60. Direct provision of market information to traders/exporters has helped in reducing marketing costs and improving market responsiveness, thereby enhancing exports. The information provided by MKIS has enhanced the marketing decision process at both regional and international levels.

5.2 Key Issues

Despite the above positive achievements, there are still a number of constraints the Low Value (LV) component will have to contend with. A few of these are cited below.

- The implementation of an intergrated commodity systems model (which encompasses technology transfer, input supply and market linkage) calls for an effective private sector participation. Furthermore, institutional linkages were found to be important pre-requisites for a successful introduction and adoption of new innovations.

The issue is therefore strengthening the involvement of the private sector and creation of a stronger linkage among different institutions in order to ensure sustainability.

- Based on figures provided by the ADC District Coordinators, the percent of producers reached with technology ranges from 35 to 55%. This is a good achievement in a spell of less than 5 years. On the input side, however, less than 10% of the households have access to inputs. The issue is how to increase access to improved technology and the use of inputs such as seeds and fertilizers.

- Sustained adoption of improved technology was not always evident. Even farmers who had seen and acknowledged the benefits of such inputs as fertilizers were not consistently using them- citing lack of funds. The issue here is what ought to be done to orient producers' attitude towards re-investing on the farm.

- The majority of maize and bean producers are subsistence farmers, who produce mainly for home consumption and rely on low input/low output technologies. The subsistence farmers are slow in adopting better farming practices as they tend to stick on traditional methods of farming. They lack vision and some have negative attitudes towards the use of certain inputs (e.g. some believe that some fertilisers spoil soil). The issue here is how to transform farmers into "commercially-oriented" producers so as to realise surpluses for the market.

- There was a general complaint within the ADC project districts that during periods of good harvest, marketing was a problem. The main issue here is what can be done to ensure that the market handles the surplus at the producer level.

- The inability of producers to adopt low and high input technologies was partly due to lack of funds. Even at the commercial farmer level, the need for working capital to allow for timely field operation was quite great. Credit is therefore an issue that requires some consideration.

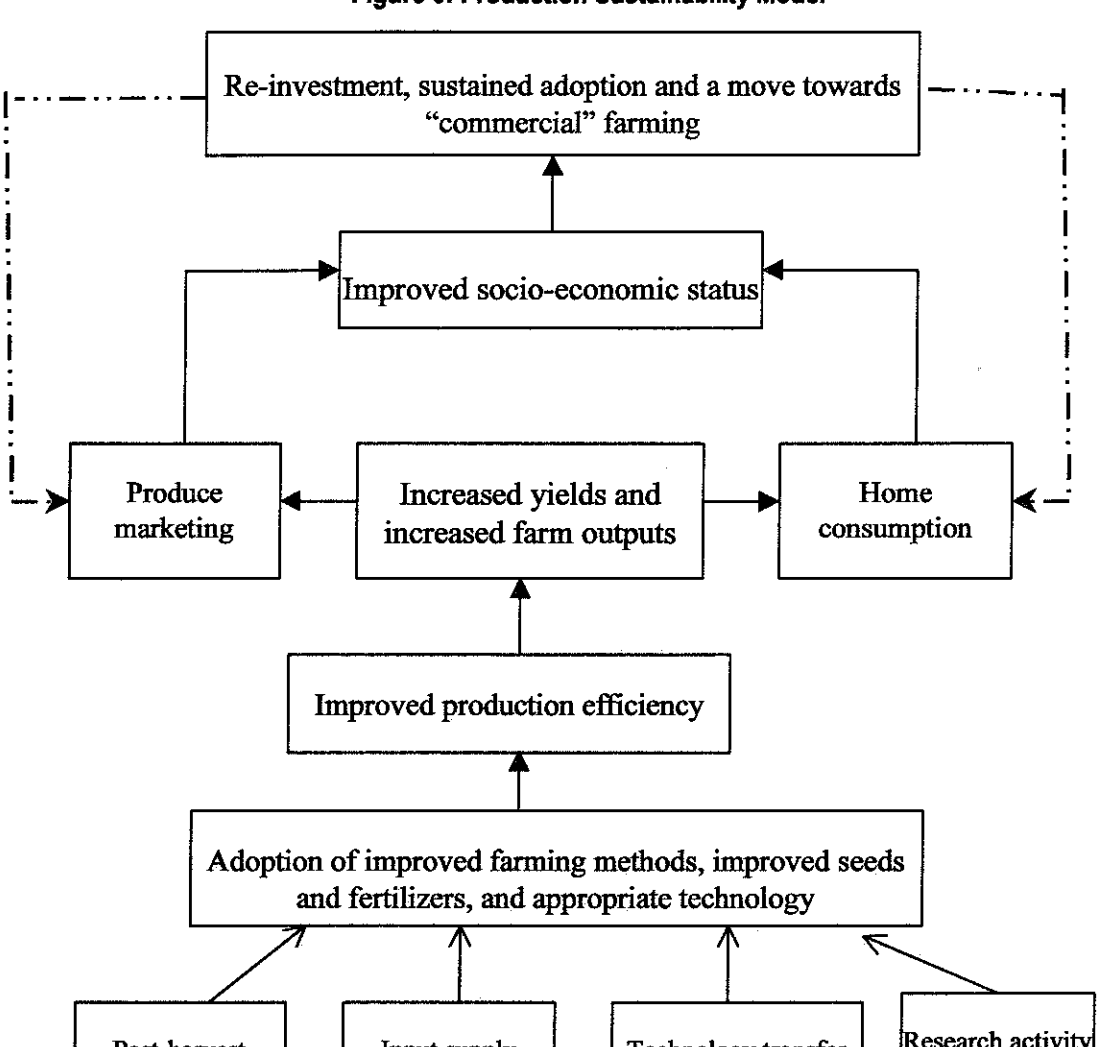
- The ADC has continued to support both the National Maize and Bean Programs, accounting for about 80% of their financial requirements. Is the ADC able to continue supporting research for a long time? Is the focus of research sufficiently market-oriented? The issue of research becoming self-sustaining beyond IDEA is the case in point.

- The promotion of maize and beans (like any other development activity) could have adverse impacts on the environment. This is in regard to bush clearing, deforestation and use of environmentally fragile areas such as hill slopes. The issue is how to ensure that project activities do not adversely impact on the environment through adequate monitoring of key variables.

5.3 Recommendations

From the foregone, the key issues, which emerge from the impact study revolve around the need to sustain achievements and translate them into tangible results and lasting impacts. These include; reaching the producer with appropriate technology and inputs, ensuring farm level efficiency and adoption of technology, minimising post-harvest losses, linking the producer to a market and credit source, and ensuring re-investment with a view to moving the producer towards an efficient "commercial" farming operation. These factors can be presented diagrammatically as shown in Figure 6. As seen from the inter-relationship, lack of focus on one or some of these factors would lead to unsustained maize and bean production operation.

Figure 6: Production Sustainability Model



Source: Derived from Study Findings

Based on the study findings, observations, beneficiaries' perceptions and with a view to ensuring sustained and progressive gains, the following sets of recommendations are proposed.

- **Enhancing Integrated Commodity Systems Model and Institutional Linkages:** With a view to ensuring sustained gains, the ADC should identify key players in its areas of operation and cultivate a spirit of togetherness among the key players. Both the private (e.g input duistributors/stockist) and public (such as extension agents) sectors should be encouraged to work for a common vision.

- **Reaching the Rural Producers:** For more effective outreach and sustained adoption, the ADC should continue placing more emphasis on the use of adopters and commercial farmers. Input supply network should be encouraged and supported as much as possible, so that more farmers are reached with basic inputs such as seeds and fertilizers.

- **Re-investing on the Farm:** The ADC should through its training and extension, encourage farmers to re-invest part of their earnings. For instance, farmers could be encouraged to deposit some money with the input distributors/stockists prior to the season.

- **Improving Farm-Level Efficiency:** The ADC should continue highlighting in its training program, the need for efficiency. It should explore and introduce cost-saving measures such as use of herbicides even for small-scale farmers. There is also a need to encourage farmers to own proper storage (such as cribs) in order to reduce on the high post-harvest losses.

- **Commercial Farming:** The ADC should continue with its commercial farming activity and intensify it to embrace a wider spectrum of clients. The ADC should, however, select commercial farmers on the basis of past production performance and ability to sustain increased market demand and where possible, select farming associations like women groups.

- **Marketing:** The ADC should refocus its market interventions by providing direct support to traders/exporters. There is a need to support traders/exporters to improve their marketing skills and to increase efficiency in the market chain, through business training, post-harvest and quality control, etc and to provide market information and processing and handling/packaging technology. Workshops and seminars could be such avenues through which such support could be channeled. There is also a need to improve the national food storage situation through the use of hitherto unutilised silos.

- **Provision of Credit** The ADC should consider facilitating some kind of financial support to commercial farmers and major buyers/exporters. Of particular note is the need to link farmers and produce buyers to affordable lines of funding. The current undertaking by the ADC in working with the banking sector should continue and even expanded.

- **Research Considerations:** The ADC should continue supporting the Maize and Bean Programs with focus on short duration varieties as well as those with export market potential. However as this is being done, there is a need to identify ways through which research activities would continue beyond the life if IDEA. Sustainability of research activity should be reviewed and appropriate steps taken to unsure that the Maize and Bean Programs will still be active even after IDEA project has closed.

- **Environmental Considerations:** The ADC should, in its training program, emphasize improved environmental practices. These should include contour farming, planting grass strips, returning organic matter to areas suitable for cultivation, crop rotation, proper use and disposal of chemicals, fertilizers and pesticides, and other soil conservation through financially viable alternative farming system that encourages conservation. Furthermore, the ADC should regularly monitor the extent of encroachment on the sensitive areas, agronomic and soil conservation practices and agrochemical usage. ADC should continue working closely with NEMA.