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GROWTH THROUGH INTEGRATION: USING COMMODITY SYSTEMS TO LINK PRIVATE SECTOR AGRO-INDUSTRIES TO FARM PRODUCERS AND DOMESTIC AND EXPORT MARKET CONSUMERS

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Analysis of Corporate Sector Constraints in Agriculture (ACSCA) Project

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A. Introduction

The purpose of this paper is to illustrate that significant private sector agro-industry formation is achievable in Pakistan without government subsidies, import substitution protection or public sector ownership of productive assets, in whole or in part. The basis for this optimism is the result of 27 months of agricultural policy, agribusiness and agro-industry research carried out under the Analysis of Corporate Sector Constraints in Agriculture Project (ACSCA). This paper is based on what we learned from our research.

The subjects covered in this paper include agro-industry research, commodity systems and agro-industry farmer linkages, agribusiness investment parameters, and a proposed oilseed agribusiness investment concept to stimulate the growth of the non-traditional oilseed seed sector in Pakistan.

In January 1989, at the request of the Government of Pakistan (GOP), the United States Agency for International Development (USAID) entered into a contract with my company, the RONCO Consulting Corporation, to identify and analyze the constraints and opportunities affecting private sector agro-industry development in Pakistan. In collaboration with our colleagues, Agri-Bi-Con International (Pvt) Ltd., and the International Center for Agriculture and Rural Development, Colorado State University (CSU), we prepared an **ACSCA National Agribusiness Action Plan** to guide policy formation and governmental efforts to promote private sector agro-industry investment, and the formation of viable agribusiness in Pakistan.

B. Research Components [1]

Our research comprised three components of analysis:

1. <u>Government Policies, Regulations and Bureaucratic Procedures</u>

   An assessment of the policy environment was carried out to determine how government intervention and action affects investment in the agro-industry sector. The results of this research are presented in the **ACSCA National Agribusiness Assessment Report.**

2. <u>Agribusiness Enterprises in Pakistan and the Structure of Agro-industry</u>

   This work comprised an in-depth empirical analysis of the status of public and private sector agribusiness operations and the agro-industry sectors in which they

operate. Our research focused on the marketing, production, management, financial practices and viability of current agro-industry activity in Pakistan. Data essential to our analysis was derived through field research carried out at company locations throughout Pakistan.

Some 200 private and public sector companies, trade associations, federal and provincial governmental entities, development finance institutions and international donor agencies participated in this component of ACSCA. The principal agro-industry sectors analyzed were:

- **o Fertilizer and Pesticides**
- **o Farm Machinery and Implements**
- **o Seed Production and Distribution**
- **o Edible Oil Manufacturing**
- **o Livestock Feed**
- **o Food Processing**

Research reports were prepared on each of these sectors. A summary of the results of our agro-industry research will be published in an **ACSCA Agribusiness Industry Case Study Report.**

3. Linear Programming Model

Since ACSCA is primarily a policy analysis and agro-industry investment promotion project, it was designed to include the development of a quantitative model to evaluate the impact of proposed structural and economic changes in the agro-industry and farming sectors. The model has the capability to simulate supply and demand response resulting from a wide range of simultaneous changes in resource allocations, agro-based production and market prices within the agricultural economy. We use the model to assess the probable economic impact of changes caused by market deregulation, the denationalization of state owned enterprises, and providing economic incentives to increase farm output, generate new investment in value-added commodity processing and improved technology, and expand domestic and export agro-based product markets.

The model and the capability to use it will be transferred to the Agribusiness Cell and the Economic Wing of the Ministry of Food, Agriculture and Cooperatives. The model and the results of simulations carried out will be published under the name of the **ACSCA Pakistan Agricultural Sector Model.** We feel this component of ACSCA is an invaluable tool for economic policy formation and analysis.

C. Why Agro-Industry Research Is Necessary

The type of research carried out under ACSCA is essential to identify and target the promotion of specific agribusiness formation and investment opportunities which maximize the use of scarce human, material and financial resources. In my view, there

are no short cuts or cost effective alternatives to rationally achieve these objectives.

In addition, our research also forcefully demonstrates that increasing the productivity and economic impact of the agricultural sector is now largely dependent on balanced growth and investment in agro-industry within the framework of integrated commodity systems and markets. From a policy and investment promotion viewpoint, therefore, understanding commodity systems, and market interaction within such systems, is a base line requirement to guide public and private sector efforts to create and strengthen the structural and business linkages between private sector agro-industries and farmers in an open market economy.

At present in Pakistan, commodity system linkages are imperfect and agro-industry development is very unbalanced. Given the dearth of empirical data and information available, there are also no short cuts to applied research and analyses of commodity systems to guide agro-industry investment decision-making and public sector resource allocations. As Pakistan shifts from a controlled to an open market economic system, viable agricultural business development--from farm to consumer--is too high risk and competitive to be pursued on the basis of circumscribed feasibility studies to justify discrete agribusinesses and product versus market led efforts to increase farm production.

In the agricultural sector in particular, thorough commodity systems' research and analysis, across disciplines and industries, is an essential component in risk analysis affecting agribusiness investment decision making. In combination with the quantitative economic modeling capability at our disposal, commodity systems' analysis is also an indispensable tool to guide economic policy formation and government action. We no longer need to accept on faith that the "invisible hand" of Adam Smith will ensure the viability of private sector agro-industry investment and confirm the economic benefit of public sector resource allocations.

To demonstrate that such research is not an academic exercise, the balance of this paper outlines the parameters of an investment concept that we feel is feasible, financially viable and economically essential for Pakistan. This concept posits the establishment and replication of substantial, vertically integrated oilseed processing agribusinesses in the irrigated cotton growing zone of Punjab. The fixed capital investment required for such a venture is estimated at Rs. 572 million ($25 million).

The concept is based on a thorough and complex analysis of Pakistan's currently fledgling but potentially highly viable oilseed commodity system. This oilseed commodity system includes four farm input supply agro-industries, four farming systems, four agro-industry processing sectors, and three agro-service sectors within its scope. The interaction of 12 primary agro-based markets provides the glue, if you will, that binds this system together.

Commodity System Participants and Linkages

Figure 1 is a simple illustration of the linkages inherent to commodity systems. The system is an interdependent assemblage of farmers, input suppliers, output processors, and marketing functionaries. The system also involves and is affected by agricultural research and financing institutions, trade associations and government regulators. The dynamic interaction between participants in the system defines the limits and determines the viability of the total agricultural business process that constitutes the system. To sustain the system, agro-industry participants and farmers must be able to make a profit when supplying goods and services to their respective markets within the system. The business relationships between participants are likely to be governed by contractual agreements between suppliers and buyers operating at various levels within the system.

A diverse range of agro-industries are generally included within the scope of a commodity system. Agro-industries provide specific products and services to markets within one or more commodity systems. Dissimilar agro-industries may also collaborate in producing and marketing one or more products. A given agro-industry generally comprises a number of agribusinesses which produce and supply the same or similar products to specific markets within the commodity system. Competition between agribusinesses, on the basis of product price and quality, as well as customer service, effectively eliminates poor performers within an agro-industry, while increasing the efficiency, productive output, quality and variety of products flowing from the commodity system to consumer markets.

Agribusinesses are individual enterprises ranging from small scale sole proprietorships to large scale companies. A given agribusiness may provide one or a variety of similar products to the market. Diversified agribusinesses often participate in several agro-industries and supply goods and services to markets within a number of commodity systems.

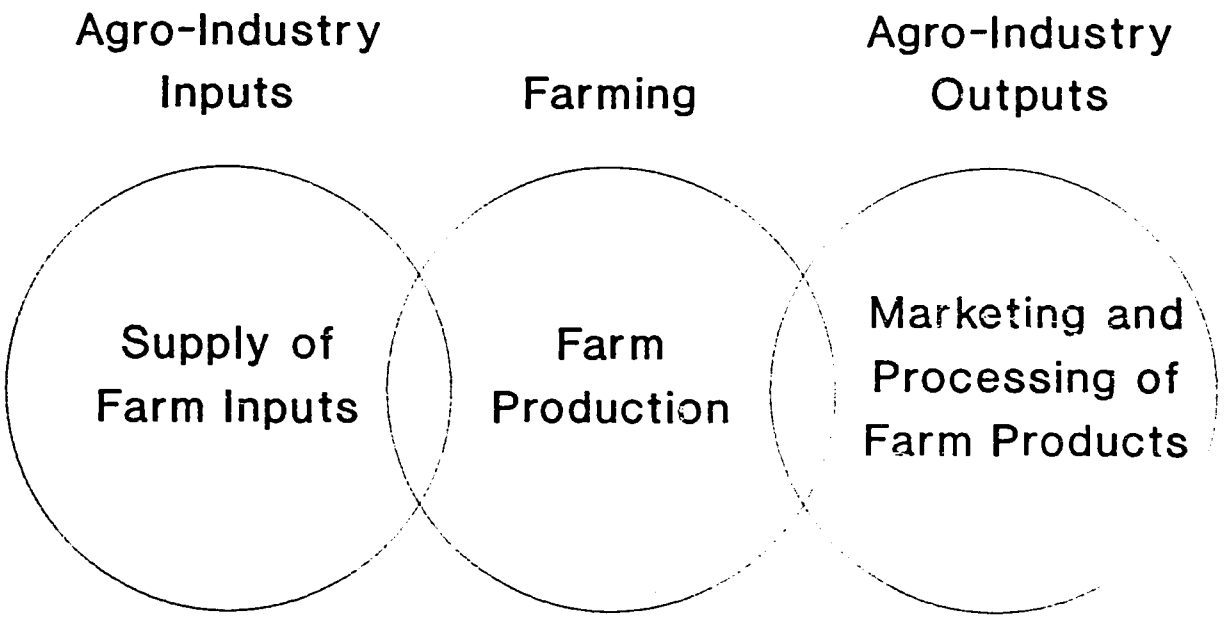
With this description of a commodity system in mind, let us consider some typical investment ground rules which establish the analysis parameters of our proposed venture.

D. Investment Parameters

We analyzed the oilseed commodity system from the perspective of a strategic planning unit of a transnational corporation engaged in one or more facets of the edible oil and livestock feed industries world-wide. The operational experience and investment parameters of the corporation require the planning unit to demonstrate that:

Figure 1

Schematic of a Commodity System



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- the political environment of Pakistan is stable and investment risk associated with political change is minimal;

- domestic and export market trends for the products to be produced by the proposed company are currently favorable and have solid growth potential;

- oilseed raw materials required by the processing facility can be readily procured from local commodity markets and contract growers;

- farm sector non-traditional oilseed production capability, input costs yields and prices, compared to alternative commodities, are currently favorable to farmers within definable ecological zones and within a cost effective radius of the proposed plant and company operated oilseed field procurement and assembly centers;

- credible local investors and financial institutions are prepared to invest in the venture and participate as members of its Board of Directors in company policy formation and advise management on matters related to farmers, labor and governmental relations;

- GOP agro-industry policies and investment tax incentives and monetary policies governing the inflow and repatriation of capital invested and profits are advantageous, and the government actively supports and fosters local and foreign investment in agribusiness;

- infrastructure and utilities required to establish and operate the processing plant are in place or can be provided in a timely manner;

- a proforma financial analysis of the enterprise over the medium term that demonstrates its potential viability, including the recovery of original capital invested in a reasonable time frame;

- the GOP will not intervene in import and export markets and trade affecting the venture by:

  a) restricting or excessively taxing the import of essential farm and processing plant input supplies, equipment and technology to protect local industry, and

  b) prohibiting or taxing the export of value-added products to international markets or regulate the prices and distribution of the same products in the domestic market; and

- the GOP will not restrict the expansion of the enterprise, at its original locations or in other areas, so long as the scope of its operations and business practices do not constitute a monopoly capable of restraining trade and competition in the market.

E. The Enterprise Concept and the Oilseed Commodity System [2]

Figure 2 illustrates the structure, linkages and markets of the oilseed commodity system within which our proposed venture will operate. The operational core of the venture at start up is envisioned to be a 500 metric tons per day oilseed solvent extraction plant. The company will also establish its own sunflower production and procurement unit. The ultimate scope of the enterprise could encompass the establishment of a major vertically integrated agribusiness company comprised of:

- the sunflower seed production and procurement unit;
- oilseed processing plant made up of the oil extraction and feed meal facility and an edible oil manufacturing facility;
- a livestock feed manufacturing division; and
- poultry and cattle farming operations.

1. Sunflower Seed Production and Procurement

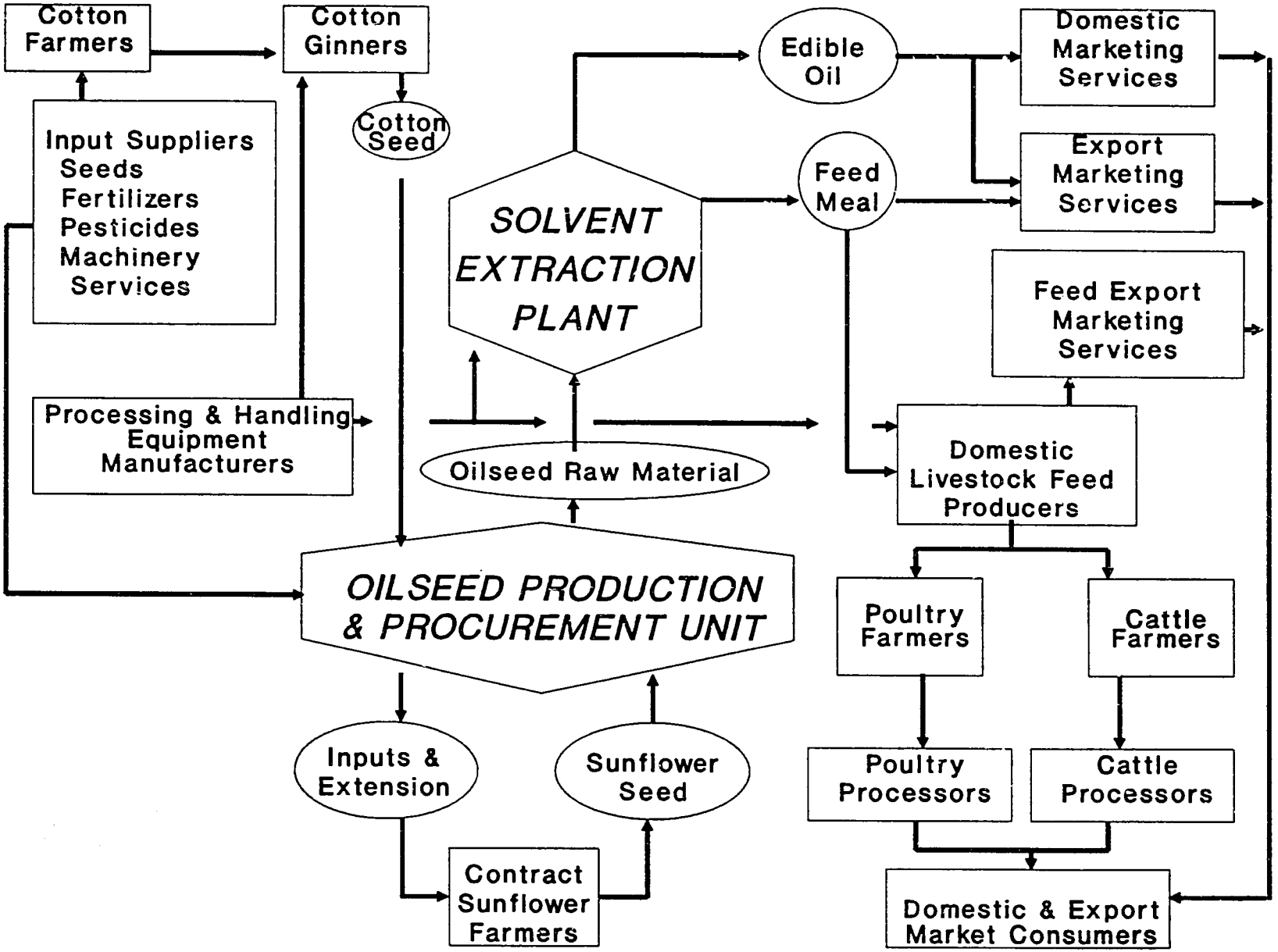
As the Figure 2 indicates, the enterprise will process cotton seed and sunflower seed. It will procure its cotton seed from cotton gins and the open market. The sunflower seed production and procurement unit will contract with farmers to supply the sunflower seed required, and, as market conditions allow, the company will also procure modest amounts of sunflower seed from other farmers and marketing agents.

The self contained raw material supply unit will procure and supply inputs to contact growers, and provide, as necessary, land preparation, pesticide applications and harvesting services. Company agronomists will also train farmers in agricultural practices to maximize their yields and the supply of oilseed to the processing plant. Inputs and services will be provided to contract farmers at cost and these costs will be deducted from the gross revenue payable to growers when the crop is harvested and collected by company procurement agents.

Timely sunflower seed assembly and storage under controlled heat, moisture and dust free conditions, is a critical facet of this component of the enterprise. Expert

FIGURE 2

The Pakistan Oilseed Commodity System



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technical advice has been provided by the Kansas State University Consultants engaged in the Storage Technology Development and Transfer/Food Security Management project in Pakistan. We accepted their recommendations that both cotton and sunflower seed raw materials should be assembled, transported and stored in bulk (unbagged) form. Capital investment in bulk handling equipment and storage facilities, at the field and processing plant procurement centers of the company, are included in our projections.

2. Oil Processing Plant

The integrated oilseed processing facility will produce cotton and sunflower oil (refined and unrefined) cotton and sunflower feed meal, oilseed hulls, lintels from the cotton seed and soap stock from both. All of these commodities are saleable in domestic and export markets. While the edible oil market is the primary target of this venture, the growth potential of the feed meal market should not be underestimated. Thus the processing plant will include the decorticating equipment required to produce high quality feed meal. This technology also maximizes the extraction of oil from the seed.

As the productive output of the initial processing operation increases and the market and profit potential of further vertical integration is demonstrated, this company would logically consider additional capital investment in compound livestock feed manufacturing and poultry and cattle farming. Such integration of agribusiness activity is quite common in more developed market economies.

3. Commodity System Markets

The viability of the proposed agribusiness depends first and foremost on the markets interacting within the system. The company's demand for oilseed raw material will strengthen the input supply and agro-services markets. This is particularly an important consideration in Pakistan with respect to sustaining the struggling hybrid seed,[3] farm implements and pesticide agro-industries, as well as the custom harvesting, transportation and marketing service sectors.

This enterprise and its replication will also foster the expansion of high value vegetable oil markets and high quality livestock feed markets in Pakistan. In addition, when the volume of sunflower oil and feed meal produced reaches substantial levels, we envision the industry will be in a position to penetrate Middle East and Asian export markets which are increasing their imports of these high value products.

F. Feasibility Characteristics

The characteristics governing the viable vertical integration of business activity within a commodity system include:

- o positive marketing opportunities and prices at all levels of the system, coupled with the flow of reliable and current market information between participants;
- o a rate of return on capital invested acceptable to farmers and agro-industry participants;
- o the technical and managerial capability to produce and distribute inputs and outputs required by the system;
- o positive, non-interventionist government policies, regulations and bureaucratic procedures which allow agricultural businesses to operate in an open and competitive market environment;
- o self imposed agro-industry or government regulated product quality control standards and guarantees coupled with fair trade and ethical business practices, to protect the interests of system participants and consumers, as well as the environment and the sustainability of the agro-ecological land and water resources on which the commodity system depends; and,
- o increasingly, production and trade agreements and ongoing interrelationships between participants which strengthen the business linkages between them to curb radical changes in supply, demand and product/service prices often caused by imperfect and untimely market information within the system. [4]

G. Investment Rationale

We believe that the business linkage characteristics described previously are adequately present or can be put in place by the current participants and proposed new entrants into the Pakistan oilseed commodity system. A few examples will demonstrate why we think this is possible.

1. <u>Farm Level [5]</u>

Sunflower oilseed production in the targeted cotton belt area of Punjab is currently a solid net income generator for many farmers, despite the adverse input supply, cultural practices and marketing channels they are subject to. Market prices have increased from Rs.180 to Rs.190 per 40 kgs in 1989 to an estimated current average price of some Rs.225 per 40 kgs.

Yields do vary between farms. According to a PARC/CIMMYT study published in 1990, average farm yields overall varied from 840 kgs/ha to 4840 kgs/ha. However, the same PARC/CIMMYT study, based on a sample of 60 farms in the target area, showed yields varied from 1587 kgs/ha to 3425 kgs/ha. Our investment projections, to be conservative, assume average yields obtained by contract growers will start at 1300 kgs/ha in year one, increasing to 1800 kgs/ha by year six of operation. We also estimate sunflower oilseed prices will be Rs.240 per 40 kg in the first year.

We are currently developing illustrative farm budgets for contract growers based on inputs and services being provided by the Production and Procurement Unit of the proposed company. But the PARC/CIMMYT study referred to provides interesting average farm cost and revenue estimates for sunflower and late wheat. The comparative results, summarized in Table 1, speak for themselves.

Table 1. **Cost and Revenue Estimates for Sunflower and Late Wheat Fields (Sample Punjab Farms 1988-89) [6]**

	Sunflower (Rs)	**Late Wheat (Rs)**
Total Variable Production Cost per Hectare	(6972)	(4420)
Gross Revenue per Hectare	10836	6106
Gross Income per Hectare (Before Rent Charges)	3686	1686
Less: Land Rent (Rs/ha @ 4 months)	2085	2085
Net Income per Hectare	1779	(337)
Average Yield (kgs/ha)	2408	2394

2. Plant Level

Given the differentiation that exists in edible oil product markets, here and overseas, we have determined that the high quality oils to be produced by this enterprise are not in direct competition with palm oil raw materials or ghee. Our processing plant does not use imported palm oil, nor does it manufacture ghee.

The demand for high value oils is increasing worldwide. The sunflower oil market in Pakistan is also growing rapidly. We analyzed the market for semi and fully refined cotton and sunflower oil products. In March 1991, one local brand of unblended sunflower oil was selling at prices ranging from Rs.106.70 (wholesale) to Rs.110.00 (retail) for a 4 litre pack. In addition, several companies expressed strong interest in purchasing refined oils from the processing plant.

The average FOB Rotterdam prices for sunflower and cottonseed oil in 1988/89 was $435 and $567 per metric ton, while the soyabean oil price was $435 per metric ton. The same relative price differentials apply to these three oils over a ten year period. Between October 1990 and January 1991, Rotterdam prices for sunflower oil ranged from $463 to $512 per metric ton, cottonseed oil was $621 to $655 and soyabean oil was $455 to $468 per metric ton.

Our livestock feed agro-industry research also confirmed the strong and growing demand for good oilseed meal and high protein compounded feeds in Pakistan. The serious shortage of feed meal and other feed components is a major constraint is increasing the volume and quality of commercially produced and marketed feed.

This is confirmed by the fact that of the estimated 1.2 million tons of poultry feed manufactured and consumed in 1989/90, only half of the feed came from commercial feed mills. The balance is produced by poultry farm operators of all sizes. We estimate that there are only a dozen or so commercial poultry feed mills in operation in the production capacity range of 5 to 50 tons of feed per day.

One final point about the poultry feed industry is worth noting: we learned that, due to the lack of traditional protein components produced in Pakistan, feed mills regularly use wheat as a substitute. Since wheat is both available and inexpensive due to low support and issue prices set by government, we estimated that some 400,000 tons of wheat was used in poultry feed in 1989/90. Some of the wheat observed at mill sites was imported by the government and sold in the market at subsidized prices. Since wheat provides none of the protein required by poultry, its use in poultry feed is very costly to the poultry farmer--and the government exchequer.

In our proposed enterprise, we project the sales price of sunflower meal at Rs.3000 per metric ton in the first year of operation. Current market prices for this meal average about Rs.3200 per ton. In addition to edible oil and feed meal, our model processing plant will produce and sell a variety of other by products. The composition of plant output by product is presented in Table 2.

Table 2. Output Percentage Recovery [7]

Output	Cotton Seed	Sunflower Seed
Oil	17%	37%
Meal	39%	40%
Hulls	31%	18%
Linters	7%	–
Soap Stock	3%	2%
Losses	3%	3%
Total	100%	100%

H. Production and Sales Parameters

Data generated to date for our investment concept paper indicates the scope and magnitude of the proposed venture.

Table 3. Oilseed Processing Agribusiness Model

Business Activity	Year One	Year Six
1. Sunflower Seed Production		
• Hectares	8000	22,400
• Villages Affected	40	160
• Yield Per Hectare	1.3 mt	1.8 mt
2. Processing Plant Production		
• Annual Operation Days (Cotton and Sunflower Seed Processing)	270	330
• Capacity Utilized		
Cottonseed Processing	75%	95%
Sunflower Seed Processing	60%	90%
• Raw Material Input		
Cottonseed	79,000 mt	100,000 mt
Sunflower seed	18,000 mt	54,000 mt
• Plant Output		
Cottonseed Products	76,400 mt	97,000 mt
Sunflower Seed Products	17,500 mt	52,400 mt
• Gross Revenue		
Cottonseed Products	Rs. 361 mil.	Rs. 409 mil.
Sunflower Seed Products	Rs. 136 mil.	Rs. 407 mil.
Total Gross Revenue	Rs. 497 mil.	Rs. 916 mil.

Our initial financial analysis indicates that the enterprise has the potential to realize an excellent rate of return on capital invested and assets employed. In addition, it appears that initial capital invested can be recovered between years three and four of operation.

If its viability can be demonstrated, the replication of such a venture would create another major commodity sector in Pakistan. That is an exciting prospect. The expansion of the oilseed commodity system based on this type of enterprise model would go a long way toward accomplishing the social and economic objectives of the government with respect to rural development, improving the health and welfare of the rural population and increasing the contribution of the agricultural sector to the economy of Pakistan.

The policies of government support this concept, the markets affecting it appear favorable and there is at least 500,000 hectares of land available and thousands more people waiting to participate. That's a pretty good start.

If the government, research community and private sector work together to plan and implement concepts like these, they can be done.

Why not give it a try?

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NOTES AND REFERENCES

1. Inquiries about ACSCA Reports may be forwarded to Mr. Amer Raza, Coordinator, Agribusiness Cell, Ministry of Food Agriculture and Cooperatives, Block "B", Government of Pakistan Secretariat, Islamabad, Pakistan.

2. A detailed description and analysis of the proposed agribusiness enterprise and the oilseed commodity system discussed in this paper will be presented in an ACSCA/AgriBusiness Cell investment concept paper to be published and distributed in July 1991.

3. Hybrid sunflower seed development and use is crucial to increase farm yields and oil content of seed raw materials processed in Pakistan. The recently improved availability and use of high yielding sunflower hybrids is promising. Field trails carried out by the National Agricultural Research Center (NARC) to assess the performance of new and improved varieties is providing farmers, extensionists and seed companies with valuable data to guide further development and selection of hybrid seed. An interesting summary of the results of field trails in 1989 is presented in the **Report of the National Uniform Yield Trails on Sunflower 1989-90** compiled by Muhammad Ayub Khan, Dr. Masood A. Rana, Muhammad Yousaf and Shafi Ullah under the auspices of the Coordinated Oilseeds Programme for Non Conventional Coops, NARC. This report is available from the Pakistan Agricultural Research Council, P.O. Box 1031, Islamabad, Pakistan.

4. See Michael A. Hudson, ***Toward a Framework for Examining Agribusiness Competitiveness*, Agribusiness, Vol. 6, No. 3, 181-189, John Wiley and Sons, Inc. (1990).**

5. For a comprehensive analysis of sunflower cropping practices and results obtained on a small sample of 60 farms surveyed see a report prepared by Muhammad Shafiq, Muhammad Azeem, Muhammad Sharif and Jim Longmire entitled **Sunflower Production in the Cotton Based Farming System of the Southern Punjab, Agricultural Economics Research Unit, Ayub Agricultural Research Institute, Faisalabad, and PARC/CIMMYT Collaborative Program, Islamabad, 1990.** Frequent reference to this report was made by us in preparing this report and the investment concept paper.

6. Adapted from **Table 30, *Enterprise Budget for Sunflower and Late Wheat Fields on the Same Sample Farms During 1988-89,* Sunflower Production in the Cotton Based Farming System of the Southern Punjab, p. 41 (see note 5)**

7. Percentage recovery estimates based on data derived from several processing plant feasibility studies we examined, and information provided by current operators of solvent extraction plants.