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FOOD AID, CO-OPERATIVES AND  
INDUSTRIAL DEVELOPMENT

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I. SUMMARY

Many developing countries, particularly the least developed ones are increasingly facing problems regarding the availability of food supplies to feed their growing populations. If urgent measures are not taken to reverse this trend, the population of these countries will continue to suffer hunger and malnutrition and will become increasingly more dependent on foreign aid.

One "far reaching measure" which should immediately be taken by the governments of the poorer countries is to increasingly provide education and training so as to enable their populations to have the opportunity to participate in economic activities and become an integral part of the economic growth of their countries.

Another strategy that should be followed by developing countries is to adopt the concept of a food-system based on the "integrated approach" which takes into account all aspects of the food chain from the production and processing of food to their distribution and marketing. Such strategy will optimize the production effects and will go a long way towards increasing the availability of food supplies for the benefits of all concerned.

Governments of developing countries should be made more aware of the instrumental role industrial co-operatives and particularly food-processing co-operatives can play to further industrial development, and the potential contribution of these type of co-operatives to self-sufficiency in food supplies. Moreover, governments should facilitate and support the work of food-processing co-operatives, and accordingly provide for the creation of the necessary conditions for their growth.

In general, the number of industrial co-operatives in developing countries and in particular those dealing with food-processing is very limited; these co-operatives are facing a great number of constraints and problems that preclude their effective development. However, in a number of developing countries particularly those with a higher level of industrialization, there is a growing number of successful co-operatives; the success of some of them should be replicated in other countries and regions.

The paper gives a very brief description of the El Zamorano Escuela Agricola Panamericana (Panamerican Agricultural School) located in Tegucigulpa, Honduras, an agronomy school having a commercial farming operation where students learn the important aspects of the integrated approach to food processing. The establishment of similar schools in other parts of the developing world, particularly in Africa, would do much to further the concept of the food system, while at the same time, addressing the problem of lack of qualified cadres in the food industry.

Research and development activities play a key and critical role in the industrialization process of developing countries. In this important area, the paper emphasizes the need for increased co-operation in all aspects of food research and development between research and development institutes from developing countries and their counterparts from the more industrialized countries. Co-operation in this area in the form of "twinning agreements" between research and development institutes from north and south with support from incumbent governments and international organizations are encouraged. Appropriate indigenous NGOs should also be actively involved in supporting food research activities in developing countries.

The role of food aid in the development of industrial co-operatives has already been successfully tested; such is the case of India where funds generated from food aid programmes were designated to finance a series of projects in the dairy and oilseed co-operative industries.

Three main recommendations are provided in this paper with respect to using food aid as a basic instrument to further industrial co-operative development; these are:

- 1) the setting up of an international committee to study the possibility of establishing, using food aid generated resources as the primary form of financing, a post-secondary agro-food institute in a selected African country to be set up along the lines of the Pan-American Agricultural School, located in El Zamorano, Honduras;

- 2) In view of the fact that in many developing countries food-research activities are still in their initial stage or are absent altogether, the use of food-aid mechanisms for the creation or strengthening of research and development activities is proposed. Through food-aid, the necessary resources could be generated, among other things, to initiate new research programmes, finance infrastructure and acquisition of instrumentation and equipment and provide necessary funding for training programmes locally and abroad. Food-aid resources could be complemented by inputs provided by northern research and development institutes from industrialized countries through, for example, twinning arrangements.
  
- 3) A great number of food-processing co-operatives in developing countries are in need of rehabilitation. Most of these co-operatives are working at very low levels of capacity utilization; millions of dollars worth of imported machinery and equipment remain idle. In order to alleviate the situation, a scheme using food-aid as the major resource for the rehabilitation of selected plants in order to bring them back to acceptable levels of efficiency and productivity is proposed. The scheme should be developed in close collaboration between food-aid donors, international agencies, major co-operative organizations and co-operative enterprises from the more industrialized countries.

In addition to the above main recommendations, the paper also suggests that food-aid mechanisms could be used to support the strengthening and expansion of food science and technology programmes in existing faculties of agriculture/food-related institutes. The strengthening and continuous improvements of such programmes would be an important step in the further development of the food industry in developing countries.

## II. INTRODUCTION

UNIDO was created within the United Nations to be responsible for the numerous and complex problems relating to the industrial development of the developing countries. Within this context UNIDO has been concerned with the role of co-operatives in industrial development and with the problems that need to be solved in order to make the co-operative form of industrial organization an effective mechanism for development.

One of the mandates of UNIDO specifically calls for encouragement and support of small, medium-scale and rural industry and industries which fulfil the basic needs of the population and which contribute to the integration of different sectors of the economy. In this connection due attention is also given to industrial co-operatives as means of mobilizing the local human, natural and financial resources for the achievement of national objectives of economic growth and social development.

It has long been recognized that industrial co-operatives in developing countries have the potential to play a significant role in industrial development. Industrial co-operatives can help to:

- provide the opportunity to a larger segment of the population to invest in industrial projects and to contribute thereby to the financing of industrial development;
- develop incentives for a fuller and more effective participation in industrial development;
- make possible the utilization of traditional productive abilities of particular population groups.

During the last several years most of the programmes and projects of UNIDO in the field of industrial co-operatives have been directed to the African region, and for obvious reasons, emphasis has been given to the field of food-processing.

The UNIDO programme benefiting co-operatives, although still very modest, has covered, among other activities, surveys of food-processing co-operatives, management training, technical assistance to specific processing plants, institutional building support, and exposure of technical and managerial personnel from developing countries to the experience of co-operatives from the industrialized countries through their participation in study tours and seminars.

Although the essence of this paper could apply to all developing countries, particularly to those having inadequate food supplies which in most cases means countries having inadequate income distribution and therefore having substantial numbers of urban and rural poor, it applies mostly to the African region where unfortunately food shortages have been a recurrent problem for many years and even for decades. Unfortunately this is becoming a problem with no end in sight due to many negative factors and calamities occurring in the African continent such as persistent droughts, as well as adverse educational and political factors.

The fight against hunger in Africa is probably being lost. One only needs to look at statistics, FAO reports, press articles, etc., to see that the amount of food-availability in the region with respect to population growth is causing increased hunger and malnutrition and ultimately death. All of this has been happening despite the efforts and different kinds of assistance provided by well meaning donors, governments, institutions and individuals. This international assistance of which food-aid is a vital part, is badly needed and well intended, but is far from eradicating the problems. Moreover, food-aid is not only indispensable in the fight against hunger, but is a moral obligation on the part of the countries which are better off, particularly those having substantial and often huge food surpluses.

African governments have recognized that, "Urgent, far-reaching and imaginative economic policies are required to avert further deterioration in the economic conditions in Africa and to launch the continent on the path of dynamic self-reliance and self-sustained economic development in a favourable external environment". One immediate task of such efforts should be to substantially increase productivity in all sectors, particularly in the central sectors of food and agriculture. Achieving such a task would be



extremely difficult without amelioration of the external and internal factors that have aggravated the structural crisis and without simultaneously enhanced supportive measures by the international community. 1/

In order to begin a healthy development of the food sector in developing countries, first priorities should be the provision of education and training. Without them, the question of becoming self-sufficient in food supplies is hardly possible. Mr. Bradford Morse, former administrator of the United Nations Development Programme speaking at the Hunger Project's worldwide satellite event in November 1987 said, "Even though just a few years ago only the most visionary idealists dared predict the end of hunger, today as a result of advances of science and heightened human concern, it is no longer possible to accept the assertion that the world cannot feed itself. Yet hunger persists: every day hundreds of millions of people go hungry. Why do these cruel, tragic circumstances still endure? To state it starkly, apart from famine created by natural catastrophes, people starve because they are mired in poverty and have been denied the opportunity to generate the wherewithal to produce or acquire food. To provide that opportunity, people must have access to education and health services, to pure water and effective sanitation, to protective vaccination programmes, to family planning services. Opportunity means access to land, to seeds and to agricultural tools. Opportunity can be provided by agricultural research, and by knowledge, acquired through extension services, of improved farming techniques and irrigation methods. Opportunity requires jobs, intra- and inter-city transport systems, communication facilities. Only with opportunity, full, free, open opportunity, will poverty be relieved and hunger eliminated." 2/

From the above, it is quite obvious that opportunity cannot exist without some kind of education and training.

### III. EDUCATION AND TRAINING

Right now probably enough food is being produced and processed to feed every single human being on earth; however, large quantities of this food are being wasted not only in the more industrialized countries but in the developing countries as well; while in many developed countries food is being wasted due to overproduction and other factors including financial considerations, developing countries waste theirs due, to a large extent, to lack of education and training; food is being spoiled and lost by contamination and poisoning, inadequate or no storage facilities, lack of food handling equipment and transportation facilities from the farms to processing and consumer centres, lack of processing, refrigeration facilities and packaging systems; all of these problems do not come only because of lack of financial resources for the necessary infrastructure and technology, but also because of lack of education and training about what to do and how to process and conserve the foods.

Without access to education and training, most people in the developing world will have no opportunity to make a real contribution to the economy of their countries, and most probably will continue to be poor and a burden to their governments. Developing countries must realize that education and training are the basic prerequisites for the increase of productivity in all economic activities; regarding food self-sufficiency, this becomes of the utmost importance. Governments from these countries, particularly from the least developed ones, have the primary and basic responsibility to provide adequate education and training to their populations, and therefore should devote a great deal of resources and efforts to achieve this goal. Without it, one cannot even begin to speak of self-sufficiency in food supplies. All other efforts made to alleviate poverty and hunger will rarely achieve full impact other than being temporary.

The education and training in food technology of personnel engaged in all phases of the food production-processing-marketing system is obviously an essential prerequisite for the growth of the food industry in any country. In developing countries and in particular in the African region, with its staggering food problems, this becomes imperative. In this connection, agricultural schools and food technology institutes and universities should be given facilities and incentives to strengthen their programmes such as

research and general stimulation of food production, processing and marketing activities; stronger faculties of agriculture and food technology will attract more young citizens to follow food-related careers. Assistance to faculties of agriculture and institutes in developing countries to acquire departments, sections or programmes of food science and technology or to strengthen existing ones would mean much to the development of the food industry.

Counterpart universities and food research institutes from developed countries should be the most adequate partners to provide such assistance. However, even though a good number of these institutions in developed countries may have the right resources in terms of technical personnel, training and research to assist these faculties in developing countries, they often have their own budgetary constraints and therefore are not able to provide much more than some technical assistance.

Food-aid therefore could constitute a useful instrument to provide needed financing to selected faculties of agriculture and food science and technology in developing countries to strengthen their food programmes including financing of necessary equipment, research and development laboratories, training of staff particularly abroad, and even financing of infrastructure improvements.

In this connection, the possibility of establishing in selected developing countries post-secondary agro-food educational institutes where the integrated approach to food-processing is emphasized in the curriculum should be investigated. Such schools should be created along the lines of the Panamerican Agricultural School, located in El Zamorano, Tegucigalpa, Honduras, which combines both classroom work and farming - food-processing operations where students are exposed daily to the different techniques of the food system, from farming to processing and marketing of foodstuffs grown in the school grounds. Such schools could also be set up within the grounds of existing agricultural/food-technology colleges or universities, but should have enough open space to conduct small-scale farming, including animal husbandry and food-processing operations. The experience of the Agricultural School located in El Zamorano which has been very successful should be replicated elsewhere.

In order to test the impact food-aid could have on the establishment of such institutes, a project for the establishment of a post-secondary school of agro-food in Africa to be financed mainly through food-aid mechanisms is proposed. To investigate this possibility and, if applicable, to work out a scheme for its establishment, an international committee of concerned parties could be formed. Such a committee could include representatives from food-aid donors, international NGOs, the El Zamorano School, leading African food and agricultural scientists and personalities involved in education and/or the promotion of African agro-food systems, and UNIDO.

The establishment of such schools in African countries would be an extremely important step towards the future of food security in Africa. It would contribute to solving the lack of qualified manpower in agricultural and food-related industrial activities and would provide a steady flow of young graduates who may wish to join food technology universities and local food research and development institutes.

#### IV. THE ROLE OF RESEARCH AND DEVELOPMENT INSTITUTES

Food-processing co-operatives in developing countries are rather limited in number and scope, and their share in total food-processing activities remains very low. Food-processing co-operatives, particularly in Africa, still have a long way to go before they can have a discernible impact on food security, and, for that matter, on the social and economic development of their countries.

One factor that has surely negatively affected the development of food industries including co-operatives in developing countries is the lack of indigenous research and development activities which for the most part have been neglected.

It is widely recognized that research and development activities provide a critical service to industrial development and offers important supporting functions in the fields of innovation, adaptation and technology transfer.

Foreign technologies available in the most industrialized countries are abundant, but its transfer to developing countries still represents a problem of certain magnitude, due, among other things, to its cost, adaptation, and lack of sufficiently trained manpower in the developing countries able to absorb and apply such technologies efficiently.

Therefore, the creation and/or strengthening of indigenous research and development institutes in developing countries is of paramount importance.

The majority of existing food research institutions in developing countries is concerned with food production research. These organizations should be strengthened so that they can undertake food-processing activities as well and be in a better position to support the local food industry. Emphasis should be given to assisting small farmers and agricultural workers generally living in rural areas as this segment of the population contributes significantly to the total food production of their countries. A wide variety of activities can be undertaken by research and development service institutions without their requiring very sophisticated and expensive equipment. Some of these services could be in the areas of prevention of spoilage and increase of shelf life of basic foods, assistance with new product development for small-scale industries and co-operatives including women's groups; quality control and standardization activities, including packaging, solar energy, etc. One important contribution emanating from research and development would be to assist the industries and co-operatives to achieve high-quality standards and uniformity to enable them to compete in foreign markets. This is an important element of the industrialization process, and can only be brought about effectively on the basis of efficient process control by the application of appropriate product quality control methods.

The initiation and/or strengthening of food research and development institutes in developing countries would require commitment and support on the part of the governments, as well as considerable assistance from the international community which should be achieved through a combination of resources including assistance from NGOs and private sector enterprises, particularly food transnational corporations (TNCs) and from research and development institutes from the more industrialized countries for the

provision of technical assistance and training. Appropriate local NGOs should also be actively involved in these efforts, particularly for the provision of support to research activities and dissemination of research results to appropriate recipients. UNIDO is actively providing technical assistance for the establishment and strengthening of research and development institutes in developing countries, including assistance to local and regional standardization and quality control institutes.

Research and development institutes from industrialized countries should co-operate with their counterparts from developing countries by providing needed expertise and laboratory equipment and more importantly providing training. Accepting trainees or young graduates from research and development institutes from developing countries to work for a given period of time in research and development institutes in industrialized countries, so as to expose the trainees to a broad range of research activities and technologies would be very beneficial. Whenever possible, and in order to institutionalize co-operation, research and development institutes from North and South should enter into twinning agreements. Support from governments and international agencies should be sought to assist in the financing and implementation of some of the resulting activities.

Food-aid could provide local research and development institutes in developing countries with the necessary financial resources for the initiation of new research programmes, for infrastructure needs and acquisition of necessary equipment and supplies, as well as for staff training programmes. Thus, food-aid could become instrumental for the establishment and strengthening of food research and development activities in developing countries.

V. NEEDS AND CONSTRAINTS OF FOOD PROCESSING  
CO-OPERATIVES IN DEVELOPING COUNTRIES

UNIDO has made several surveys of food-processing co-operatives in certain African countries, and has held several workshops on this topic mostly with the participation of African countries. A summary of the conclusions emanating from these activities which are also pertinent to other developing countries and regions are given below:

In general, the number of industrial co-operatives in developing countries, particularly those engaged in food-processing activities, is not yet significant. They have not flourished due to a certain number of constraints and problems such as: lack of government support and incentives for their effective development, lack of management training, shortage of industrial skills, lack of capital, and inadequate marketing and commercial facilities. These constraints may be responsible for the great number of enterprises and co-operatives in developing countries which are working substantially below capacity levels, and, moreover, are in need of rehabilitation.

As a general rule, national governments have not paid enough attention to industrial co-operatives. It is therefore essential that governments recognize the important role industrial co-operatives play in direct benefit to their own economies and should create the necessary conditions for their growth. Some of these conditions should include a clear government policy for industrial co-operatives, and accordingly, a clear legislation adapted to their needs.

Supporting organizations/institutions within each country should be created and given the task of assisting co-operative development by providing adequate services, such as expert advice, assistance with pre-feasibility and feasibility studies, and even training. In any case, training at all levels must be provided within the country, as co-operatives alone in most cases do not have access to training, nor the necessary financial resources and capacity to implement their own training programmes.

Manpower training at all levels should be of the highest priority, particularly management training as well as training of all personnel involved in processing and quality control, repair and maintenance including electrical installations, and marketing operations.

More attention should be paid to quality control activities which would enable food-processing co-operatives to compete successfully in local and export markets. Storage facilities are a key aspect in the development of food-processing, and are closely linked to the quality control issue. A large proportion of food-processing co-operatives do not have adequate storage (including cold storage) facilities which are necessary in order to maintain product quality and avoid waste/spoilage. Therefore, assistance in this area is necessary in order to ensure minimum adequate storage facilities for food-processing co-operatives.

Industrial financing in developing countries is a major problem, and industrial co-operatives are no exception, as they often require more capital than other types of co-operatives (infrastructure needs, processing machinery and equipment, etc.). This issue is linked to government policies towards co-operatives; government taxation, for example, coupled with the policies of some national government banks, which often do not contemplate favourable terms for co-operative financing, severely limit their activities.

In order to reverse some of the above trends, governments and local institutions in charge of co-operative development should assist industrial co-operatives as much as possible by providing a favourable climate and the necessary conditions to enable industrial co-operatives to have better possibilities for success.

Likewise, when appropriate, governments should request international agencies and co-operative and related donor organizations from the more industrialized countries, for assistance to improve their industrial co-operatives in areas such as rehabilitation of specific industrial plants, manpower training and transfer of technology.

In line with the above, there is a need for increased co-operation between food-processing co-operatives from developing countries and co-operatives and related organizations from the more industrialized countries with a view to establishing collaboration arrangements for assisting the former to become more effective in their development efforts.

Co-operative managers and other key personnel from developing country industrial co-operatives should be exposed to the experience accumulated by industrial co-operatives in other countries and regions. Moreover, training courses, study tours and visits to industrial fairs and related activities should be organized. This has proved to be an excellent way to introduce to co-operative personnel from developing countries the experience of co-operatives in more advanced countries, including new and appropriate technologies needed in their operations. International agencies and donor country organizations should provide increased assistance in the organization and implementation of some of these activities.



## VI. REHABILITATION OF FOOD-PROCESSING CO-OPERATIVES

Surveys undertaken by UNIDO of food-processing co-operatives in several African countries (Benin, Burkina Faso, Senegal, Sudan, Tanzania, Zambia) indicate that many of the co-operatives visited are in need of rehabilitation.

Industrial plants in developing countries are often subjected to a progressive degradation with a resulting decrease and often shocking reduction in capacity utilization. In addition to poor management and lack of trained manpower, the most common causes are lack or complete absence of financial resources to purchase spare parts and provide adequate maintenance, which results in constant work stoppages and production delays. When these enterprises manage to produce, they do so inefficiently and the final products are often of poor quality; a waste of internal resources and raw materials due to inadequate storage facilities compound the existing problems.

In order to bring these plants to an acceptable level of efficiency and productivity, a programme of rehabilitation is required. However, rehabilitation programmes for food-processing co-operatives are expensive and these co-operatives are very often not able to raise the necessary resources for their rehabilitation efforts.

Some international organizations and co-operative bodies from industrialized countries are able to provide technical assistance free of charge to the co-operatives, but the question of who will pay for machinery, equipment and supplies and infrastructure improvements often bring these rehabilitation efforts to a standstill.

In order to save millions of dollars which are invested in these plants in developing countries, rehabilitation efforts should be pursued. It is therefore proposed to initiate a scheme for the rehabilitation of selected food-processing co-operatives whereby food-aid should play the major role. Revenues from food-aid should be used for the more urgent and costly rehabilitation tasks such as acquisition of new and refurbishing of existing machinery and equipment, supplies and spare parts, additional infrastructure if needed, and implementation/execution of work, i.e. plant re-start up.

These efforts should be complemented by inputs from appropriate international agencies such as UNIDO and co-operative organizations from the more industrialized countries who could consider providing technical assistance for plant surveys and feasibility studies and other technical services needed, including the setting up of training programmes for management and other co-operative personnel.

A well designed rehabilitation scheme to be financed with food-aid generated resources and with participation of food-aid donors, international and co-operative organizations including co-operative enterprises from the more industrialized countries under which each organization and enterprise involved would contribute with appropriate inputs for assisting selected projects would go a long way towards bringing back these co-operatives in developing countries to an acceptable level of efficiency and productivity.

#### VII. AN INTEGRATED APPROACH TOWARDS FOOD SELF-SUFFICIENCY

UNIDO fully recognizes that the integrated approach to the food-processing industry is of major importance as regards self-sufficiency in food. An integrated approach to food-processing can be described as a set of interrelated and co-ordinated activities aimed at achieving a balanced development of all elements of a given complex from the production of agricultural commodities, their transportation and handling, to their processing and marketing, with a view to optimizing the production effects and subsequent benefits to all concerned. However, an abundance of constraints and problems prevailing in the food-processing sector in most developing countries has not contributed to the integrated approach.

Some of the negative factors include:

- Decreasing supply, particularly in Africa, of domestically processed food to meet populations' increasing demand, due, among other things to lack of efficiency and productivity of existing plants and lack of good quality products which, to a certain extent, drives the general public towards preferences for imported goods thereby increasing the countries' dependency on imported food. This problem is aggravated due to population growth and rapid urbanization;

- deficiencies in national strategies and policies for the promotion of local food processing;
- insufficient complementarity between agricultural production and food processing as a result of weaknesses in agriculture-industry linkages.

In order to overcome some obstacles and begin the establishment of food-processing complexes based on the integrated approach, governments from developing countries should orient their national policies and provide incentives for agriculture and industry. Such policies and incentives should facilitate the creation of organizational, social, economic and financial conditions to ensure closer links between production, and transformation units and marketing facilities. This entails the creation of mechanisms that will ensure adequate pricing and credit facilities for all concerned. Such mechanisms should facilitate the development of closer links between the different actors and will provide for an improved supply of raw materials to the processing plants, improved factory capacity utilization, better quality products based on quality standards and specifications and improved marketing strategies.

Co-operatives have the potential to be key players in the development of the integrated approach to food-processing. Co-operatives in developing countries should take account of the experience accumulated by co-operatives in developed and the more industrialized developing countries in applying the integrated approach. As mentioned under item V above, there is a need for increased co-operation between food-processing co-operatives from developed and developing countries; co-operatives from developed countries can become effective partners due to:

- (i) their experience in integrated development of agro-food industries, from the production of raw materials through processing, and marketing;
- (ii) their experience in providing various forms of technical assistance to developing countries;

- (iii) modern technology, know-how, highly qualified managers and managerial productive manpower, well-developed organizational structures and services to satisfy the needs of developing countries in their food-processing development.3/

Several co-operatives from developing countries have successfully applied the integrated approach to their particular industrial complexes. Some of the more successful and well-known examples are the oil seed and dairy co-operatives of India 4/, 5/. The success of these co-operatives needs to be replicated in other developing countries but should not necessarily be confined to the dairy and vegetable oil industries.

Footnotes:

- 1/ United Nations General Assembly. United Nations Programme for Action for African Economic Recovery and Development 1986-1990. A/S - 13/15 - 4 June 1986.
- 2/ Quoted from "World Development Forum", Vol. 6, No. 3, 15 February 1988.
- 3/ Second Consultation on the Food-processing Industry with Special Emphasis on Vegetable Oils and Fats, Copenhagen, Denmark, 15-19 October 1984, Issue No. 2, 14 August 1984, ID/WG/427/7
- 4/ An interesting example of financial assistance was undertaken by the Co-operative League of the USA jointly with the Co-operative Union of Canada on behalf of the Oilseed Co-operatives of India. A grant of soybean oil (delivered by the USA) and rapeseed oil (delivered by Canada) and financed by the United States Agency for International Development and the Canadian Development Agency accordingly was sold commercially on the Indian market by their Indian counterpart, and generated funds were designated for financing a series of projects, including institution and infrastructure development, manpower development, operations research, monitoring cost, revolving operating capital for the new co-operatives, new product development and market research.
- 5/ In the field of dairying, the Kaira District Co-operative Milk Producers' Union Ltd in India, popularly known by the name of its branch products, AMUL, is now world famous. A two-tiered organization in which over 800 milk producers' societies are affiliated, the activities of the Kaira Union have brought a number of changes and helped to modernize the dairy industry. Its annual milk collection is of the order of 160 million kgs and it employs 2,500 persons with many highly qualified professionals and is headed by voluntary leadership of a high level and a chief executive who has initiated scientific dairying and diversified the activities in many allied fields. The approach adopted in this project is now providing the model for other programmes known as Operation Flood I and II.