OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

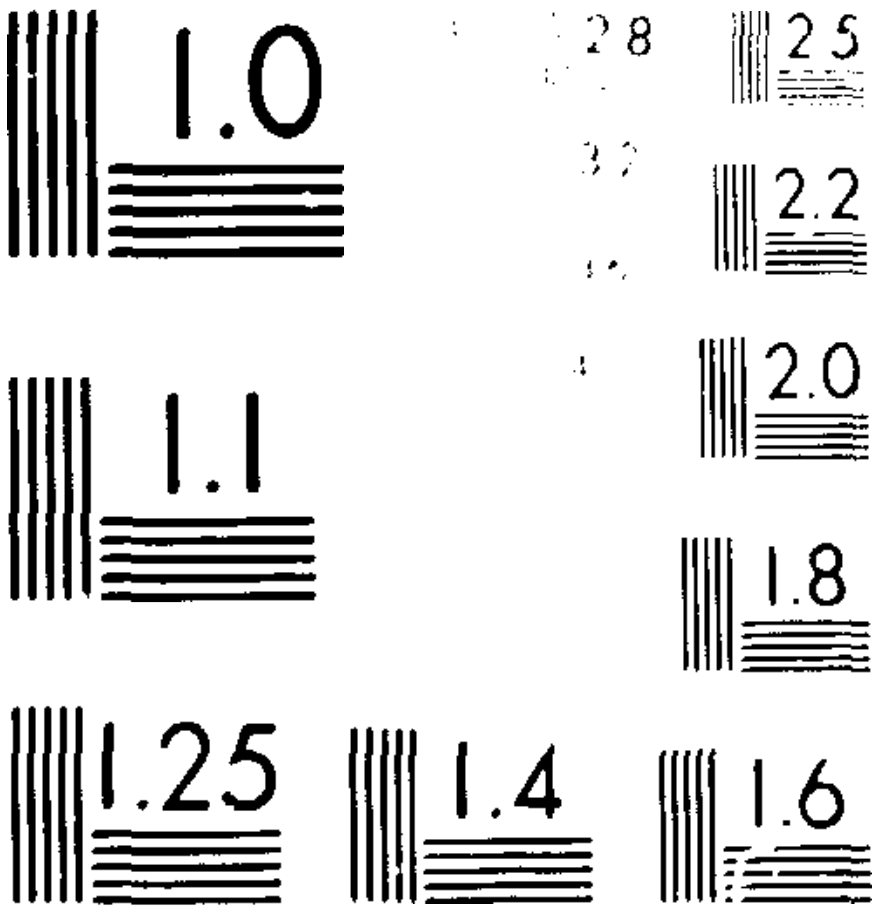
FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org


1.0
2.8
2.5
2.2
1.1
2.0
1.8
1.25
1.4
1.6

10234

Distr.
LIMITED

ID/WG.328/20
7 October 1980

ORIGINAL: ENGLISH

United Nations Industrial Development Organization

Round-Table Ministerial Meeting on
Agro-Industry Development

Baghdad, Iraq, 19 - 24 January 1981

NATIONAL PAPER

presented by the

Government of India

K.V.S. [illegible]

000[illegible]1

80-44433

I N D E X

This paper was prepared by K. V. S. Murthi and S. Ramachandran, Planning Commission.

CHAPTER I The organizational and promotional role of the State in the industrialization of agriculture; formulation and implementation of a national policy regarding agro-industry development.

India has adopted planned economic development since 1951, as a means of achieving socio-economic goals enshrined in the constitution of India. The objectives of India's planning and its social premises derive from "the Directive Principles of State Policy" set forth in the Constitution. The more important of these Directive Principles are that the State shall strive to promote the welfare of the people and secure a social order in which social, economic and political justice will prevail. The State shall, in particular, direct its policies towards securing adequate means of livelihood for the citizens, men and women equally. It has also been specifically mentioned that the ownership and control of the material resources of the community should be so distributed as to subserve the common good and that the operation of the economic system should not result in the concentration of wealth and means of production to the common detriment. India's Plans are based on a broad strategy of economic development in order to ensure that the economy expands rapidly and becomes self-reliant and self-generating within the shortest possible period. India's strategy throws emphasis on economic dependence between agriculture and industry, between economic and social development and between national and regional development, and on mobilization of domestic and external resources. Considerable stress is also placed on measures for scientific and technological advance and for regular general levels of productivity as well as on policies relating to population, employment, human environment and social changes.

2 - India's economy is basically agrarian in character. The rural population constitutes 80% of the total population and 72% of the total working population depending upon agriculture and allied activities. Agriculture contributes 41% of the gross domestic product against 16% for the industry sector. The development of agriculture, therefore, holds the key to the rapid development of the country. The maximum increase in agricultural production physically possible has to be secured essentially through intensive cultivation. Industrialization of agriculture would naturally involve timely as well as adequate supply of inputs as also a reasonable degree of mechanization, improved agricultural practices and processing of agricultural produce so that the farmers are left alone to attend to the basic agricultural operations and need not have to waste their time and efforts in the quest for essential inputs as well as disposal of output. The essential approach in agriculture has been to plan for increase in production which will meet the estimated requirements of food, industrial raw materials and exports which will be physically possible. The principal limiting factors are organization (technical, administrative and at the community level), credit (especially medium and long term) and foreign exchange (for supplementing the production of fertilizers). Considerable

increase in the agricultural production has been achieved since the beginning of economic planning era by adoption of extensive irrigation, application of fertilizers, plant protection measures, provision of improved seeds and implements, agricultural extension services and cooperativisation wherever possible of agro-industries. A technological break-through in agriculture came in 1966 in the wake of the introduction of high-yielding varieties in major cereals which set the new strategy for agricultural development in India. Several other measures for providing various inputs were also introduced.

3 - In order to provide high-yielding varieties of seeds in increasing measures, a National Seeds Corporation was set up in 1963. For assisting the expansion of cooperative marketing and storage facilities. a National Cooperative Development Corporation was also set up in 1963. The Agriculture Refinance Corporation was established in 1963 for provision of refinancing facilities to the land development banks. In order to supply and service agricultural machinery, Agro-Industries Corporations were created in several States from 1965 onwards. The Indian Council of Agricultural Research was reorganized in 1965 to give impetus to coordinated research at the national level. Several new agricultural universities came to be established with a view to combine the functions of education, research and extension. These measures help significantly to increase the use of modern inputs in agriculture.

4 - The targets in the Plan relate to the various physical tasks to be carried out - the areas to be irrigated, to be brought under soil conservation operation, to be planted with improved varieties of seed, to be benefitted by manures and fertilizers, to be protected through the use of pesticides and so on. Simultaneously, specific programmes are also formulated for intensification of research, expansion of institutional credit, enhanced use of power and effective operation of price policy which provide for requisite incentives. These measures are implemented through the Central, State, Regional and Local agencies.

5 - For accelerating the economic growth and to speed up industrialization, the Industrial Policy Resolution of 1956 laid emphasis on the complementary role of agriculture and industry. Special assistance was envisaged to enterprises organized on cooperative basis for industrial and agricultural purposes.

6 - India has a federal structure consisting of the Union/State/Union Territory Governments who have been assigned specific powers and functions. The planning of agriculture, irrigation, power, education, etc. falls within the scope of the State Plans. The Union Government is concerned with planning of industries, railways, national highways, etc. as well as the overall fiscal and monetary policies and the principal financing institutions.

7 - The formulation of national Five-Year Plans of India involve simultaneously: -

(a) apprising of past trends and performances;

(b) assessment of major current problems; and

(c) determination of measures and policies for future growth.

Alongwith this, an attempt is made to take stock of knowledge of natural, material and human resources which may have become available in the course of the preceding Plan and to assess the significance of economic and social data for understanding the structure and functioning of different parts of the economy. The cooperation of a large number of agencies and institutions is also sought both within and outside the Government.

8 - The Annual Plans are the main operational instruments for the Five Year Plan and it is linked up with the preparation of the capital budget. Each Five Year Plan devotes considerable attention to the appraisal of implementation in different sectors, the difficulties met with and the outstanding problems remain to be solved. On each identified problem, new approaches are being constantly developed through studies undertaken by the Programmed Evaluation Organization and special teams constituted for the purpose.

CHAPTER II The inter-relationship between industry and agriculture: formulation and implementation of national Plans and the role of industry in mechanization, chemicalization and irrigation in agriculture.

In the total production of the manufacturing sector about 62% is contributed by the agro-industries. This does not include the machinery and machine tools and parts required in agriculture as inputs. According to the Annual Survey of Industries 58.2% of the total employment in the manufacturing sector is provided by such industries. These industries are getting more than 80% of their raw materials from agriculture alone which accounts for about 52% of the total raw material consumed by the manufacturing sector. In order to increase agricultural productivity by adoption of modern technology and agronomy practices to suit Indian conditions, important inputs have to come from the industrial sector. Cement and Steel required to build irrigation projects, the implements for ploughing and preparing the land, equipment for processing high quality seeds, fertilizers, pesticides, diesel oil, power and a wide range of industrial inputs are essential for increasing the level of agricultural production. The programmes and schemes envisaged in the various agricultural activities are, therefore, inter-linked by way of inter-sectoral balances. The weights allotted in the Index of Industrial Production in India to agro-based industries like Textiles, Food Manufacturing, Tobacco, Beverage Industries, amount to around 30%. The other industries which provide the major inputs for the agricultural sector like Fertilizers, Transport and Electrical Equipment, etc. account for more than 40% of the total weightage. In view of the close inter-action between the agricultural and industrial sectors of the Indian economy, establishment of inter-sectoral linkages is one of the key elements in the planning process of the country.

2 - The prosperity and distribution of income arising from a broad-based growth of agricultural and related activities in the rural areas, would provide the basic demand for a wide range of industrial articles of consumption. It is by such a process of reinforcing inter-action of the agricultural and industrial sectors that employment can be found for the large numbers of the rural population, who cannot be absorbed in the agricultural sector.

In the context of Indian conditions, the role of industry in mechanization, chemicalization and irrigation in agricultural development, is carefully formulated.

3 - The mechanization of agricultural operations is adopted on a selective basis, keeping in view the twin objectives of increased productivity on the one hand and the need to expand employment opportunities in the rural sector on the other. Some forms of mechanization like irrigation pump sets are beneficial because of their positive

employment effect and are, therefore, encouraged. On the other hand, given the nature of small farm holdings and the large manpower available, mechanization of tilling and harvesting operations is adopted only on a selective basis. Where the intensity of cultivation is high and harvesting has to be carried out within a limited period of time, tractors and harvestors have been employed. In other circumstances, manual operations continue to exist. The policy approach as exemplified above is reflected in the industrial programmes. A detailed analysis is carried out about the requirements of pump sets for irrigation, diesel engines, tractors, combine harvestors and other mechanical inputs required for agriculture and are planned to be produced in the country by setting out appropriate production targets.

4 - A major strategy in the rapid increase in agricultural production is the application of fertilizers, along with high yielding varieties of seeds and irrigation. In tune with this strategy, the production of chemical fertilizers has shown a rapid increase over the Plan periods. Starting with the production of about 9,000 tons (in terms of nitrogen) of nitrogenous fertilizers, the output was stepped up to over 2.2 million tons by 1979-1980 and is expected to be further increased to 3.9 million tons by 1982-1983. Similarly, there has been a rapid increase in the production of phosphatic fertilizers from practically negligible quantities in 1950-1951 to 757,000 tons (in terms of P_2O_5) in 1979-1980; the target of production envisaged in 1982-1983 is over 1.1 million tons. Simultaneously, action is also being taken to increase the supply of organic manures and a number of units for the production of bio-fertilizers have been set up in the rural areas.

5 - Another area of inter-action between industrial and agricultural sectors is in plant protection; plant protection measures would need to be strengthened to reduce crop losses and to improve yields. The production of pesticides, is therefore, carefully planned taking into account the requirements of the agricultural sector. About 40 pesticides, including BHC, DDT, Malathion, Carbaryl, Endosulphon, etc. are manufactured in the country. The production of pesticides (in terms of technical materials) was about 50,000 tons in 1979-1980 and is planned to be stepped up to 78,700 tons by 1982-1983.

6 - There are many other industrial inputs like plastics, electricity, etc. that go into the agricultural sector and the requirements of these are worked out and incorporated as a part of Plan programmes in the Five Year Plans. To cite a few examples, reference many be made to the use of plastics in agricultural operations such as for canal lining, lining of storage tanks, pipes for irrigation and cover to agricultural produce for open storage, etc. The rural electrification programme specifically intended to extend application of electrical energy to pre and post harvest operations is another example. The specific requirements of agriculture for cement and steel are also explicitly taken into account in formulating the production programme for these industries.

7 - On the other hand, industrial programmes would need to take into account the outputs of the agricultural sector and provide for adequate utilization of these for industrial purposes. Some of the major industries which are critically dependent on agricultural raw materials are cotton and jute textiles, sugar, rubber goods and vegetable oil industry. A close linkage in regard to the expansion of capacity for sugar production with the targeted output of sugar cane and a similar close interlink between cotton and jute production and textile production are woven into the Plan as an integrated programme of agro-industrial development. Such planning is not only made at the aggregate level but to a large extent attempted on a specially decentralized basis to bring the benefits of industrial developments on a more dispersed basis to rural areas. A further integration that has been attempted with some success is the leading to farmers being given opportunities to be the owners of industrial units for the production of sugar, cotton textiles, vegetable oils, etc. Thus, the benefits of industrialization ultimately percolate to the agricultural producer and the terms of trade between the industry and agriculture are sought to be harmonized. Many other industries based on agriculture such as the processing of foodgrains and oilseeds etc. are also similarly dispersed into rural centres. Due to the dearth of cellulosic raw material, in the country, secondary raw material like wheat and paddy staw (agricultural residues) and baggasse is being used for the manufacture of paper and paper board through the establishment of small paper plants up to 30 tons per day capacity in a widely dispersed manner. Agro-industrial complexes are being developed linking production with processing and marketing so as to maximize agricultural production, minimize losses and generate more employment in producing centres besides giving remunerative price to producers.

8 - Bulk of the rainfall in the country is during the monsoon months from June to September. Depending on rainfall, large areas in the country produce one crop in a year though climatic conditions would permit two or more crops. One-fourth of the gross cropped area is under irrigation and sustained growth of agriculture in most parts of the country is not possible without irrigation. The high-yielding varieties of crops require water at frequent intervals and are sensitive to water shortage. Irrigation facilities, therefore, assume great importance. It also provides gainful employment on a permanent basis through the intensification of agriculture.

9 - It is estimated that the country has irrigation potential of 114 million hectares consisting of 74 million hectares from surface water and 40 million hectares through ground-water potential. By the end of 1977-1978, a potential of 32 million hectares had been created through surface water and another 20 million hectares through ground water making up a total of 52 million hectares. It has been proposed to increase the potential by 1982-1983 by an additional 6.5 million hectares by major/medium irrigation projects and yet another 8.5 million hectares will be from surface minor irrigation works and the rest 7 million hectares through ground water development.

10 - Ground water resources are being tapped through the drilling of tubewells. Power rigs are being used for large sized holes of for drilling through greater depths and difficult strata. All equipment needed except for heavy-duty percussion-cum-rotary drilling machines are made in the country. Over a thousand rigs are estimated to be in use. The Central Groundwater Board undertakes drilling operations on behalf of various Departments. The Board brings out basic data on ground water development and management activities. To achieve the large-scale development of ground water, the targets for various items in the five year period (1978-1983) has been fixed as follows:

i)	Dug Wells ...	12,00,000 numbers
ii)	Private tubewells	12,00,000 numbers
iii)	Deep tubewells ...	10,000 numbers
iv)	Electrical pumpsets	20,00,000 numbers

11 - The objectives and targets laid down in the Plan could scarcely be achieved without the requisite effort forthcoming at each level of tha national life. The shortfalls arise at all levels of the implementing machinery, starting with the Government departments at the Centre and the States, autonomous Corporations, Boards and other authorities down to the organization in the field at the project, district or village level. The basic weaknesses like structural, procedural and institutional, in the implementation of Plan programmes are identified and specific remedies suggested, in every Plan. The development of the organizational framework has not kept pace with the increasing variety and complexity of thejob. Rigid compartmentalization in fields which require a high degree of integrated multi-disciplinary activity, excessively wide or narrow spans of control, lack of clear lines of responsibility, inadequate delegation of authority and improper relationship, positioning of line and staff functions have all hindered Plan implementation.

12 - The planning capabilities at all levels is being strengthened. Special attention has been given for overhauling and professionalization of planning machinery at all levels and for integrating it more closely with the administrative decision making process. Specialists have been increasingly inducted in policy making, programming and review of implementation. Considerable attention is paid for techno-economic appraisal of all projects not merely in terms of financial returns but also in terms of socio-economic benefits to the country.

13 - There have been cost and time overruns in implementing public sector projects; similar slippages also occur in the attainment of targets in the private sector. The management of public sector units are streamlined to make them more functionally oriented and to induct greater measure of relevant professional expertise. For this purpose a scientific system for selection, appraisal, training and career development of managers in public enterprises has been evolved. A Bureau of Public Enterprises has been set up to constantly apprise the performance of public sector units, lay down various norms, and help

in the solution of common problems faced by the public enterprises. In the case of private sector, licensing procedures have been simplified and constant review of performance of each sector is made. A mechanism has been established for bringing about closer coordination between financial institutions and the Government so that the funds flow (short term and long term) preferentially according to the Plan priorities. The various projects under construction are being closely monitored to institute timely action for the completion of the projects within the target timeframe. Monitoring and evaluation cells for each major industry have been established at various levels with an overall coordination in the Planning Commission. Expertise is being built up or inducted in developing and operating data banks, monitoring and evaluation.

14 - As very high priority is attached to the fertilizer industry, a high level committee has been established to closely monitor the performance of the existing projects and implement all new projects in an expeditious manner. In the field of science and technology, the research and development programmes of various institutions are sifted with a view to choose only such of those of immediate and medium term relevance to the national economy.

CHAPTER III The Organizational and Institutional framework in agro-industry; agro-industrial complexes and other forms of institutional framework for integration between industrial and agricultural activities.

One of the principal objectives of the Five Year Plans is achieving of self-sufficiency in food production and increase in agricultural production to meet the requirements of industry and exports. In the industrial sector, correspondingly, emphasis is placed on increased production of fertilizers, pesticides, farm implements, pumps, diesel engines, etc. in order to meet the growing needs for these inputs by agriculture as well as production of mass consumption goods like cotton textiles, sugar, etc. utilising agricultural produce. Developmental strategy in India has taken due note of the basic inter-relationship between agriculture and industry and had recognized that lagging agriculture may jeopardize industrialization and the growth of the economy as a whole. The successive Five Year Plans have, therefore, highlighted the complementary roles of agriculture and industry.

2 - Agro-industries are broadly understood to mean those industries/activities which provide basic inputs for agriculture like seeds, farm machinery and implements, fertilizers, pesticides, irrigation, electricity, pumpsets, etc., on the one hand, and those industries which use agricultural produce as the principal raw materials for processing or preparing finished products like food processing, animal food, cotton textiles, sugar, jute, rubber industries, etc. on the other hand. In a majority of the developing countries, agricultural produce are the most readily available raw materials for industrialization. The raw material represents a large portion of the total cost and its ready availability at reasonable price can often offset such disadvantage as lack of infra-structure or skilled labour. Many of them have lower capital intensity than other industries and their requirement of skilled labour also is often lower. These industries have a special degree of linkage with other industries so that their establishment has beneficial effect throughout the economy.

3 - The Plan strategies have assigned high priority to increased use of fertilizers, step-up of plant protection programme, selective mechanization of agriculture, cooperative processing and marketing of agricultural produce and the provision of institutional credit to sub-serve the above objectives. As part of the promotional and organizational role of the State, Government themselves have set up a number of fertilizer plants in the public (State) sector as well as in cooperation with private and cooperative sectors. Government has also set up public sector plants for the production of insecticides, agricultural tractors, textiles, sugar, etc. In order to extend an integrated service to the farmers, specialized agencies like Agro-Industries Corporations, National Seeds Corporation, etc. have been created. The progress made in the establishment of agro-oriented industrialization are briefly explained below:

INSTITUTIONAL AGENCIES

A - Agro-Industries Corporations

4 - The need was felt for modernization of agriculture which involves timely and adequate supplies of essential inputs and a reasonable degree of mechanization of agricultural practices. Since the average land holding in India are very small (70% of holding is below 10 hectares) and the farmers are poor, it is extremely difficult for them to harness the various inputs to achieve better production. In order to fulfill the vital needs of the farmers, State Agro-Industries Corporations were being established since 1965. The principal objectives in setting up these corporations are as under: -

i) To promote and set up enterprises for manufacture of inputs required for agriculture and allied pursuits;

ii) To promote and set up industries required for processing, preservation and distribution of agricultural outputs and allied pursuits;

iii) To set up and develop marketing and distribution net-work for providing varied inputs for agriculture and allied products;

iv) To establish agro-service networks for distribution of agricultural equipment and implements coupled with custom hiring and repair services; and

v) To provide technical guidance to farmers and to persons concerned with agro-industries with a view to enabling efficient conduct of their enterprises.

5 - Initially, the Corporations were mainly engaged in the distribution and sale of imported tractors, hiring of machinery and repair services. With the increasing production of tractors in the country, the Corporations diversified their activities to include manufacture of machinery, implements, accessories and spare parts. They also arranged equitable distribution of certain selected equipment relieving direct governmental involvement to a great extent. While in the early stages they advanced loans to farmers for purchasing agricultural machinery, implements and accessories, later their direct involvement in advancing loans was curtailed and they rendered advice and encouraged farmers to secure loans directly from scheduled banks.

6 - Some of the Corporations have set up subsidiaries for the processing/manufacturing activities. Some Corporations are promoting projects in marketing, processing, warehousing and storage of agricultural produce with international assistance. The World Bank has assisted the Himachal Pradesh Horticultural Produce Marketing and Processing Corporation in respect of apples and for increasing the output of mulberry silk ir

Karnataka. Their total paid up capital at the end of 1978-1979 was Rs.656 million. The main activities of the Corporation are:

i) manufacturing, processing and preservation;

ii) distribution of inputs;

iii) technical service of machinery, hiring and repairs, plant protection services, storage and marketing;

iv) distribution of agricultural inputs like seeds, manures, fertilizers, insecticides, etc.

B - National Seeds Corporation

7 - The High Yielding Varieties (HYV) of seeds was introduced in the early sixties. It became necessary to think of means of multiplication and distribution of HYV seeds as a concomitant at this programme. The National Seeds Corporation (NSC) was started in 1963 to organize initially the production of small quantities of hybrid seeds and the seeds of some specific vegetables. In 1965, the NSC was given an extended role of producing foundation seeds and initiating a programme of maintaining quality of seeds. It organized a fairly good system of seed certification around 1965 with the help of Indian Agricultural Research Institute and the Indian Council of Agricultural Research and Rockefeller Foundation. It had to arrange also for production and marketing of certified seeds. The brand of NSC has come to be recognized as a hallmark of quality seeds. There is now a network of over 2,000 seed farms in the country. Most of the seed production programmes are confined to crops like wheat and rice and even in these crops, seeds of only a few varieties have been multiplied and distributed to the farmers. The programme of seed multiplication is being expanded through the existing seed corporations at the national and regional levels.

8 - Seed production has become a major constraint in the transfer of technology to farmers. This is particularly true of crops like pulses and oilseeds, which calls for greater technical and management skills. Special emphasis is being given for these programmes in the national planning.

9 - India is one of the very few countries in the whole of Southeast Asia and West Asia which has the technical skill and organizational ability to promote large-scale seed production programmes.

C - Measures for Assuring Minimum Prices for Important Agricultural Commodities

10 - The cost of production of a number of agricultural commodities like cereals (wheat, rice, coarse grain, etc.), sugarcane, cotton, oilseeds,

jute, etc. are studied by Agricultural Prices Commission (APC) set up by the Government and based on their recommendations, the Government announces a minimum support price. The major objective of agricultural price policy is to achieve price stability without destabilizing total income of the farmer and provide a price support which would be economic to the grower as well as agro-based industry and at the same time subserve the interest of the consumer. Individual Commodity Corporations have been established who effect purchases to build buffer stocks and to maintain a reasonable stability in the prices throughout the year. Some of the important Corporations are:

i) Food Corporation of India (FCI);
ii) Cotton Corporation of India (CCI);
iii) Jute Corporation of India (JCI);
iv) National Agricultural Cooperative Marketing Federation of India (NAFED).

While the Cotton and Jute Corporations deal with specific commodities, NAFED which is a National Apex Federation of Marketing Cooperatives plays a vital role in the price support operations of commodities like Soyabean, Pulses, Groundnut and commercial marketing for perishables like onions and potatoes.

D - Role of Cooperatives in Agro-Industries Development

11 - Cooperation was recognized as an instrument of planned economic action in Indian democracy since independence. There was no organized attempt to develop agro-industries in the cooperative fold till around 1956 when the Industrial Policy Resolution emphasized that the principle of cooperation be applied wherever possible. As a result of this policy, definite programmes for agro-industries were formulated by the cooperatives and this activity gained further momentum with the advent of National Cooperative Development Corporation in 1963. Considerable progress made in cooperativising agro-industries could be seen from the following table:

	Units Installed				
	1963	1976	1977	1978	1979
Sugar Factories	3	106	119	130	142
Rice Mills	32	721	711	711	747
Cotton Ginning and Processing Units	34	221	226	234	249
Spinning Mills	-	54	54	56	62
Vegetable Oil Mills	2	148	148	150	217
Fruit and Vegetable Processing Units	4	33	33	28	31
Cold Storages	-	97	105	118	204
Dairy Units	-	5	14	17	20
Others	63	300	331	359	359
T O T A L	183	1685	1741	1803	2031

12 - Out of 298 sugar factories in the country, 142 belong to the cooperative sector. Another 15 are in the process of being established. The share of cooperatives in the production of sugar is 52%. Government policy is to encourage preferential establishment of sugar factories in the cooperative sector as it serves as a nucleus for rural development. Out of a total 347 spinning mills, 62 are in the cooperative sector; 28 are run by growers of cotton and the rest by weavers. A number of cooperative spinning mills are contemplated to be established in the cooperative sector. The cooperative spinning mills supply yarn to handloom sector. There are also 249 cotton ginning and pressing units, 747 rice mills, 4 bakeries, 217 oil mills including solvent extraction units, hydrogenated oil, cottonseed oil, etc., 27 animal feed mix units and 31 fruit and vegetable units in the cooperative sector. A polyester filament yarn unit has also been established in the cooperative sector. Two modern fertilizer plants have been set up in the Cooperative sector. In order to meet the growing needs of farmers, especially potato and onion growers, 204 cooperative cold storages have been organized accounting for nearly 15% of the total cold storage capacity in the country. With the remarkable growth in the cooperative sugar factories, a need was felt for manufacture of sugar machinery. A heavy engineering complex for the manufacture of sugar machinery in the cooperative sector was set up in 1974 with the objective of manufacturing sugar machinery for the cooperative sugar factories.

13 - The National Cooperative Development Corporation (NCDC) was set up in 1963 essentially for promoting and financing of cooperative agricultural marketing processing, supplies and storage. In addition, NCDC also helps programme relating to development of handlooms and spinning mills. It also helps in the distribution of essential consumer articles in rural areas through cooperative infrastructure. The Corporation acts as a catalytic agent in the formation of Cooperatives and assists them to avail institutional credit from other financing institutions. The major financial role of NCDC is to enable the cooperatives to acquire the requisite risk capital and margin money so that they are able to have access to funds from financial agencies. Since its inception, it has provided financial assistance of over Rs.2,800 million. It has also helped in obtaining assistance from international funding agencies.

INDUSTRIES SERVING AGRICULTURE

A - Agricultural Machinery and Implements

14 - Mechanization of agriculture has a limited role to play in the context of agricultural development except in special cases where they lead to a significant increase in cropping intensity. In all cases where mechanization merely leads to substitution of labour by machines, mechanization will worsen the distribution of income in the short and medium run. Possibilities of long run benefits are also quite uncertain in view of demographic pressure. Unrestricted mechanization of agricultural operations will not be in the interest of the country as it will adversely affect the rural unemployment problem. Hence, the policy of selective mechanization of agriculture is envisaged.

15 - The introduction and popularization of improved tools and implements is given a great stress in the interests of small farmers. Towards this end, special schemes of trials and demonstration of implements like seed-cum-fertilizer trials, organization of prototype production-cum-designing centres, dissemination of information on design features and conventional performances of equipment under various crops/soil conditions are contemplated to be undertaken. A committee is looking into the effect of combine harvestors and tractors on employment, output and costs, for framing suitable policies of farm mechanization. The following table shows the populaiton growth in some of the commonly used agricultural implements during the period 1965-1979.

(thousand numbers)

Equipment	1965	1972	1979
1. Iron Ploughs	3520	5350	-
2. Improved Seed Drills	1135	4047	-
3. Threshers	350	420	-
4. Oil Engine Pumpsets	471	1629	2704
5. Electric Motor Pumpsets	414	1618	3598
6. Tractors	54	148	305
7. Power Tillers	16	17	21

16 - The production of tractors has increased from 18,128 in 1969-1970 to 62,450 numbers in 1979-1980. The production of power driven pumps during 1979-1980 was of the order of 347,000 numbers. Rural Electrification has been receiving high priority and has been pursued vigorously both by Central and State Governments. The exploitation of groundwater resources would not have been possible without the emphasis that was placed on rural electrification from village electrification to energization of pumpsets. By the end of 1977-1978, 217,000 villages out of 576,000 have been electrified. A new scheme of joint financing by Rural Electrification Corporation, Agriculture Finance and Development Corporation and Commercial Banks has also been introduced.

B - Fertilizer Industry

17 - India came up on the chemical fertilizer map when its first unit started producing Single Super Phosphate (SSP) in 1904. But the first breakthrough in the production of nitrogenous fertilizers came up in 1951, when a public sector fertilizer plant was set up in Sindri. The production of nitrogenous fertilizers which was about 53,000 tons in 1952-1953 has increased to 2.22 million tons by 1979-1980 in terms of nitrogen. In the case of phosphatic fertilizers, the production was 7,400 tons in 1952-1953. As against this the production in 1979-1980

amounted to 757,000 tons. At the end of 1979-1980, India had 28 nitrogenous and 10 complex fertilizer plants, 6 by-product ammonium sulphate plants, 2 triple super phosphate (TSP) plants, and 30 single super phosphate plants. Apart from these 7 nitrogenous, 2 complex fertilizers and 10 SSP plants are under implementation.

18 - With the advent of oil crises, India was forced to look upon alternative raw materials and feed stock for the fertilizer industry. Endowed with large coal reserves, the country went in for two coal based fertilizer plants - largest in the world of its kind - each with a capacity of 900 tons per day of ammonia.

19 - With the discovery of off-shore gas and oil fields in the western coast of India, in the Arabian Sea, India has an ambitious programmed to set up ten gas based fertilizer plants, each with a capacity of 1350 tons per day of ammonia - the largest existing anywhere in the world. With this the total nitrogenous production in the country is expected to go up to 7.5 million tons of nitrogen by the end of this decade.

20 - The growth of consumption of fertilizers between 1951-1952 and 1979-1980 is presented in the following table:

CONSUMPTION OF FERTILIZERS IN TERMS OF NUTRIENTS
1951-1952 to 1979-1980

Year	Consumption				Compound Rate of Growth			
	N	P_2O_5	K_2O	Total	N	P_2O_5	K_2O	Total
	('000 tons)				(percent)			
1951-52	58.7	6.9	-	65.6				
1956-57	123.1	15.8	14.8	153.7	16.0	18.0	45.5*	18.6
1961-62	249.8	60.5	28.0	338.3	15.2	30.8	13.6	17.6
1965-66	574.8	132.5	77.3	784.6	23.1	21.6	28.9	17.6
1966-67	737.8	284.6	114.2	1100.6	28.4	87.6	47.7	40.3
1971-72	1798.0	558.2	300.1	2656.3	19.5	17.6	21.4	19.2
1976-77	2457.1	635.5	318.6	3411.2	6.4	2.7	1.2	5.2
1979-80§	3499.0	1150.3	606.5	5255.8	12.6	21.8	24.0	15.5

* Over 1952-1953

§ Provisional

21 - The consumption of fertilizers is expected to go up to 8.5 million tons of nitrogen, 3.3 million tons of P_2O_5 and 2 million tons of K_2O by the end of the current decade. As against this, the production will be about 7.5 million tons of nitrogen and 2.7 million tons of P_2O_5. The demand-supply gap is proposed to be made good by imports.

22 - The ranking and share of India in production and consumption of nitrogenous and phosphatic fertilizers in the world is presented below: -

RANKING OF INDIA IN PRODUCTION AND CONSUMPTION OF N AND P_2O_5

Year	NITROGENOUS		PHOSPHATIC	
	Production	Consumption	Production	Consumption
1966-67	16	8	18	14
1977-78	4	4	10	8

PERCENTAGE SHARE OF INDIA IN PRODUCTION AND CONSUMPTION OF N AND P_2O_5

Year	NITROGENOUS		PHOSPHATIC	
	Production	Consumption	Production	Consumption
1966-67	1.4	3.4	0.9	1.5
1977-78	4.0	6.1	2.2	3.1

23 - The NPK ratio in 1950-51 was 9.2 : 1.3 : 1 with the All India consumption of 0.5 Kg/ha. After the introduction of high yielding variety programme the ratio changed to 6 : 2 : 1 and the level reached 9.4 Kg/ha in 1967-1968. The consumption ratio further improved to 5.8 : 2 : 1 in 1978-1979 with the consumption of fertilizers estimated at 30 kg. per hectare. In 1984-1985 a consumption ratio of 4.5 : 1.7 : 1 is anticipated with a consumption level of 57 kg/ha. The increase in irrigated area, the introduction of high yielding varieties in wheat, paddy, gram and pulses has increased the consumption of fertilizers. It has been estimated that the incremental response for paddy and wheat is estimated at ten per unit of nitrogen. In the case of P_2O_5 it is six and in the case of K_2O it is four. From 1973-1974, the following incremental response ration (Kg. of extra product for additional Kg. of nutrients) has been observed in the country:

	Paddy/Wheat	Gram	Sorghum
N	12.0	8.0	5.6
P_2O_5	7.0	5.0	4.0
K_2O	5.0	11.5	11.5

24 - In the production and distribution of fertilizers the cooperatives have made a tremendous progress in the country. The Indian Farmers Fertilizer Cooperative (IFFCO), a cooperative organization of a large number of member cooperatives, has set up a nitrogen and a complex fertilizer plant in the early seventies. The share capital of IFFCO is around Rs.2600 million and consists of 27,000 cooperative societies representing over 25 million cultivators, IFFCO has established two fertilizers factories, one with a capacity of 400,000 tons of urea at Kalol and a complex fertilizer unit at Kandla with a capacity of 400,000 tons of fertilizers. The third factory is expected to go on stream at Phulpur with a capacity of 500,000 tons of urea. Two additional plants each with a capacity of 750,000 tons of urea is proposed to be set up based on natural gas. The investment cost of these plants is estimated around Rs.6,000 million.

25 - The Indian fertilizer industry has got an extensive marketing and distibution system for fertilizers. The fertilizers produced in the plants are distributed to farmers through a number of dealers spread all over the country. The soil and the crop requirements are examined by a large number of extension service centres which periodically examine the requirement of soil as well as that of the crop. The cooperatives play a significant role in spreading the fertilizer consciousness to the farmers.

26 - At the end of 1979-1980 cooperatives handled about 23.5 lakh tons of fertilizers through 47,000 outlets thus, accounting for about 43% of total fertilizer distribution. The cooperative network of retail distribution points are extensive and largely cover interior and far-flung areas. It is proposed to increase the number of retail points to 60,000 by the middle of the current decade. It is also proposed to develop fertilizer distribution points as composite distribution centres where the farmers would in addition to fertilizers be able to procure other agricultural inputs like pesticides.

27 - Chemical fertilizers are used along with the organic manures. Organic manures, besides providing nutrients for plant growth and making up micro-nutrient deficiencies in the soil, help build up and maintain physical properties and fertility of the soils as well as enable the better performance of the chemical fertilizers when applied in conjunction. The recycling of waste material has also become urgent for saving energy. Organic manures give stimulus for bacterial action and help in recycling of phosphate and potash. The organic manures are produced from urban and rural composts. The production of urban compost was 8 million tons in 1978-1979. Rural compost production was estimated at 222 million tons. The area which has been green manured was about 7 million hectares. The potential nutrients of organic manures which may be available for major crops may amount to about 5 million tons of nitrogen. Major share is accounted for by cattle dung and urine.

C - Plant Protection in Indian Agriculture

28 - The intensified agriculture especially after 1964 has provided the most favourable/conducive climate for the huge build-up of insects, diseases, weeds and rodents resulting in higher intensities of pest attack. The fertilizer-responsive high yielding dwarf varieties of food grain crops have proved to be more susceptible to the existing insects and diseases. If the high yielding potential in new cultivation is to be sustained, increased plant protection coverage is inevitable. The investment on plant protection, being the preventive input, will also help in maximizing the return on investment made on other inputs, for example, good quality seed, fertilizers, irrigation resources, etc. India's per hectare use of pesticides on a national average basis is about 400 gms. while in countries like Japan which are ecologically far more conscious, the corresponding amount is around 10,000 gms. Pesticides must be introduced judiciously and scientifically which should form a part of integrated approach to pest control.

29 - The intensification of agriculture in selected areas, utilization of high yielding varieties and application of increasing amount of plant nutrients have necessitated greater amount of plant protection measures. From the Third Plan onwards (1961-1966), pest control has been looked upon as a major factor in agricultural development in general and in increasing the productivity in particular. It was realized and amply demonstrated with the use of plant protection measures, that pesticidal chemicals alone can sustain the yield potential and protect 10 to 25% of the avoidable losses to cover the deficit in foodgrains. Indiscriminate introduction and use of pesticides are prevented through the mechanism of approving pesticides by Insecticides Board and registration of all pesticides manufacturing establishments.

30 - There has been a spectacular rise in the plant protection coverage from 6.2 million hectares in 1961-1962 to 43 million hectares in 1971-1972. It has now (1979-1980) reached 75 million hectares. The target of 100 million hectares is proposed in the new Plan, 1980-1985. From a level of consumption of 10,000 tons of pesticides in 1961-1962, it increased to 30,000 tons in 1971-1972 and further doubled to reach a consumption level of 60,000 tons of technical grade pesticides in 1979-1980. The demand for pesticides for agricultural use is estimated to be of the order of 80,000 tons by 1984-1985. Taking into account the pesticides used for health purposes, the demand is estimated to be of the order of 100,000 tons by 1984-1985.

31 - Thus, in the development plan 1980-1985, plant protection has to be accorded a fairly high priority not only in the interest of maintaining high yield potential in the crops but also to maximize returns on other crop inputs. Attention is being increasingly paid to detect the development of pest diseases in the initial stages, thereby taking recourse to minimum pest plant protection measures. The surveillance pest plant protection measures have proved very beneficial in preventing a rapid

build-up of pests and diseases into epidemic proportions all over the country. Although there is scope for cultural, biological and mechanical methods of control chemical pesticides will still form the main plank because of the comparative superiority in effectiveness.

32 - The percentage increase in yield due to the application of pesticide has varied from 3% to 40%. In general, the benefit-cost ratio ranges between 2.3 to 9.5, mostly in the neighbourhood of 3.

33 - Presently, around 45 basic pesticidal chemicals are produced in the country. The installed capacity is around 80,000 tons per annum. The current level of production is around 39,000 tons per annum. Presently the country imports 40 types of pesticides amounting to 7,000 to 8,000 tons. Twenty five (25) large units produce pesticides and formulations apart from 450 small scale units who produce formulations. The demand for pesticides would be influenced by the expected extent of incidence of pests, which in itself is likely to vary from place to place and year to year depending upon weather conditions. Pest complexes are also changing quickly.

INDUSTRIES USING AGRICULTURAL RAW MATERIAL

34 - The policy of the Government is to take up processing of agricultural produce in the area of production preferably on a cooperative basis. Agro-Industrial Complexes are being developed linking production with processing and marketing so as to maximize agricultural production, minimize their losses and generate more employment in producing areas besides giving a remunerative price to the producers.

A - Cotton Textile Industry

35 - Cotton Textile Industry is the oldest organized industry in India and the first among the agro-based industries. Of the total estimated employment of 5 million workers in the manufacturing industries, the organized Textile Mill Industry alone accounts for 1 million or 20% of the employment. In addition, around 9 million workers are employed in the decentralized sector of the industry. The Textile Industry comprises textile mills (637 mills with a spindlage capacity of 20.68 million and 207,000 looms) on the one hand and largely dispersed handlooms (3.8 million) and powerlooms (0.5 million) on the other hand. India produces around 10,000 million metres of cloth which is expected to increase to 13,000 million metres by 1984-1985. Although the country has adopted a multi-fibre policy in the Textile Industry, a harmonious balance between the use of cotton and synthetic fibres ensuring maximization of income and employment of cotton growers is sought to be achieved through planned production of cotton, blended and synthetic fabrics. Almost

the entire requirement of spinning, weaving and processing machinery are being produced in the country. While satisfying the clothing requirements of the country, this industry also earns substantial amount of foreign exchange through export of yarn, cloth, ready-made garments and textile machinery. There are a large number of research associations engaged in the Textile Industry. Besides, there are number of technological institutions to supply the technical manpower to the industry at various levels.

B - Sugar Industry

36 - India is the largest producer of sugarcane in the world. Sugar Industry is the second largest agro-based industry in India being next only to Cotton Textile Industry. More than 20 million cultivators are dependent upon this industry and about 250,000 people are employed in sugar industry apart from the large number of people engaged as contract labour. There are 298 sugar factories with a capacity to produce around 7 million tons of sugar. The prosperity of a large number of industries like sugar machinery manufacture, distilleries, a large number of alcohol based organic chemical industries, Cattle Feed and Poultry Feed, Confectionery, Biscuit Making and Papaer and Pulp are closely linked with the prosperity of sugar industry. The entire sugar mill machinery is manufactured in the country. Sugar factories upto the range of 6,000 tons sugarcane crushing capacity per day have been set up.

37 - While establishing new sugar factories, adequate care is taken to assure that there is planned input for adequate sugarcane cultivation in terms of extension services, irrigation facilities and extensive cultivation to meet the requirements of the factory. It is also ensured that sugarcane transportation does not exceed a specified lead and proper demarcation of areas are enforced for drawal of sugarcane by the factories in the vicinity.

38 - A number of institutions are engaged in agronomical research on sugarcane like the Sugarcane Research Institute, Coimbatore; Indian Institute of Sugarcane Research, Lucknow, with a number of sub-stations throughout the length and breadth of country. There is also a National Sugar Institute which deals with the technological aspects of sugar manufacture and train the requisite number of technologists for the Indian Sugar Industry. The Institute has also trained a number of foreign nationals both in developed and developing countries.

C - Jute Industry

39 - India is the largest producer of jute goods accounting for 30% of World's production. There are 74 jute mills with 44,200 looms employing 230,000 workers. The cultivation of jute provides assistance to nearly 4 million farmers. In order to protect the interests of the jute growers

and the jute industry, synthetic substitutes are being permitted only in such cases where it is functionally necessary. A number of research institutions have been established for coordinated research and development of jute industry from cultivation of jute to the manufacture of jute products.

D - Rubber Industry

40 - Rubber plantation industry occupies an important position in the economy of the country as it provides principal raw material required for the manufacture of variety of products like automobile tires and tubes, cycle tires and tubes, footwear, belts, hoses camel back, latex foam products and provides considerable direct and indirect employment. India is the fifth largest producer and fourth largest consumer of natural rubber. Against a world consumption ratio of Natural: Synthetic of 30:70 India's pattern is 80:20. While half the requirement of synthetic rubber (special purposes) is imported, the balance is being produced through alcohol route which in turn is produced through fermentation of molasses obtained from sugar factories. The rubber industry is truly an agro-based industry as 90% of rubber is obtained from plantation and through the by-product of sugar industry.

41 - The area under rubber plantation has increased from 69,000 hectares in 1950-1951 to 236,000 hectares in 1978-1979. Over 70% of the area under rubber plantation belongs to small holders with an average holding of one hectare. The production and the average yield per hectare increased during the period from 16,000 tons to 135,000 tons and 284 kgs. to 710 kgs. per hectare respectively.

42 - Over 60% of rubber is consumed by the tires and tubes industry. There are 16 manufacturing establishments producing automobile tires and tubes with an installed capacity of 8 million numbers. These units produce tires required for commercial vehicles, buses, earth moving equipment, scooters, animal drawn vehicles, etc. Apart from this, there are about 90 factories producing about 50 million numbers of cycle tires.

43 - For an orderly development of the rubber plantation industry Indian Rubber Board was constituted in 1942. Its activity inter-alia includes distribution of high yielding planting materials, dissemination of cultivation and production know-how, financial assistance for cooperative processing and marketing, etc.

44 - A Rubber Research Institute established by the Rubber Board in 1955 provides various inputs for the satisfactory growth of trees by appropriate use of different propagation and planting techniques and by optimal use of fertilizers based on soil and leaf analysis. It has developed better control measures for pests and diseases and more efficient methods of exploitation of trees. The Institute has evolved new types of dry rubber and latex concentrates conforming to rigid technical specifications.

E - Other Industries

45 - The Rice Milling Industry is dominated by traditional Huller Mills which yield poor quality rice as well as bran. Such bran yields poor quality oil. It is proposed to modernize the Rice Milling Industry through centrifugal dehusking, and separation of grain and bran. Through modernization it is becoming possible to produce good quality rice bran fit for oil extraction. Steps have already been taken to promote large scale production of edible grade rice bran oil.

46 - Government had set up Modern Bakeries (India) Ltd., a public sector unit to provide adequate nutrition to the consumers. This is the first bakery in the country to produce fortified and enriched bread on a large scale for supply to consumers at reasonable price. Facilities exist in India for fabrication of Bread Making Plants. Similarly, Bread Slicing and Wrapping Machines have also been fabricated in the country. To provide training facilities in the bakery operations, Institutes of Catering Technology and Food Crafts Institutes have been set up in the various parts of the country.

47 - Efforts are being made to popularize the improved technology of pulse processing to achieve higher recovery of pulse.

48 - The protein isolated toned milk made from groundnut protein isolate and milk fortified with vitamins and minerals,- miltone - is produced on a large scale as supplementary feeding.

49 - In the case of cotton, new types of gins and presses which could efficiently meet the process requirement of long, extra long and finer varieties of cotton are encouraged in the cooperative sector.

50 - There are programmes to develop agro-industrial complexes to integrate production processing and marketing of horticultural produce. Preservation of fruits and vegetables using modern techniques is of recent origin in India. The manufacture of fruit concentrates in such areas as Jammu and Kashmir, Himachal Pradesh and Sub Himalayan Terrain is proposed to be taken up. Dehydration on a commercial scale has so far been tried only in the case of peas and onions. Special attention is proposed to be given to other crops whose production is likely to increase substantially in the future.

51 - Agro-based industries provide one of the most promising avenues of employment and those in the unorganized sector (small-scale industries) are based on labor intensive technologies using low energy. According to the census of small-scale units conducted by Small Industry Development Organization (SIDO), the share of agro-based and allied industries

accounted for 42.7% in terms of number of units and 46.6% in terms of employment with a share of 54% in production during 1970. The food industry in the small industry sector constitute an important segment in the agro-based industries and comprise all aspects of preservation, processing and marketing. With a view to ensure smooth development, selected agro-based industries have been reserved for exclusive development in the small-scale sector. Some important industries among them are: Bread, Confectionery, Oil Extraction, Processed Spices, made up textiles including knitted wears, Cycle Tires and Tubes, Essential Oils, Agricultural Implements like Chaff Cutters, Animal Drawn Implements, Pumps, Diesel Engines, Seed Drills, etc.

52 - SIDO provides technical and managerial assistance, development of proto-type products and process development facilities, export assistance, etc. India provides assistance in training facilities in small industry development, which has been utilized by many developing countries. Indian experts have extended assistance to more than forty countries in formulating policies and programmes for the development of small-scale industries.

53 - In order to utilize local raw materials and local markets, protect and improve employment opportunities in the traditional industries, the Khadi and Village Industries Commission (KVIC) was established in 1956. The objective of KVIC is to promote and strengthen the infrastructural facilities and supply of improved tools and equipments, marketing, and organizations of artisans for self help. It also helps artisans to obtain credit at concessional rate for working capital and capital expenditure. A number of Research and Development Centres have been established to adopt improved technology for increasing the earnings of artisans and guard against process and product obsolescence. The programme of KVIC include promotion of such agro-industries as Khadi (hand spun and woven fabric), Jaggery, Vegetable Oil Extraction, processing of cereals and pulses, methane gas from organic residues, fruit processing and preservation, carpentry, blacksmithy, etc. The activities of KVIC has resulted in providing employment for over 2.5 million people.

CHAPTER IV Bilateral and multilateral forms of economic cooperation between the participating countries to promote agro-industry development.

Basically, bilateral/multilateral cooperation would involve identification of complementary areas of production-cum-trade in agro-industry sector. Forms of production cooperation would include pre-feasibility study, consultancy, technical know-how, etc. and trade cooperation could involve tariff and non-tariff measures. International assistance has become available to back up these efforts. Various industrial enterprises utilizing agricultural raw materials and producing requisites for agricultural production have been established in developing countries in recent years with financial and technical assistance from bilateral aid programmes. Training and demonstration have always been major elements. Permanent training institutes have been set up in various countries under the UNDP for personnel working in different agricultural processing industries and also in agricultural engineering. Research is promoted in a wide range of projects, including the establishment of permanent institutes for research in such subjects as food technology and in the technology of processing specific agricultural products. Pre-investment surveys, feasibility studies, and pilot projects are also carried out for industries using agricultural raw materials.

2 - India today has the third largest complement of qualified science and technology (S and T) manpower in the World, next only to the USA and USSR. The S and T base has also enabled the nation to build a large and varied industrial infrastructure and India now ranks amongst the first 16 industrialized countries in the world.

3 - New knowledge is certainly necessary in areas such as new varieties of seeds, increased nitrogen fixation through micro biological or chemical methods, biological control of pests, improving photo-synthesis, new uses for various local plants and other materials, recycling of waste products, new source of energy, specially those suited for decentralized exploitation, new materials, improvement in the productivity of the soil, better understanding of parasitic diseases, fertility control, etc. In the field of technology, efficient systems of storage and marketing are important in particular with regard to forward linkages from agriculture to industry. While agricultural innovation in developing countries may require both the creation of new technologies and transfer of known technology for storage and marketing activities, the main emphasis should be on the transfer of the best existing practice. It is necessary to emphasize that application of existing knowledge to the solution of neglected problems of development, especially in inter-disciplinary areas, often demands highly creative and innovative efforts and application of systems analysis capability of a high order. Optimizing the performance of gobar (methane) gas plants and integrating their widespread use with other sources of energy on the one hand, and with the use of chemical fertilizers on the other hand is an example of such a challenging area.

4 - While it is not possible to identify and list all the areas in which India could extend assistance and would require assistance for herself in turn a few areas are mentioned below. Detailed bilateral and multilateral discussions would be needed to identify each project. India has the capability to provide bilateral and multilateral cooperation in the following fields: -

i) Hybrid Seed and Seed-Multiplication

India had adequate technical skill and organizational ability to promote large-scale seed production programme.

ii) Fertilizers

In the design and consultancy field for fertilizers, a number of organizations exist like Fertilizer Planning and Development India Ltd. (FPDIL), FACT Engineering and Designs Organization (FEDO), Engineers India Ltd. (EIL), etc. These organizations could undertake design engineering, erection and operation and maintenance of fertilizer plants. The above organizations have so far involved in design engineering and installation of more than 10 Nitrogenous Fertilizer Plants with capacities ranging from 600 to 900 tons per day of Ammonia and 3 Phosphatic Fertilizer Plants with a capacity of 150 tons per day of P_2O_5.

FPDIL has set up two largest coal-based fertilizer plants at Talcher and Ramagundam which have gone on stream. Detailed engineering and fabrication of equipment have been executed in the country and the country is in a position to help setting up of coal-based fertilizer plants on multilateral basis.

iii) Pesticides

India is in a position to undertake turn-key projects for manufacture of such pesticides as DDT, BHC, Melathion, Endosulfon and a large number of organo phosphatic pesticides.

iv) Textiles and Sugar

Requisite capability exists for establishment of textile and sugar factories and also extend training facilities for intermediate and high technological levels. India has already set up on bilateral basis a number of cotton textiles and sugar mills abroad.

v) Food Processing

India could extend training facilities in the post-harvest technology of Rice Industry, and could also provide technology for preservation of fruit and vegetables, vegetable oil extraction, solvent extraction of oil, etc.

vi) Engineering

India has requisite expertise for ground water survey, sinking of tubewells, manufacture of diesel engines, pump sets, insecticides spraying equipments and accessories, etc.

vii) Phyto Chemicals

Technology for such phyto-chemicals as CN Stimulants, intermediates and final products of cortisones, cortico steroids, cardiovascular drugs, anti-malerial drugs, anti-hypertensives, vitamin A, narcotic drugs, etc. is available in the country.

viii) Others

Technology is available from the country for the following items: hand seed drill, improved seed drill, portable foodgrain drier, grain storage, detoxification of cotton seed flour, garlic powder, protein isolate from groundnut, improvements in groundnut cake, bromelain from pineapple waste, nicotine sulphate from tea waste, methane gas plant from organic waste, surgical sutures, infant food, baker's yeast from molasses, regeneration of used lubricating and engine oil, plastic processing, etc.

5 - India would welcome bilateral/multilateral cooperation in the following areas:

i) Know-how and basic engineering for large size fertilizers plants of 1350 tons per day of Ammonia;

ii) Technology for the improved absorption of nitrogenous fertilizers (presently the absorption is of the order of 25% to 50% of fertilizers applied);

iii) Utilization of solar and wind energy for agro-industrial purposes;

iv) Continuous fermentation of molasses;

v) Manufacture of fats and oils from molasses;

vi) Expertise and exchange of experts in the propagation and adoption of "No Tillage Cultivation";

vii) Effluent disposal technology;

viii) Extrudor Cooker Technology for manufacture of ready-to-eat food;

ix) Technology for the manufacture of edible quality Rice Bran Oil;

x) Manufacture of a large number of pesticides like synthetic pyrethrins, etc.

SUGGESTED ISSUES FOR DISCUSSION

1 - The need for evolving appropriate policies for bringing about close integration between agriculture and agro-industries.

2 - What methods and techniques may be devised to integrate the agro-industries with rural development programme on the one hand and national industrial development programme on the other hand?

3 - In what manner and form, extension service agencies may be organized to serve both agriculture and agro-industry, in the light of experience of the developing and developed countries?

4 - What role can UNIDO play in improving the efficiency of agricultural machines and implements and for the induction of appropriate technology in agro-industries?

5 - In the light of the experience of the various countries, what role may be assigned to the 'cooperative movement' for promoting agro-industries?

6 - How to achieve the much needed coordination and intensification of research activities in the area of preventing loss of fertilizer nutrients through leaching and nitrification and increase the absorption of nutrients by plants?

7 - What measures are needed to promote the orderly development of the Textile Industry in the developing countries and to increase their exports to the developed countries?

8 - Measures to encourage research and development on the promotion of Natural Products to compete with Synthetics and identify the steps to harmonize their roles especially under the context of making greater use of renewable resources as against finite resources.

9 - How and to what extent UNIDO should encourage promotion of proper storage and warehousing facilities and assist in developing internal and international marketing systems?

10 - To identify the major areas where regional cooperation could be promoted in terms of trade, technology, training and expertise.

11 - What provisions may be included in international agreements, directly or indirectly, in order to stimulate agro-industries development in developing countries?

LIST OF STATISTICAL TABLES

TABLE - I(A)

INDIA - GROSS DOMESTIC PRODUCT AT FACTOR COST
(1950-51 to 1978-79)

(Rs. in million)
At 1970-71 prices.

Sector	1950-51	1960-61	1968-69	1978-79
1. Agriculture	100,040 (57.05)	133,950 (52.46)	145,390 (44.43)	198,100 (40.67)
2. Manufacturing	17,500 (10.0)	31,350 (12.28)	51,790 (15.83)	77,060 (15.82)
3. Gross domestic product at factor cost. (Total)	175,360	255,340	327,250	487,090

Note: Figures in bracket indicates the percentage share to the total gross domestic product of the country.

TABLE - I(B)

GROWTH RATES IN GROSSDOMESTIC PRODUCT
(percent per annum compound)

Sector	1960-61 over 1950-51	1968-69 over 1960-61	1978-79 over 1968-69	1978-79 over 1950-51
1. Agriculture	3.0	1.0	3.1	2.5
2. Manufacturing	6.0	6.5	4.1	5.5
3. Total GDP	3.8	3.2	4.1	3.7

TABLE - 2(A)

PUBLIC SECTOR OUTLAYS IN AGRICULTURE AND ALLIED SECTORS IN DIFFERENT PLAN PERIODS

Sl.No.	Period	Outlay (Rs.Million)	Percentage increase over previous period
1.	First Five Year Plan (1951-56)	7240	-
2.	Second Five Year Plan (1956-61)	9690	33.54
3.	Third Five Year Plan (1961-66)	17540	81.01
4.	Fourth Five Year Plan (1969-74)	36740	109.46
5.	Fifth Five Year Plan (1974-79)	83990	128.61

Note: The outlays given above cover agriculture, animal husbandry, fisheries and forestry sectors as well as major, medium and minor irrigation projects, flood control schemes, cooperation, warehousing and marketing programmes.

TABLE - 2(B)

GROWTH OF INVESTMENT IN AGRICULTURE

Sector	1950-51	1960-61	1970-71	1977-78
1. (i) Gross domestic capital formation in agriculture (Rs. millions at 1970-71 prices)	5280	7530	14040	22310
(ii) Annual Compound rate of growth over the previous period (percent)	-	3.5	6.4	7.4
2. (i) Aggregate gross domestic capital formation (Rs. millions at 1970-71 prices)	22590	43180	72530	107900
(ii) Annual Compound rate of growth over the previous period (percent)	-	6.7	5.3	6.2

TABLE-3

GROWTH RATES IN INDIAN AGRICULTURE : 1949/50 TO 1977/78
(Percent per annum compound)

Sl.No.	Item	1949/50 to 1960/61	1960/61 to 1970/71	1970/71 to 1977/78
	Production: (crops)			
1.	Foodgrains ...	2.8	2.8	2.2
2.	Cotton ...	6.8	Negative	6.0
3.	Jute ...	2.0	1.8	1.1
4.	Sugarcane ...	5.7	1.3	4.8
5.	Oilseeds ...	3.0	3.0	Negative
6.	Overall Index of Agricultural production ...	3.1	2.5	2.6
	Production: (Subsidiary Supplementary Food)			
7.	Fruits & Vegetables	4.9	4.3	5.0
8.	Milk	-	1.8*	4.3@
	Resource Use:			
9.	Gross Cropped Area	1.4	0.8	0.6
10.	Gross Irrigated Area	1.1	4.0	3.8
11.	Area under High Yielding Varieties	-	-	13.8
12.	Soil Conservation	-	26.0	6.3
13.	Consumption of fertilizers	-	27.0	9.6
14.	Cooperative credit	22.5	13.3	10.5
	Land & Asset distribution			
15.	Owned Holdings (Concentration ratio)	0.6893[1]	0.6796[2]	0.6635[3]
16.	Operational Holdings (Concentration ratio)	0.6741[1]	0.5790[2]	0.6600[3]
17.	Asset Distribution in Rural Area (Concentration ratio)	-	0.5976[2]	0.5847[3]

* Represents growth rate between1968-79 and 1973-74.
@ Represents growth rate between 1973-74 and 1977-78.
1. Relates to 1953-54
2. Relates to 1960-61
3. Relates to 1970-71

TABLE - 4(A)

DEVELOPMENT OF IRRIGATION POTENTIAL

(Irrigation potential in m/ha(Gross)

Period	Major Medium	Minor Irrigation			Total Irrigation
		Ground	Surface	Total	
1. Pre-Plan (1950-51)	9.70	6.50	6.40	12.90	22.60
2. End of First Plan (1955-56)	12.19	7.63	6.43	14.06	26.25
3. End of Second Plan (1960-61)	14.33	8.30	6.45	14.75	29.08
4. End of Third Plan (1965-66)	16.56	10.52	6.48	17.00	33.56
5. End of Annual Plans (1968-69)	18.10	12.50	6.50	19.00	37.10
6. End of Fourth Plan (1973-74)	20.70	16.50	7.00	23.50	44.20
7. End of Fifth Plan (1977-78)	24.77	19.80	7.50	27.30	52.07
8. End of 1979-80	26.70	21.99	8.01	30.00	56.70
9. Ultimate feasible	58.50	40.00	15.00	55.00	113.50

Table - 4(B)

DEVELOPMENT OF GROUNDWATER STRUCTURE

(In '000 Nos.)

Period	Dugwells	Private shallow Tube-wells.	Public deep Tube-wells	Electric pump-sets	Diesel pump-sets.
1. Pre-Plan (1950-51)	3860	3	2.4	21	66
2. End of Second Plan (1960-61)	4540	20	8.9	200	230
3. End of Annual Plans (1968-69)	6110	360	14.7	1090	720
4. End of Fourth Plan (1973-74)	6700	1140	22.0	2430	1750
5. End of Fifth Plan (1977-78)	7425	1700	30.0	3300	2350
6. End of 1979-80	7777	2118	36.0	3950	2650
7. Ultimate feasible	12000	4000	60.0	12000	5000

TABLE - 5

OUTPUT OF SELECTED INDUSTRIES

S/No.	Item	Unit	1950-51	1960-61	1970-71	1979-80
1.	TEXTILES					
	i) Cotton yarn	m/kg.	534	801	929	964
	ii) Cloth	m/mt.	4318	6740	7596	10435
2.	JUTE MANUFACTURES	'000 tonne	837	1071	1060	1337
3.	SUGAR	m/tonne	1.12	3.03	3.74	3.90
4.	VANASPATHI (Hydrogenated edible oil	'000 tonne	170	340	558	626
5.	Automobile Tyres	m/Nos.	-	1.44	3.79	7.1
6.	Fertilizers					
i)	Nitrogenous Fertilizers (N)	'000 tonne	9.0	98.0	830.0	2229.0
ii)	Phosphatic Fertilizers (P_2O_5)	'000 tonne	9.0	52.0	229.0	757.0
7.	Pesticides	'000 tonne	-	-	34.17@	50.0
8.	Power Driven Pumps	'000 Nos.	-	109	259	347
9.	Diesel Engine Stationary.		-	44.7	65.0	142.3
10.	Tractors	'000 Nos	Nil	Nil	19.3	62.5

@ Relates to 1974 - 75.