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REPORT ON THE POSSIBILITIES OF AGRO-INDUSTRIAL FOOD PROCESSING DEVELOPMENT DURING THE IRANIAN FOURTH FIVE-YEAR PLAN 1/

(1968 - 1973)

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1/ The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the Secretariat of UNIDO.

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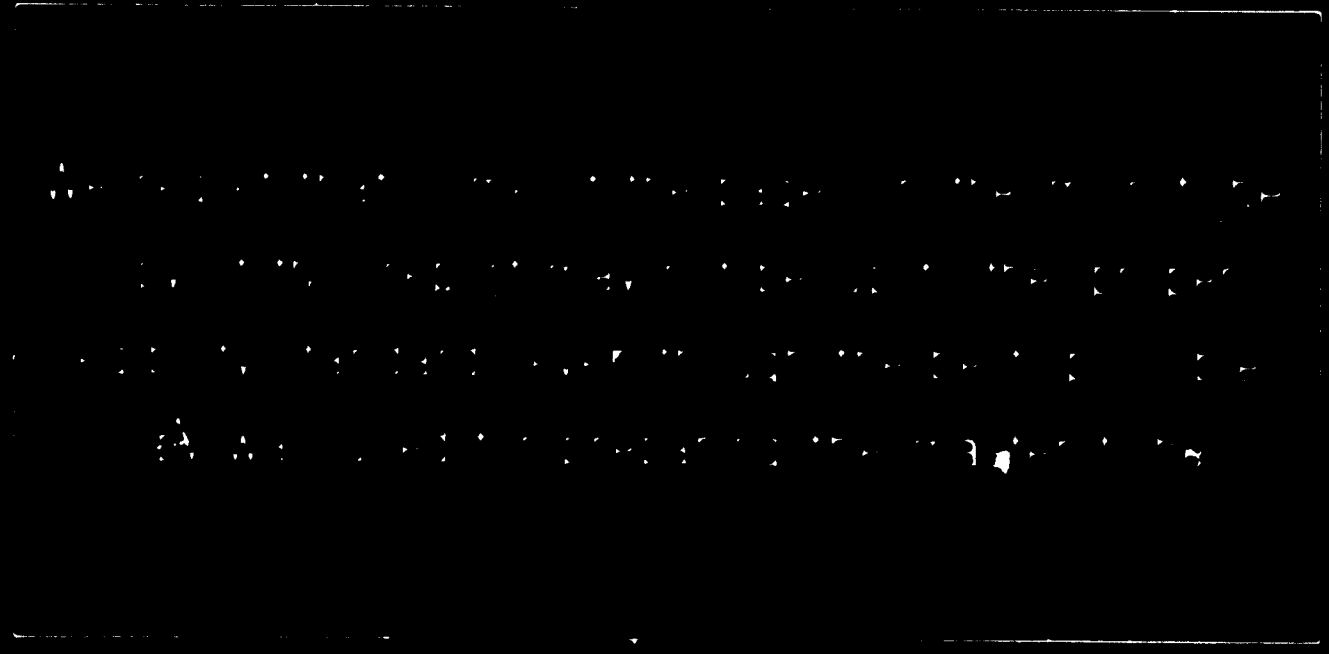

I. BACKGROUND

1. The Government of Iran, through the Ministry of Economy, requested the services of the Officer-in-Charge of the Food Technology and Light Industry Unit of UNIDO, New York, to assist, in a brief visit of two weeks, in the delineation of a project on agro-industrial development of the food processing industry in Iran, required in connexion with the preparation of the Fourth Five-Year Plan, 1968-1972.

2. Information was obtained in interviews with experts and other persons with various governmental, United Nations and private groups and organizations, and data were also collected from various sources cited in directories of literature.

3. The main purpose of this visit was to prepare the terms of reference for future UN assistance, and to outline possibilities of development in intensive, integrated agro-industrial food production for the fast growing needs of Iran's consumer.

4. This report is, of course, not based on a thorough exploration of the vast and complicated field of food production in Iran and its relation to the dynamic growth of other industrial production, but on numerous reports, investigations, analyses and oral information gathered during the brief visit.

5. No doubt some discrepancies will be found in this tentative report, which is intended only as a first step to introduce systematic planning of food production, in addition to implementing surplus promotion in ancient farming methods.

II. INTRODUCTION

Farm production vis-a-vis agro-industrial food production in Iran

Growth of Industry

6. The focus of national interest at the present time has turned from agriculture to industry in Iran. Industry has become the most dynamic sector of the national economy, and is increasing three times faster than agricultural production. The trend is for a still more rapid increase in industrial activity.

7. At the current rate of immigration to the cities, at the end of the next five years about two thirds of the whole population will be living on land producing one third of the value of industry. At the present time the value of agricultural production in Iran is about equal to the value of all Iranian industrial and mining activity - including all revenue from the mineral oil industry.

8. This trend hides two dangers for the future. The first result of such development will be the relatively low average per capita income for the population within the agricultural sector. The second problem concerns the growing deficiency of food, both in quantity and quality, for the increased buying force of the white collar employee and the highly skilled worker in industry, by the end of the Fourth Five-Year programme of development.

9. Therefore, the faster growth of the agricultural sector is the first task to be undertaken, because the unsatisfied demands for food by communities would create an insurmountable obstacle for the further development of industry. By coincidence, both trends are also linked together in the opposite direction. With every effort being made at present to find and develop export markets for the increased industrial production, it is clear that the greatest potential for industry lies in an expanded domestic market. This would mean that all people living on the land and producing food as a cash crop, would have an increased income, which would be reflected in the national per capita income.

10. The creation of agro-industrial combines is the only means to provide additional values which can be partly returned back to the basic raw material producer; additional quantities of high quality foods adapted to the needs of the increased number of industrial employees in the country; and additional exports of hard currency-earning goods, to offset increasing imports. Because of the progress in the creation of up-to-date, large scale, aggressive methods in modern marketing, agro-industry, especially in developing countries, is having a greater effect on the economy than is generally realised. Higher productivity on integrated industrial farms to the processing industry assures not only a steady flow of first-class, standardised raw material to the industry itself, but is the best means of efficient farming methods, whether or not the farmers co-operate directly.

Agriculture in relation to food processing

11. To date the modest progress in agricultural development in Iran has created a feeling that no further, more rapid increase in food production has real prospects of success. There are many pessimistic reports regarding the operation of farms, factories and stores. These reports include observations on primitive farming and horticulture; low yields of inferior products; primitive tools; inadequate storage; poor processing and grading; long hauls over bad roads, leading to spoilage of fruits and vegetables, causing losses.

12. Many of the experts have doubts about the possibility to: extend fast and sufficiently efficient agricultural services; raise the level of the farmers' education; successfully change ancient, old-fashioned methods of production; build roads; create demonstration farms; make available agricultural credit, on low-interest long-term loans; organise moral co-operation; replace the old landlord system; establish small-scale rural processing food industry, develop the co-operative marketing system; eliminate the middlemen.

13. The FAO Report, No. 999, on Agricultural Marketing, hesitates to propose the successful introduction of fruit-grading, unless quality fruits can be produced. The first effort to improve marketing should be to improve the quality and the yield. But this is a closed circuit, because the producer is not able to invest if he cannot realise better prices by improved marketing, etc. The marketing reformer has difficulties on two fronts. He has to tackle the illiterate, ignorant, poverty-stricken peasantry, who are shy and suspicious of any change. On the other hand, he has to grapple with a shrewd type of merchant class whose interests may suffer with the introduction of reforms in the antiquated marketing procedures.

14. There are many recommendations to the Government of Iran, clearly described in detail, with job descriptions, and estimated costs, all steps to be taken to improve agricultural services, both in production and in marketing.

15. A Marketing Department should be created for the whole country which would issue marketing surveys; organise research and intelligence services;

establish grading and packing houses for fruits and vegetables in strategic centres; regulate markets; establish co-operative marketing associations of producers; train farmers and marketing personnel in various directions.

16. The difficulties of the rapidly increasing food production in Iran's agriculture are clearly evident from reports on animal protein production and marketing in the country.

Animal husbandry

17. The benefits of more intensive input and more efficient development of animal husbandry in Iran would be a great contribution to the economy in general, and to the food industry in particular, especially in regard to meat, milk, eggs and poultry.

18. However, there are obvious difficulties and obstacles. The animals appear to be under-nourished; the yield of milk is low; meat and cheese are normally expensive, and in short supply. More intensive work should be done on: the improvement of pastures; selection of breeds; hygienic processing. Numerous other recommendations have been proposed to the Government of Iran in many reports, to improve the present situation of animal husbandry.

19. At the present time Iranian agriculture is rarely a producer of cash crops. The farmer sells his surplus to the middleman. In some cases there are as many as five to seven such marketing steps between the farmer and the consumer. Iranian agriculture is an extensive one; its products are low in quality; its supply for the needs of up-to-date large scale food processing industry is unsteady, expensive and ill-timed. Iranian agriculture is traditional and static, not willing or able to undergo fast and progressively the growth and changes required by the dynamic, modern food processing industry. Iranian animal husbandry has almost the same characteristics. Only a small part is at the ranch level, the greater part being nomadic. Intensive industrial animal protein production by feeding is practically negligible. In spite of this situation and, fortunately for Iran, the main dominating factors which are necessary to transform this agriculture into a dynamic producer for markets by intensive methods and techniques, are present in Iran.

20. Iran's climate is so diversified that it is possible to grow almost all of the fruits of subtropical and temperate regions, for instance, all kinds of grain, fodder, legumes, sugar cane and sugar beet, tea, tobacco, vegetables, oil bearing materials, grasses, grapes, citrus fruits, all kinds of nuts - in brief, almost all the raw materials to supply a modern food processing industry.

21. Iran's soil is one of the oldest cultivated by mankind, and in many places is lacking in organic compounds because of a fast growing salination in certain circumstances, and a relatively quick dehydration caused by insolation and the strong sea winds which blow during the dry season of the year.

22. Iran's agriculture depends a great deal on irrigation. Water is the country's dominating problem in agriculture. The most rational use of water is essential in the further development of food production in Iran. The investment required to improve regional soil conditions is quite beyond the means of individual farmers. Water resources should be exploited, allocated and supplied by the Government of Iran, or by its regional authorities.

23. From these facts, other conclusions may be drawn. A huge investment to allow for soil enrichment, reclamation and conservation and an effort to find and store water for irrigation can be repaid only by intensive agro-industrial activity connected to food processing. Everything possible should be done to make the soil produce, as the revenue from the crops would more than offset production costs, and this would greatly assist in the development of the country.

III. THE AGRICULTURAL APPROACH TO IRAN'S FOOD PRODUCTION DEVELOPMENT

24. The agricultural approach to solve the future development of Iran's increased food production is best summarized in the Final Report of Mr. J. H. Vanderamissen, FAO expert, dated March 1966. After a substantial analysis of Iran's agricultural structure, he proposed to organize the future increased agricultural production, based on natural(?) agricultural regions, respecting the traditional crops, intensifying the beet sugar production, tobacco and rice growing, assisting the further

development of tea plantations, cotton cropping, and reducing the average of kenaf (fibre raw material) as non-interesting raw material for the expanding textile industry.

25. The organization of the specific agricultural zones or regions should be implemented by overcoming different obstacles in assisting the private farmer in obtaining a general education for the programme foreseen, as for example: teaching the agro-technical methods and techniques; organizing the irrigation systems, and helping the execution of individual micro-structures fit for every producer; giving advices for future crops; advising in phytosanitarian measures at the most opportune time; helping to collect and store the crops; and assisting in marketing of the preprocessed or sorted standardized goods.

26. Another publication by J. L. Haynes, "Crop Zones of Iran", USAID, Iran, October 1965, makes a similar approach to the agricultural development of Iran. This document was inspired by a previous study, "The Soils of Iran", and the connected map, "Soil Potentiality Map of Iran", and by other studies and reports pertaining to views of this kind on agricultural development. Mr. Vandermeiden has proposed a classification in five zones, giving a list of priorities as follows:

First priority: Caspian Zone

(a) Guilan: To develop rice and tea, tobacco, potatoes, fruits, cattle and fish production

(b) Mazdaran: Rice, cotton, kenaf, feedstuff, maize, wheat, soya, alfalfa, beans and cow milk

Second priority: The Northern Zone

(a) Azarbaidjan: Cotton, tobacco, sugar beet, wheat, foodstuffs, sheep and cattle, onions, vegetable oil bearing materials

(b) Gorgan: Cotton, wheat, potatoes, animal husbandry

Third priority:

(a) Isfahan: Cotton, sugar beet, vegetables, melons, fruits, wheat

(b) Khuzistan: Sugar cane, wheat, sugar beet, dates, onions

(c) Teheran: Wheat, legumes, vegetables, sugar beet, fruits, potatoes, cotton

( ) Hamadan: Sugar beet, animal husbandry, wheat

( ) Kurdistan: Sugar beet, animal husbandry, wheat

( ) Fars: Cotton, sugar beet, wheat, fruits, dates, citrus fruits, animal husbandry

(f) Khorassan: Wheat, sugar beet, cotton, fruits, safran, animal husbandry

Fourth priority [illegible]

(a) Jiroft: [illegible] vegetable oil bearing crops, wheat, fruits, vegetables, citrus fruits

(b) Minab: [illegible], tropical fruits, bananas, citrus [illegible]

( ) Bandar-Abbas: Wheat, animals, vegetables, fish industry

Fifth priority. [illegible]

(a) Kerman: [illegible], sugar beet, pistachio nuts, citrus fruits, dates, tobacco, Henné, animals

(b) Sistan Baluchistan: Wheat, melons, animal husbandry

27. While it is not the intention to enter into discussion of this tentative and indicative proposal, it should be emphasized that the main characteristic of such an approach to the programme of agricultural development should be initiated, implemented, developed, financed, organized, and operated in co-operation with millions of small farmers from the highest level of governmental bureaucratic authorities to the infrastructure of hundreds and thousands of different services - but without the "hot" and irresponsible initiative of individuals or enterprises motivated only by self-interest and profit.

28. Such a programme should be implemented by big <u>material efforts</u> of the State, without assurance that the modern pattern and low costs of food production in developed countries could be reached, and an entrance to world markets opened.

29. This programme should be undertaken at the same time as the "white revolution" through Land Reform takes place, and when the immense task hangs over the whole country to keep the agriculture going despite the disorientation of the new land owners who have first to learn how to make basic decisions on the most simple work of management in traditional agricultural techniques of their small farms.

30. Such programmes, relying only on climatic, ecological properties of soil and water resources - if once realized - would solve many problems in connexion with the processing of food production (as is normal in modern economy) by processing for preservation and by creating quality products for export. The planted area of the country is not in balance with the commercial size of an up-to-date food processing plant and the quality of the raw material is not suitable for modern mechanized processing.

31. An informative description of Iran's problems was supplied by Mr. Eng. Asghar Azarnia, Director General of Independent Gazvin Development Project. This is an independent governmental agency which has had the task of reconstructing the Gazvin Region heavily damaged by an earthquake in 1965. Since then the Project has built 85 brand new villages. By 1972 there will be 36,000 hectares of land under irrigation and mechanised agro-technique applied. The yield of wheat has increased from 1 to 2.8 tons per hectare. The production of sugar beet was increased from an average of 15 tons to 40 tons per hectare. By the end of 1978 there will be 110,000 hectares of land under irrigation. Modern chicken production is under way, in co-operation with farmers, and a large orchard has been planted. The total area of apples, pears and peaches should be 8,000 hectares in a few years' time. This is an extraordinary effort and the results are remarkable. In regard to the question of processing, I was told that the Government, together with its farmer-partners, has contracted processing with various private enterprises. There is already on the spot a beet sugar factory with a capacity of 1,500 tons of beets per day. A contract has been signed with a canning plant to deliver 1,000 tons of tomatoes. A cheese factory is nearby. The Project is trying to persuade the Ministry of Economy to establish storage and cold stores for the fruit and other products. In four or five years the orchard mentioned above should yield about 40,000 tons of apples, pears and peaches per year. In eight to ten years the yield is expected to increase to 120,000 tons per year.

32. The Ministry of Agriculture, together with the Plan Organization, has a programme of 45 or more such projects of co-operation with relatively small farmers who will take over the management of the operation once they have sufficient knowledge and experience to do so.

33. Investments for such projects are enormous and should be charged to the Government's budget as it is not possible to estimate when these investments could be paid back. The investments for the orchards would be approximately

Irrigation costs	$1,800 per hectare
Construction of buildings, agricultural input, etc.	1,200 " "
Investment for the orchards	1,500 " "
Total	4,500 per hectare

34. The amount of cold storage that would be required for 120,000 tons of various fruits would be about 100,000 m^3 of cold storage and a relevant cold chain with transport and distribution facilities, in addition to sorting and cleaning equipment. The total cost of the pre-processing capacity would be about $40 to 50 million. This is considerably more than initial cost of the orchard itself.

35. The existing sugar beet factory is too small and cannot compete with larger factories. The private factory will put pressure on beet prices and this will reduce the beet producers' profits. The cheese producer and the canning factory owner have opposite interests in relation with the raw material producers.

36. The situation in Iran became more difficult through the agricultural reform. The feudal landowner lost his huge, compact land, obtaining long-range repayment from the new owner, who was financed by cheap State loans. From the small particle of land the new owner will have to repay the investment, pay the high cost of a house for himself, the village and community services, his farm equipment, animals, agricultural and other services. A great effort is being made to establish such projects in many areas of Iran. International assistance in experts and loans was required to initiate this procedure which should neutralise the negative influence of the agricultural reform on food production increase.

37. All these efforts are financed by the State, with the aim of forming strong, financially independent co-operatives which will be able to repay the loans - becoming the exclusive owners of the land and being the only producer of food and other agricultural products.

38. By this scheme no highly mechanized agricultural production closely connected to processing in up-to-date large modern factories was foreseen nor the direct distribution of products to the consumers. Many private food processing factories will be in control of the raw materials, with the power to impose prices against the producers and usurping a lion's share of the profits, without any risk of participating in the investment made by the State without any risk of participating in the repayment.

39. If a factory as a co-operative enterprise was contemplated, mostly a small, rural capacity was taken into consideration - within the boundaries of the project itself.

40. The policy of how to develop modern mass production of food was outlined generally and was not elaborated in detail for the main food commodities which applied to the situation pertaining to Iran's traditional and future needs.

41. In view of all this and many other economic and technological facts and inter-relations of the up-to-date modern food industry, we should try to develop projects in which the whole technological process from raw material production through processing and distribution of food products, would be integrated, executed and balanced as an indivisible, integrated process, namely, the agro-industrial enterprise.

42. We will try to indicate the possibility of outlining such general criteria of development which should be applicable to all regions and to all series of production and which should be taken into consideration in any event of investment to produce more and better food in Iran.

IV. FOOD PRODUCTION, FOOD BALANCE AND FOOD MARKETING IN IRAN

43. Iran's food processing industry is in full development. There are some very modern factories (sugar, vegetable oil, biscuits, etc.) established in the past few years parallel to small-scale artisan's rural production facilities. Food technology, food sanitation, food equipment production, food packaging materials, processed food distribution, are only beginning to expand. Iran has no special food technology education at all, either for technicians or for a university degree. Some food

technology and food engineering was initiated at the Agricultural Faculty of Teheran. An Institute for Nutrition and Food Research was established some time ago.

44. It is very difficult to collect data on food processing capacity. The following data illustrate the present situation.

1) Sugar:

Sugar is a very important product for Iran. It is produced from beet, sugar cane and from imported raw sugar.

Beet sugar:

	Surface	Production/ha	Production/t	Sugar refined
1962	75,000 ha	16 t	1,350,000	175,000 t (13%)
1967	150,000 ha	19 t	2,850,000	397,500 t (13.9%)

Cane sugar:

	Surface	Production/t	Refined sugar	Yield
1962	2,000 ha	200,000	12,000/t	6%
1967 (Plan)	5,000 ha	500,000	35,000/t	7%

Sugar beet is grown all over the country. Sugar cane only in the southwestern part (Khouzistan). The yield of sugar is relatively low.

The consumption of sugar in 1967 will be about:	550,000/t
Production in Iran, 1967 :	315,000/t
Deficit which must be imported :	235,000/t

There are several beet sugar factories, but only one cane sugar factory.

2) Vegetable oil production:

Vegetable oil is consumed in Iran in the form of hydrogenated fats. This overall picture of the oil and fat situation is as follows:

Edible Fats:	1966
Domestic production of	
vegetable oils	40,000
butter and ghee	35,000
animal fat	20,000
total	95,000
Imported fats and oil	69,200
total	164,200 tons
In 1966 additional industrial fats (tallow) were imported	20,400 tons
grand total	184,600 tons

Taking into consideration the consumption of fat per capita (on the basis of these data), with 7-8 kg/year we must come to the conclusion that the need to expand the supply of fat and oil is very significant.

Imports and Exports

45. A better insight into this situation is given by the available import and export lists. Here it should be noted that in spite of its almost balanced foreign trade, Iran cannot afford to import the quantity of food really needed and it has to export food which should go to the consumers in the country.

46. In a period of eleven months (21 March 1966 - 21 February 1967) Iran has imported:

Imports	Number	T	Value (million rials)
*Cows	1,503	659	98
*Sheep	33,000	1,200	50
*Chickens	1,300,000		34
*Meat		96	12
Fish, preserved			3.5
*Milk		3,700	236
*Butter		3,200	182
*Cheese		390	32
*Eggs		532	69
Bananas		703	10
Coffee		84	3.3
*Tea		5,994	798
Pepper		427	25
Cinnamon		200	9
Curries		513	16
*Wheat		166,293	877
Rice		12,700	118
Flour (wheat)		7,188	65
*Starch		2,360	32
Ground nuts		231	8
Oil seeds		30	3.5
Animal oil		15,414	282
Cotton seed oil		12,895	302
Vegetable oil hydrogenated		7,700	191
Other vegetable oils		500	30
Soya bean oil		28,118	693
Special oils		14,422	302
*Edible oil and fats		79,049	1,802
*Sugar, all kinds		243,845	1,122
Glucose		2,237	21
Cocoa powder		80	5
Infant flour		243	22

* Most important and interesting items of the foreign trade.

Imports	Number	T	Value (million rials)
Fruit juices		80	7.?
Edible yeast		120	7
Alcoholic beverages		157	16
*Fish meal		2,364	37
*Feedstuffs, fodder		3,462	65

47. At the same time, Iran exported:

Exports	Number	T	Value (million rials)
*Bulls and cows		1,964	43
*Sheep	141,252	4,286	181.8
*Goats	187,000	4,542	161.2
Fish, preserved	1,330	1,350	44.8
Fish, salted		2,660	21
*Casings, salted and dried		671	106
*Tomatoes		367	2
Onions		5,529	18
Potatoes		12,610	48
Beans, dried		3,613	38
*Dates		26,000	157.9
*Sultanas		27,548	487.9
*Almonds		1,181	98.5
Walnuts		392	18
*Nuts (pistachios)		5,974	431
*Apricots		1,970	55
*Roots (liquorice)		17,410	92
*Cummin (seeds)		7,610	303
*Gum traganth		2,489	284
Fats		1,044	30
*Caviar		190	283
*Cakes from oil		46,670	200

48. Other branches of the food processing industry which are developed with difficulty:

Alcoholic beverages: Production of wine and other alcoholic beverages is low in quality and quantity.

Soft drinks: A highly developed industry. In some cities a surplus of soft drinks is produced.

Bakeries: Most of the bread is produced by thousands of small private bakeries.

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* Most important and interesting items of the foreign trade.

Fish industry: A modern up-to-date caviar industry has been developed in the North. A small canning factory has been established in the area of Bandar-Abbas.

Dairy industry: Practically undeveloped. Teheran has two factories (about 200,000 litres daily). The capacity of various other factories is between 2,000 and 5,000 litres daily. There are many projects recommended for sheep cheese factories.

Meat processing: One meat processing plant was established near Teheran processing about 50 hogs daily, and carcasses of about 30 to 60 cows. A slaughterhouse has been constructed in Teheran, but is not yet in operation. Capacity: 10,000 sheep and 1,000 cattle daily. A project has been recommended to establish 100 to 120 small community slaughterhouses all over Iran.

Dried fruits: A very promising industry in state of development. In the northern part is a drying and packaging plant for sultanas and different kinds of nuts. In the South there are several for dates.

Fruits and vegetables: Some small-scale units to process tomatoes and fruits are already in commercial use. Ketchup, sauces and dressings are produced by several smaller factories.

Tea: Tea is of special interest in Iran. Thousands of tea farmers and hundreds of tea processors are sub-dividing the job of supplying the amount of tea required. The consumption of tea exceeds the trend of production increase.

Can manufacturing: There is no can factory in Iran. Imported cans are expensive and the locally produced "Hand-made" cans are so bad that in some private factories the percentage of blown cans may run as high as 20-25 per cent.

49. The equipment used in food processing factories inspected "excellent" to "very poor", depending on the owner or the leading technician who made the choice. Most of the factories are operated by foreign engineers or consultants. There is no domestic engineering company with know-how to provide service for food processing. The evaluation of the various projects depends on foreign experts or consultants, and industrial development is mostly based on a feasibility study submitted by a foreign equipment producer.

V. AGRO-INDUSTRIAL FOOD PRODUCTION IN IRAN

50. In view of all these problems and situations, we might propose to the Government of Iran to give full attention to the possibilities of integrated agro-industrial food production and processing in Iran as a means of avoiding difficulties in the present situation and to overcome tradition and expand the production of food to meet the needs of the country.

What is agro-industrial integrated food production?

51. Contrary to the approach depicted previously and applied by agricultural food production, we may find that the market (instead of climate, soil and tradition) is the initiator and promoter of agro-industrial food production. Up-to-date developed agro-technique and food processing can be used to produce the quantity and quality of food required by the market. The exigencies of the markets have imposed and reversed the traditional method of food production.

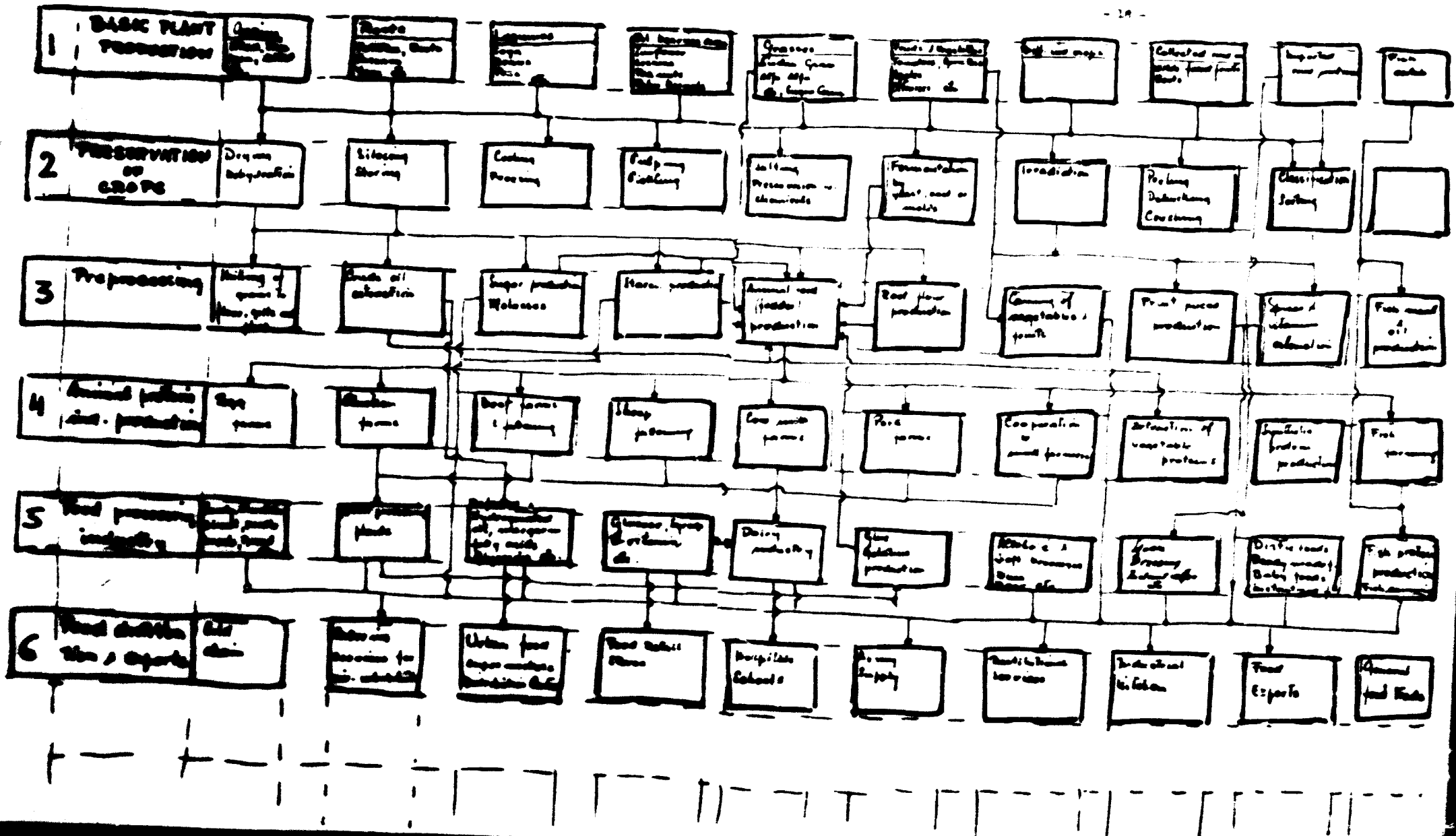
52. The market for food was tremendously developed, both in quality and quantity. In developed countries only 10 per cent of its inhabitants are producing food for the other 90 per cent. The food market grew in the last 20 to 30 years at an average rate of 200 to 1,000 per cent in countries where the individual growth was successful. The fresh food market growth was not nearly as great. More and more processed, stabilized, concentrated, sorted, and packaged food has become important. Today's consumption of food in large cities and communities consists of 90 per cent processed and less than 10 per cent fresh food.

53. In the same way as the market initiated and decided where and when food should be processed, the food-processing made quite an impact on agricultural production. The food factory promoted and initiated a new kind of industrial agriculture, using industrial methods for its raw material production, planning and dictating the quantities, the prices, the quality and the time of delivery of agricultural products. The food industry became and will become more and more the main entrepreneur of agricultural food production.

54. Thus, marketing, food processing and industrial agricultural raw material production became an indivisable unique technological process which has to be planned, implemented, executed, organised and exploited with one investment.

LEVEL

INTEGRATED AGROINDUSTRIAL FOOD PRODUCTION



55. In Scheme No. 1, attached, we have tried to show the six main levels sub-dividing the whole array of integrated food production in phases which logically and necessarily follow one another. This is not only a scheme of production and organization, but also a scheme of planning the agro-industrial food production from the growing process to the markets at home and abroad.

56. We see in the scheme six different levels along the integrated food processing activity. At the first level the basic production of vegetable crops occure together with the collection of wild, spontaneous growing food raw materials, different forest animal products, and fish catch. The first level is characterized by high level application of mechanized agriculture, special selection of seeds, and varieties convenient for mechanical harvesting and special processing of products requested by the markets. No extensive agriculture is included here. The promotion of this agriculture is the task of the food processing industry and is executed on own land or on land owned by farmers but bound to the factory on the basis of long-term contracts by which they become, in fact, factory workers.

57. The main task of the second level activity is to preserve highly perishable crops by modern industrial preprocessing operations. The main object of this phase is to save the high quality of the freshly cropped plant, to assure a prolonged supply of the raw material to the processing capacity, to reduce the weight by dehusking, extraction of kernels, etc., to enable transport for reproduction or consumption, and to produce a semi-product which can be sold, exported, or coverted out of the own technological process.

58. At the third level a very important activity is concentrated, that is, the preprocessing of semi-finalized products or the production of input for the industrial animal protein production. At this level the primary food products are extracted from raw materials in concentrated pure form as, for example, vegetable oil, sugar, starch, fruit juices, fish meal and fish oil, animal feed, different root flour, etc. These basic products have very important by-products (milling by-products, oil cakes, molasses, dry grasses, press cakes, fish meal, etc.) which are important as ingredients for animal feedstuffs and which, enriched with supplements, antibiotics and some vitamins and glandular extracts,

are basic for the modern feeding and fattening of animals in pure or semi-industrial forms. On the other hand, these purified basic products (flour, sugar, starch, oil, etc.) are raw materials for further reproduction in bakeries, glucose, candy, noodles, convenience food and other factories - and are, at the same time, very important articles for direct food consumption.

59. At the fourth level the animal protein production is concentrated by means of animal feedstuff. Modern feeding and fattening on huge highly mechanized farms is rational and this may be adapted for developing countries because the extensive animal husbandry can be developed only slowly and will never more become a basis for mass-production in up-to-date food processing. By this means great numbers of young animals produced in developing countries can be saved and fattened in a short period of time, with very good results both for reproduction and for direct sale.

60. The fifth level is the finalizing food processing industry which became more important as the number of consumers increased in fast-growing communities. This type of industry is rapidly replacing all processing of food previously undertaken by small artisan enterprises, and also by women in the kitchens of their homes. This level is characterized by high intensity of work-hours, despite highly automated processes. This level, combined with the great need of work hours which occurs at the sixth level in food distribution, provide the source of new working places apparently lost by the high rate of mechanisation at level one and level two.

61. At the sixth level we have to establish proper facilities for food distribution which is quite different from what it was at the beginning of the industrial era. Chilled meat or frozen fish cannot be distributed without a perfect cold chain, extended from the fifth level to the freezer or refrigerator in the home of the consumer.

How an integrated agro-industry is planned

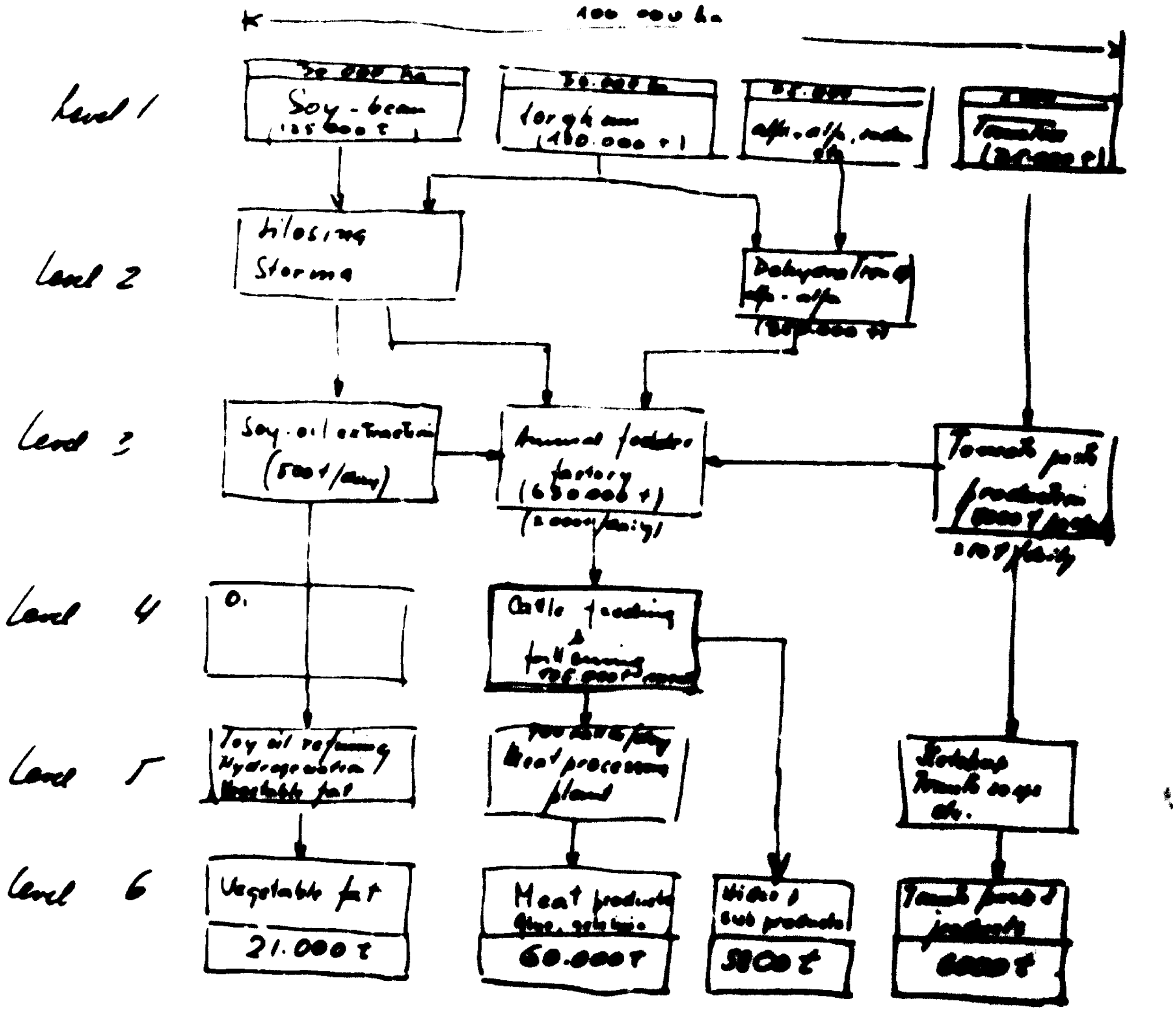
62. It is difficult to cover this very interesting question fully in detail. However, to show the reverse method of classical planning of agricultural food production, we will give a simple example: The marketing research in Iran has shown that animal protein (cattle, milk, beef, etc.) is very deficient. The prices are very high and the exigencies

are fast growing. At the same time, we know that the export of tomato paste would be profitable because many of Iran's neighbors (Saudi Arabia, Kuwait) are great importers of this commodity. In Khousistan there is land which could be exploited intensively for agro-industrial crops. If we want to produce animal protein in a meat processing plant (fifth level), we have to create first a source of vegetable protein (at the first level). We decided to choose soya as the most convenient source of vegetable protein. The minimum capacity for soybean crushing mill with extraction should be, for instance, 500 tons of soybean daily, or 25,000 tons a year. If a yield of four tons of soybean can be expected, then a surface of 30,000 hectares should be devoted to soybean production. On another 30,000 hectares a crop of sorghum should be grown to supply the carbohydrate component. An average yield of 60 tons of sorghum per hectare could bring 180,000 tons of grain; 35,000 hectares of surface can be covered with alfalfa grass and similar voluminous crop which, after dehydration, will give about 350,000 tons of dehydrated or dried material.

63. The foodstuff factory will, thereafter, be supplied with: 100,000 tons of soy cakes; 180,000 tons of sorghum; and 350,000 tons of dried grass; a total of 630,000 tons of foodstuffs (average: 16-17 per cent vegetable protein). This would be enough to produce 105,000 tons of cattle. On 5,000 hectares of surface can be grown 85,000 tons of fresh tomatoes, giving 5,000 tons or 30 per cent tomato paste, processed by a factory with a capacity of 250 tons daily.

Scheme 4: 2

Integrated production of vegetable oil, meat and tomato paste



The gross-revenues from this integrated agroindustrial process would be about: very roughly:

Gross revenue:		(thousand dollars)
21,000 tons of vegetable fats, margarine, etc.	700/t. =	14,700
60,000 tons meat products	2,000/t. =	120,000
5,800 tons hides and other sub-products	1,000/t. =	5,800
6,000 tons tomato products	350/t. =	2,100
		142,600
Other products and services		28,400
Total		$171,000

The gross product is $171,000, or $1,710 per hectare.
Sorghum alone would bring only $350 per hectare.

This rough comparison shows the difference in revenues, along the lines of the whole technological process in integrated industrial food production, in relation to extensive agricultural production, and the economic advantages of investing, organising, and exploiting a land surface like this. This is especially true, and important, if investments for reclaimed land and irrigation facilities should be repaid as soon as possible. It is obvious that huge investments per hectare of reclaimed and irrigated land could be repaid only by means of agro-industrial exploitation.

Advantages of agro-industrial production.

The main advantages of agro-industrial investments in food production of developing countries.

64. There are a number of advantages obvious if investments have been made by agro-industrial planning of food production, and we should like to emphasise a few of them:

1) Faster realisation. A substantial food production increase, through agro-industrial production, can be achieved in only 4-6 years through all six levels, if consistent planning, investment, and execution by experienced engineering companies, is assured. The increase in food production by traditional methods and pattern of the same volume could be reached only after 20-30 years, if all problems pertaining to this complicated endeavour would be solved positively.
2) Fewer skilled workers, fewer specialists, fewer experts and consultants. The agro-industrial enterprise requests a smaller

number of skilled workers, general consultants, and specialists than would be required if the traditional way of increasing agricultural food production were followed. The number of skilled, qualified workers, administrators, consultants, can be reduced this way to 10-15 per cent.

3) Less investment per unit of produced food value. In spite of the high level of mechanization and automation in processing, we have to stress the fact that investment through agro-industrial processing is only a small part (one third to three-fifths) of the amount required for the traditional agricultural production, if expressed as per unit of produced food.

4) Independence of raw material producers. Food industry depends on quality, quantity, price, and timing of delivery of the raw material by the producer. Normally, the producer is free to sell his agricultural products to the free market if he has not fixed his delivery to the processor. The up-to-date food processing industry is far better off if it does not depend on thousands of small producers, but has the quality, quantity, and time schedule of delivery in its own hands.

5) Independence from marketing organizations. If a big agro-industrial enterprise has its own marketing organisation and facilities for up-to-date distribution, it is possible for it to achieve far better prices on the market and reduce the very high marketing costs.

6) Reduced production costs. It is obvious that the high mechanization, specialization, and the short time and transport requested, are factors which enable the agro-industrial enterprises to reduce substantially the production costs. In addition to this, there are a number of other factors with the same influence, as for example, elimination of all middlemen, reduction of spoilage, possibility of re-using sub-products in the same enterprise, transfer of seasonal workers from agriculture to processing and reverse, common general services, accounting, etc.

7) Standardized quality of products. Standardised raw materials are required for the production of standardised processed food.

It is obvious that such a goal can be more easily achieved if it is not necessary to deal with 100,000 small individual producers.

8) Export, under reasonable conditions. Export is desirable, if competition on world markets can be met successfully and profitably. To enable the bearing of introduction, and marketing costs in a foreign market, it is necessary to export huge quantities of high quality products, in order to satisfy first class importers servicing the main retail markets. Only agro-industrial production in a developing country can successfully meet such requirements.

9) Foreign investment financing made easier (or possible). It is a very difficult task to persuade an international banker to finance a project of increased food production by which thousands of individual farmers should realize results from small investments and assisted by governmental or different co-operative services which ought to be established. It is difficult to assess all the risks involved, the time of fulfilment, the adverse situations to be met in the future, etc. An agro-industrial project can be studied, its viability ascertained and relevantly financed.

10) Agrar-reform and agro-industry. In some developing countries it is only now that the feudal system in land ownership has been abolished and agrarian reforms applied. Sub-dividing the land into small particles is an adverse activity to up-to-date agricultural production. The classical agrarian reform has a negative influence in food production increase. Through agro-industrial enterprises, it should be possible to jump from feudal to up-to-date agro-industrial production with safe results also in the political part of that solution.

11) Self-sufficiency for national safety. There is no better way than agro-industrial food production to ensure up-to-date rations for an army, and the required reserves for national safety in case of war.

12) Independent agro-industrial enterprises and bureaucracy. The independent agro-industrial enterprise does not need the extended

services and guidance by the State as traditional agricultural production. The bureaucratic behaviour, and the traditional general attitude of the State bureaucracy, would be positively influenced.

13) Control of food prices. By intervention on the domestic market, through normal prices by huge agro-industrial enterprises, a disorganization through speculation can be avoided, and a steady market supply achieved in competition with private entrepreneurs.

14) Agro-industry and private capital. The agro-industrial planning is the best way to awaken the interest of accumulated private capital in the hands of wealthy private persons in cities, who are not normally very enthusiastic about becoming involved in rural food production increase.

VI. PLANNING OF AGRO-INDUSTRIAL FOOD PRODUCTION IN IRAN

65. As a consequence of the aforementioned and underlined facts, it is recommended that the idea to develop a programme of food production increase in Iran through agro-industrial enterprises to be adopted very soon. However, before we try to indicate concrete details, we must set some general criteria on which to base the policy which is to be followed once it is determined to be of general value for this period of Iran's development. To arrive at this general evaluation, it is our idea to make a short study of the situation of particular food items on the Iranian market, discussing the various solutions and underlining the most convenient ones. We feel that only this approach has indisputable value. Our suggestions should be discussed afterwards, and seriously studied. Our aim here is merely to suggest procedure.

Discussion of particular food items in Iran

66. Meat. Iran has a very complicated situation is regard to meat supply. Meat is extremely expensive. Beef is of very low quality. Pork is not used, for religious reasons. Fish is consumed at a minimum rate per capita. Chicken is more expensive than other meats. Sheep and goat meat is in good supply, but also expensive, and only in "red" distribution. Lamb, sheep, and goat's meat is relevant to the taste of the Iranian consumer, but not suitable for freezing because it is too thin - and partly because it is too fat (near the tail

of the sheep). There are very different opinions as to how to increase meat production, the majority being for sheep. There are plans to establish more than 120 new small community slaughterhouses all over Iran. Our opinion is in favour of cattle (beef). The present Iranian cattle can be fattened to such an extent on industrial farms that the yield of high quality meat can be increased 100-140 per cent, without additional number of cattle, without new breeds, without any other investment. The second most convenient trend should be chicken meat, because of the know-how of the individual process already adopted by some private enterprises in Iran, and the good food conversion factor. Fattening of young sheep would be the third way to rapidly increase the meat production in Iran.

67. Milk. Milk is the second main problem of Iran's food deficiency. To try to establish a policy on this important subject is a very delicate matter. Tradition in sheep husbandry has influenced many projects, financed by the Government to solve the problem of milk supply be sheep milk. A dairy industry based on sheep milk should be established all over the country (cheese factories, etc.). In our opinion, Iran's hitherto method of approach has been absolutely wrong. The economy of sheep husbandry is far better if directed to wool, and skin, production. Australia is the best proof of this statement. Australia's gross revenue from agriculture is: 27 per cent from sheep's wool and skins; 9 per cent from all meat (cattle, hogs, chickens, etc.). Iran could achieve far better results by using the sheep's wool to produce better carpets than through sheep's meat and milk production. Australia has highly efficient cows for milk production. There is no dairy industry based on sheep's milk. Cheese from sheep's milk could be produced in Iran as a luxury item, and not as daily important food for the common man. Dairies, based on one to two litres of milk per sheep per day, over a period of one to two months, in small units processing 2,000 - 5,000 litres of milk daily, would be a disaster of they were operated on a large scale throughout the country. Milk farms and agro-industrial approach is the only right answer for Iran.

68. Tea. Tea is in very short supply. The first eleven months of 1967, Iran had already imported 6,000 tons of tea, at a value of 800 millions rials. The endeavour of the State Tea Direction had some good results, but the trend of consumption growth is faster than the effort to

increase production. There are thousands of small tea farmers, and 120 small tea processors. The agro-industrial approach would be very fruitful, if applied to this important sector.

69. Citrus industry. Iran has immense possibilities of growing many kinds of citrus fruits, both in the northern part and in the southern part of the country. Markets surround Iran. The U.S.S.R., Romania, Czechoslovakia, Eastern Germany, Turkey, and many other countries are potentially great importers of Iranian citrus fruits, fresh, or processed. Many smaller private projects are considered and realised, mostly in the field of packaging, sorting, and delivering fresh oranges to the markets. No agro-industrial approach was visible by which certain special kinds of citrus fruits should be planted, because of their total industrial utilization and processing, followed by very lucrative sub-products, such as single strength citrus juices, citrus syrups, citrus juice concentrates, citrus essential oils - natural and deterpened, provitamin A, vitaminic-K, animal fodder, pectine and pectine derivations, etc. The total utilisation of citrus fruits can be achieved reasonably only in a factory of a certain minimum size of, for instance, 500 - 1,000 tons of citrus fruits input daily. A huge agro-industrial enterprise, consisting of orchards, appropriate cold stores, and a commercial size factory, would be the solution of this very interesting problem.

70. Vegetable oil. From the import statistics, we are aware that Iran is very deficient in vegetable oil and derivatives which have replaced more and more the traditional animal fat and very expensive ghee. More than 80,000 tons of vegetable oil was imported in 1966-1967, but the needs are far greater than this figure.

71. The problem of vegetable oil production (as already shown in Scheme 2) should not be considered without taking into account the production of the most deficient vegetable protein. The source of both of these basic foods are the poor and rich oil-bearing materials, which cakes are mostly rich in vegetable protein. The profit and loss calculation along the whole technological process would be very different if the production of both commodities were realised in agro-industrial production.

This has a special value in a developing country which cannot afford to buy vegetable protein in world markets in the form of cakes or soy beans. A rough example of this assertion follows:

Potential gross revenue

One hectare planted gives:

Sunflower		Soybean	
40 tons seeds, 35% oil		2.5 tons seeds, 18% oil	
1,440 kg. oil		450 kg. soy-oil	
300 kg. cakes * 35% protein		1,750 kg. cakes * 50% protein	
100 kg. protein gives 75 kg. meat		1,000 kg. protein gives 625 kg. meat	
1,440 kg. oil * 0.50	= 720	450 kg. oil * 0.40	= 180
75 kg. meat * 2	= 150	1,000 kg. meat * 2	= 2,000
Total	870	Total	2,180

72. This tentative, exaggerated example is given only to show the necessity of a policy which should be established and followed by Iran for a certain period and for certain region. Hitherto no such approach was visualised or carried out. In our opinion, the soya project is one of the most important and most promising at this moment of Iran's food production development.

73. The most obvious insufficiency in the Iranian food market is sugar. The policy of the Government has been a steady import of raw or refined sugar to keep the price down. The sugar-calorie is today's cheapest calorie in Iran, and sugar is the poor man's popular food. We have seen that about 250,000 tons of sugar are imported. Again, there is no defined sugar policy fixed and agreed upon. The most important step at this time is the need to make a decision as to whether beet or cane sugar, or both should be produced in the future. Certain beet sugar economists are trying to persuade the Government that sugar beet growing is the only answer, because it could be grown all over Iran (in the southern part as a winter crop). Sugar beet has a great impact on other agriculture and should be favoured in spite of the slightly higher investment and production costs.

74. The existing cane sugar factory, outlined, projected and executed from the beginning as an agro-industrial enterprise, was very successful and shows that every twelve months a fully-ripe cane crop can be grown, harvested, and processed, yielding 8-12 tons of refined sugar per hectar.

76. [illegible] processing of sugar cane is ideally suited to agro-industrial processing. Beet sugar normally cannot compete with cane sugar. Beet leaves and tops can be rationally utilized only by small farmers. In our opinion, Iran would increase sugar production most rapidly and cheaply by enlarging the sugar cane plantations and capacities of processing in Khouristan. A feasibility study to solve this controversial problem should be undertaken immediately, so that a final decision can be made. There are already projects under consideration, and offers in evaluation, for new beet sugar factories of very small, uneconomical size (1,000-1,500 tons of beets per day).

77. Starch and glucose. Iran is a potential big starch and starch derivatives consumer. Today's import is about 5,000- 6,000 tons, but the real need at this moment could be estimated at between 10,000 - 15,000 tons. This would require a full-size commercial factory. Today's small glucose factory, relying on imported starch from Holland or Germany, is not competitive. An agro-industrial enterprise, planting sorghum as a very cheap source of starch, adequate to the dry Iranian climate, would be the answer to this challenge.

77. Fish catching and processing. The agro-industrial approach to the solution of the southern fish industry development would be of great help. A first development could be envisaged, studied, financed, and executed only on the basis of a comprehensive, integrated, industrial process, including: catching, landing, processing for human consumption and fish meal, and organizing the market in Iran and abroad. There is no partial solution possible. We would suggest, as a first step, to outline a feasibility study for such an integrated project, with the aim to clear up the goals of the first period of development and to show the viability and level of investment needed. The second step would be to find ways to implement this programme. Special emphasis should be on the production of fish meal as a source of valuable animal protein in this part of the world.

78. Tomato products. Today's world market is being supplied mostly with vegetables in processed form. In large cities of developed countries green peas, carrots, tomatoes, green beans, spinach, and other vegetables, are consumed by 65 per cent in frozen or canned form. Fresh vegetables are a luxury and far more expensive than frozen or canned.

79. We are not very sure which of the eight most processed vegetables that are most suitable for agro-industrial production could be given priority in Iran. Tomato is one of them, indeed. The production of tomatoes in Khusistan can be developed to a high industrialised [illegible], especially because the markets in Iran, and in the neighboring countries, are growing very fast. Saudi Arabia, Kuwait, Iraq, and Lebanon, and other neighboring countries, are already importing tens of thousands of tons of tomato products. Tomato paste, tomato pulp, tomato juice, peeled whole canned tomatoes, tomato sauce, ketchup and tomato dressing, are the most important articles. A competitive capacity should start with 500 tons input of fresh fruits daily, for a minimum of 100 days.

80. Dates and derivatives. The export value of dates in 1967 was about 150 million rials. The production of dates is far beyond this figure. The production of date syrup was reduced to a minimum during the past few years. The quality and the commercial appeal of Iran's export dates are relevant to the low prices realised and to the minimum of interest shown abroad for them. At the present time an agro-industrial approach and a technical review of this whole sector would be advisable. We would suggest undertaking a feasibility study to solve this important problem.

81. Sultanas and the wine industry. A similar situation exists as above described, in connexion with dates. The potential of sultanas to become a first class export commodity is obvious. The quality of processing at present is far below what could be achieved with existing raw material. The value of exports could be substantially increased if better processing, packaging, labelling, and marketing were undertaken.

82. At the same time an agro-industrial approach to the grape industry could be realised in the country. We have seen very good results of intensive grape plantations in Khousistan. A typical agro-industrial development could be established in this area, which would include: production of dried processed sultanas; single strength grape juice, and grape juice concentrate; all kinds of wines and brandies; cognac; champagne; tartaric acid; and grape seed oil. The minimum capacity of such an agro-industrial unit would be 10,000 tons cellar capacity, or input of about 15,000 tons of grapes for wine-making.

If an average of 5[illegible] tons of grapes (together with sultanas) could be calculated as the yield per hectare, a vineyard of 5,000 hectares would be sufficient. An expert, who would be able to solve the existing problem of sultanas, including drying, processing and packaging, and plan a project for an agro-industrial grape industry, might be suggested.

83. Almonds and pistachio nuts. The export of almonds (98 million rials) and the export of pistachios (431 million rials in 1967) is already an important branch of the food industry in Iran. Both kinds of nuts are very interesting commodities for the world market, and have the potential of further extension of exports to the markets of the most developed countries. No serious competition is expected in the near future, especially for pistachios. Iran has the same possibility of growing almonds as California. At present California supplies 65 per cent of the world's trade in almonds. The processing unit in Sacramento has developed a special technique of almond processing and has become the promoter of intensive co-operative, organized increase of almond growing in the Sacramento Valley. This agro-industrial approach should be applied in Iran also, both in connection with almonds in the north, and pistachios in the south. The production and export could be tripled in a very short time. A joint venture with the Almond Growers Association of Sacramento might be suggested.

84. Dried apricots and dried peaches. The export of dried peaches and dried apricots has already reached a high figure of 69 million rials. Production of apricots and peaches, and processing both of these fruits in nectar juices, pulp in barrels, "solid pack" canned fruits, dried halves, or dehydrated fruit powder, would be desirable because of the steady demand in world markets for these products. An agro-industrial enterprise, with own orchards, and co-operation with specialised fruit-farmers, would be the right solution. As a first step, an expert might organise pulp stations for the existing production, to improve the quality of the present dehydrated fruits, and to prepare the agro-industrial feasibility study.

85. Licorice roots, cumin seeds and gum traganth. In spite of the fact that these three items are not normally included in the nomenclature of food industry, we feel these products are important to Iran's economy. The present export of 91 million rials of licorice roots, 303 million rials of cumin seeds, and 284 million rials of gum traganth, are the best proof of our conviction.

86. We would recommend that an expert explore the possibility of liocrice extraction, and the export of liocrice extract; of improving the quality of gum tragnnth, and determining the possibility of agro-industrial increase in cummin seed production in the areas of Iran which are not suitable for other agricultural production.

87. The issues discussed are far from exhausting the main problems of agro-industrial food processing possibilities. The above comments cover actual problems to stress the need for immediate basic decisions regarding a policy on food investment.

88. Today's trends in Iran's food increase investments, especially in the projects visited by the author of this report (Paramin-Garmsar, Kazvin, and Khousistan, etc.) are sometimes oriented in the very opposite direction of agro-industrial enterprises, and will show results only after a very long period of time, and only after a great effort on the part of the State, both in financing and giving assistance by way of consultants and services.

89. We are aware that by this method food production increase is expected, and that these projects should also have a definite impact on the social and cultural development of the Iranian farmer. However, in our opinion, the investment ought to be sub-divided, in both directions, and by a definite relation - and this must be clarified and agreed upon by the next Plan of Development.

90. Investments in Khousistan per hectare of irrigated land are already now at the level of approximately $3,000. After four years of various experiments, there is still no definite programme of intensive exploitation of this fertile area. To date no programme has been planned which would convince a domestic or a foreign investor that the huge investment could be profitably repaid and the project successfully carried out.

91. A team of experts, with enough experience in agro-industrial planning and programming, might be suggested, to prepare, as soon as possible, a comprehensive programme of agro-industrial development in Iran for the next five years. This team should be the nucleus of a steady body, which would take care of further planning of agro-industrial development, and whose main task would be to implement the plan as an engineering organization.

VII. UNIDO'S ASSISTANCE SUGGESTED

92. Iran has very little experience in agro-industrial food production. This branch of compact, integrated food processing has only recently been adopted in some of the medium or highly developed countries of Europe (U.S.S.R., Sweden, Yugoslavia) and in America (United States, Canada) and others.

93. In connection with the issued discussed above, and with the objective of preparing, as soon as possible, an increase in food production for the Iranian Fourth Five-Year Plan (1968-1973), we suggest the following projects for UN assistance, as already discussed during our stay in Iran:

Project No. 1

Planning of agro-industrial development (1968-1973). (12 months)

We would suggest the assistance of a team, led by an experienced planning expert, assisted by a food technologist and an agricultural engineer, to prepare the five-year plan of agro-industrial food development and, in particular, to:

set a policy which should be followed on the main issues of agro-industrial food production;

locate the main areas adaptable to various combines of agro-business;

outline roughly the feasibility studies, with appropriate figures for the particular areas or enterprises;

summarize the results, to form a comprehensive plan of development which could be submitted to the Government of Iran, and the relevant Plan Organization, with all important characteristic items and comments.

This team should be incorporated to the Centre for Industrial Development and Trade, and be financed by funds for the short-term subdivision. This team should also have the task of forming a nucleus of an agro-industrial food engineering organization, able to fulfill all future activities linked to the implementation and realization of the programme.

Project No. 2

Instant Tea and Instant Coffee - SIS. (1 month)

A short-term expert should be provided under SIS assistance, whose main task would be to prepare a feasibility study for an

up-to-date "instant tea" and "instant coffee" extract factory, having at the same time the duty to explore the possibility of an agro-industrial tea-growing and processing enterprise.

The expert should be attached to the Governmental Agency for Tea.

Project No. 3

Citrus processing expert - SIS. (6 weeks)

A short-term expert should be provided under SIS assistance to assist the Government of Iran in exploring the possibility of an agro-industrial integrated citrus-producing and processing enterprise in Khouzistan. The expert should prepare a feasibility study, foreseeing a total processing of own production of various citruses.

At the same time, the expert should inspect the existing projects and orchards of Iran and, after careful study, should recommend steps to be taken in the consideration of further development of the citrus industry in other areas of Iran.

Project No. 4

Soy-bean oil expert - SIS. (6 months)

A short-term expert for soy-bean agro-industrial production, processing, and marketing, should be provided to the Government of Iran, under SIS assistance, to prepare a study in close co-operation with Khouzistan Water and Power authority, on soy-bean growing, processing, and utilization. The expert's task should be to locate the best variety, to outline the agro-technique, the processing, and the best utilization of the oil and cakes in combination with a feedstuff factory, and an industrial farm for fattening of cattle or other animal protein production. This feasibility study should include the meat processing factory, and also the marketing services.

The study should be elaborated to the extent that it can be used as a basis for a joint venture offer.

Project No. 5

Sugar Expert - SIS. (3 months)

A highly experienced sugar expert should be provided to assit the Government of Iran to clear up the future optimum policy to be

followed in the sector of sugar industry. The expert is expected to recommend the right choice between sugar beet and sugar cane in Iran. He should further settle the boundaries of competitive sizes of future sugar factories, both in cane and in beet sugar, thereby determining future enlargements of new factories. His task should include a technological and economic analysis of the last sugar beet campaigns, with recommendations for improvements.

Project No. 6

Starch and Glucose Expert - SIS. (2 months)

An expert on starch and glucose industry should be provided under SIS assistance to the Government of Iran. The expert is expected to explore the possibility of an agro-industrial enterprise for starch and glucose production. His duties should be, in particular, to:

locate the optimum raw material for starch production in Iran, among corn, sorghum, and wheat;

explore the region, and find the best location for an integrated starch plant, which should be outlined complete with finalisation of all sub-products, such as vegetable oil, crystal-glucose, starch syrups, dextrine, arabic-gum substitute, C-vitamin, protein-enriched feedstuffs, concentrated stickwater, etc;

investigate the possibility of independent enlargement of the existing glucose factory, giving professional advice for the improvement of quality and productivity.

Project No. 7

Tomato Products - SIS. (2 months)

A specialist for all branches of agro-industrial production, processing and marketing of tomato products, should be provided to the Government of Iran, under SIS assistance, in order to prepare a feasibility study for an agro-industrial tomato combine. The expert is expected, in particular, to:

prepare a short marketing research study, stating the needs of the expanding domestic markets and the potential exports to the neighboring countries of Iran;

outline the programme of production of various kinds of tomatoes (for peeled, canned whole tomatoes, tomato paste, tomato juice, tomato

ketchup and sauce, etc.) by high-scale mechanized agriculture, the relevant processing lines and marketing facilities;
show the financial background and viability of the whole enterprise;
locate the best site for the agro-industrial tomato combine.

Project NO. 8

Dates and derivatives - SIS. (2 months)

A date processing expert should be provided to the Government of Iran, under SIS assistance, to inspect the present state of date growing and processing in Iran, and recommending improvements in this important and potential export branch of food industry. The expert should, in particular:
explore the possibilities of the existing date processing plants to improve the capacity, the quality of drying and processing, and especially of packaging whole and pitted dates. Standards for export should be reviewed and improved;
recommend better utilisation of the whole date crop in order to produce date syrup, date dehydrated powder, animal fodder, alcoholic beverages from off-quality dates and from non-utilised by-products.

Project No. 9

Pistachio and Almond Expert - SIS. (2 months)

A nut-processing expert should be provided to the Government of Iran, under SIS assistance, in order to assist in exploiting more satisfactorily the potentials of pistachio and almond-growing of Iran. The expert should prepare a study and recommend to the Government of Iran:
the improvement of pistachio growing, collecting and processing, in order to improve the present quality and to diversify the array of pistachio export products, such as, dehusked whole kernels, covered with sugar, caramelised, salted, smoked, crushed to grits, milled to semi-products for reproduction, etc.;
to explore the possibility of planting, growing, and processing almonds in agro-industrial enterprise combined with co-operative of individual almond growers - with central processing facilities - producing the kinds of almond products required by world markets in developed countries.

Project No. 10

Sultanas and wine industry - SIS. (6 months)

An expert on sultanas and wine processing should be provided under SIS assistance, to assist the Government of Iran to implement the industrialization of sultanas and wine production. The expert is expected, in particular, to:

review the existing processing facilities of sultana-processing in Iran, and to recommend and realize on-the-spot improvement in quality and achievement of international quality standards for export;

prepare a feasibility study by which the development of the sultana industry would be achieved by means of agro-industrial implementation of integrated production on huge vineyard complexes, in co-operation with individual growers - locating areas or regions of such enterprises;

explore the possibility of agro-industrial wine production in Khuzistan or in other regions, and preparing a feasibility study of an integrated agro-industrial enterprise, with full exploitation of the raw material.

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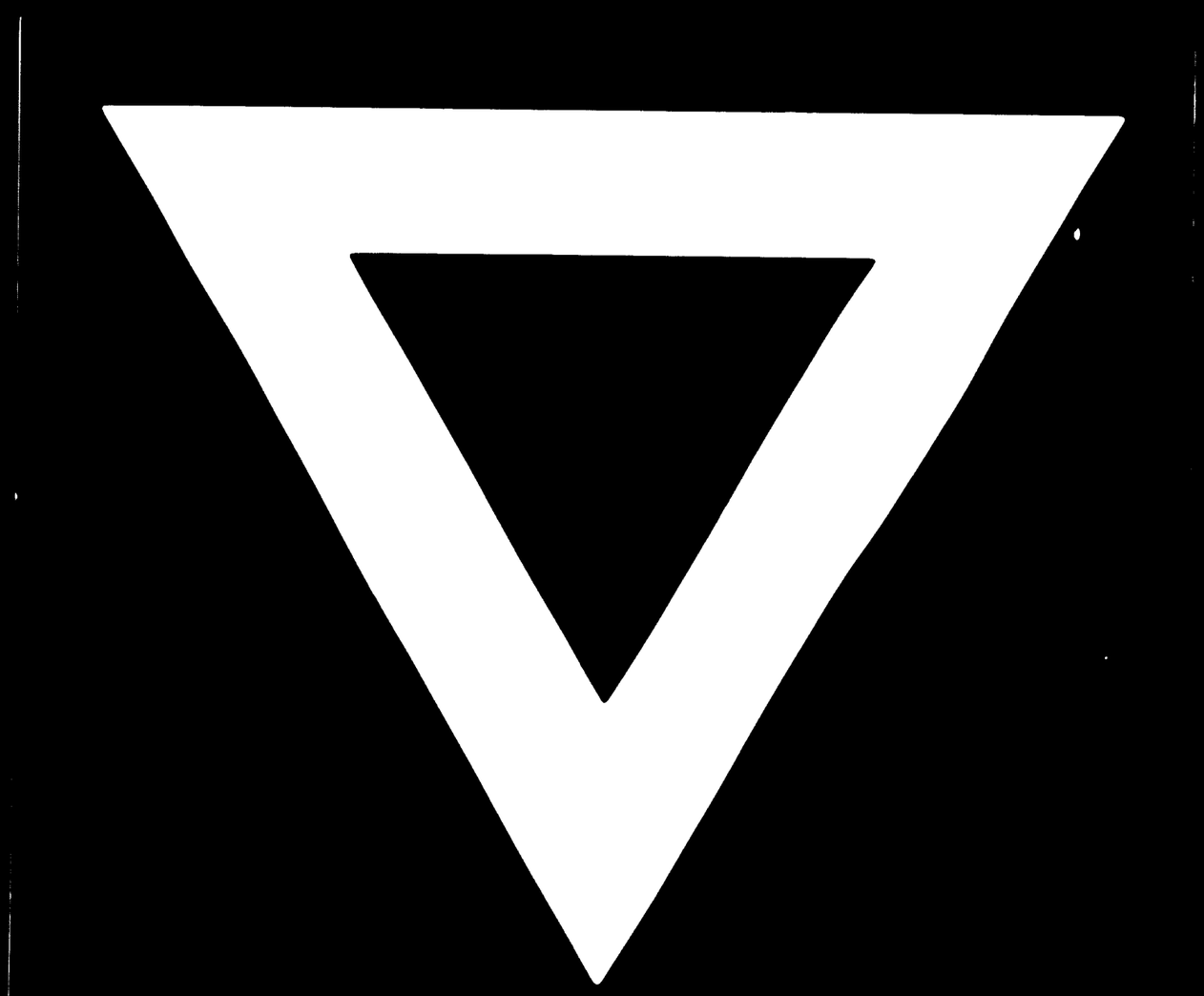

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