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INTER-REGIONAL SYMPOSIUM ON TECHNICAL  
SERVICES AND FACILITIES FOR  
SMALL-SCALE INDUSTRIES

Vedbaek, Denmark  
26 June - 8 July 1967

Agenda item 4

TECHNICAL SERVICES AND FACILITIES FOR RURAL INDUSTRIES

Presented by the

Food and Agriculture Organisation of the United Nations

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**TECHNICAL SERVICES AND FACILITIES FOR RURAL INDUSTRIES**

by the Food and Agriculture  
Organisation

**SUMMARY**

1. This paper briefly describes the important role of small to medium-size processing industries in economic development which are based on raw materials derived from agriculture, forestry and fisheries.
2. Most of the raw materials required for the establishment of such processing industries are the produce of farmers and forestry workers and the catch of fishermen, i.e., people living under "rural environmental conditions".
3. The raw materials, especially those derived from horticultural and agricultural occupations, are often not suited to be used for integral processing. Thus, cultural practices need to be adapted in order to have raw materials conditioned for industry, and a feed-back system between primary producers and industrial plants needs to be established to ensure successful processing operations.
4. In addition to economic and technological aspects, integrated planning for production, therefore, needs also to take into account sociological aspects.
5. It is also recognized that industrial development of these important sectors greatly needs to be accelerated. The paper, therefore, recommends to

make a far greater use of what is termed "pilot processing plant" as an operational pre-investment object from which larger scale units can be developed with increase in experience.

6. These units are nowadays made available in increasing number by the equipment and machinery manufacturers at reasonable costs and some indications of investment involved are given in the present paper.
7. The paper finally describes the type of technical services and facilities which could be made available by FAO at Government request.
8. A list of some FAO publications is also attached.

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## **SERVICES TECHNIQUES ET FACILITES OFFERTS AUX INDUSTRIES RURALES**

par l'Organisation des Nations Unies  
pour l'Alimentation et l'Agriculture

### **Résumé**

1. Le présent document décrit brièvement le rôle important, dans le développement économique, des industries de transformation de petite ou moyenne envergure, dont les matières premières proviennent de l'agriculture, des forêts ou de la pêche.
2. La plus grande partie des matières premières nécessaires à l'établissement de telles industries sont produites par des exploitants agricoles et forestiers, ou fournies par les pêcheurs, tous vivant dans des conditions relevant du "milieu rural".
3. Les matières premières, en particulier celles qui proviennent d'activités horticoles et agricoles, ne sont pas toujours intégralement utilisables par l'industrie. Une adaptation des pratiques culturales serait nécessaire afin

d'obtenir des matières premières conditionnées pour l'industrie; de même un "feed-back system" d'informations entre les producteurs de matières premières et les usines doit être établi afin d'assurer le succès des opérations de transformation.

4. En dehors des considérations économiques et technologiques, un plan intégré de la production devrait, en conséquence, envisager également les aspects sociologiques du problème.
5. Il est également reconnu que le développement industriel de ces secteurs importants de la production devrait être accéléré. En conséquence, le document recommande que soit étendu l'usage des "usines-pilotes", dans le cadre des opérations de pré-investissement, à partir desquelles pourraient être développés sur une plus grande échelle des unités bénéficiant d'une expérience accrue.
6. Les fabricants de machines et d'équipement fournissent actuellement un nombre toujours croissant de ce type d'installations, à des prix raisonnables. Le présent document donne quelques indications sur les sommes engagées.
7. Enfin, le même document décrit les types de services techniques et de facilités pouvant être offerts par la FAO à la demande des gouvernements.
8. Une liste des publications de la FAO se trouve également en annexe.

## SERVICIOS E INSTALACIONES TÉCNICAS PARA INDUSTRIAS RURALES

por la Organización de las Naciones Unidas  
para la Agricultura y la Alimentación

### Resumen

1. Este estudio describe brevemente el importante rol que desempeñan en el desarrollo económico las industrias elaboradoras de tamaño pequeño y mediano, que trabajan materias primas derivadas de la agricultura, los bosques y la pesquería.
2. La mayor parte de las materias primas necesarias para el establecimiento de tales industrias elaboradoras, son el resultado de la labor de trabajadores agrícolas forestales y pesqueros. Es decir de gente que vive en "condiciones de un ambiente rural".
3. Las materias primas, especialmente aquellas derivadas de las ocupaciones hortícolas y agrícolas, son a menudo inadecuadas para ser utilizadas en la elaboración integral. En consecuencia, se requiere una adaptación de las prácticas culturales, a objeto de disponer de materias primas adecuadas para la industria y además el establecimiento de un sistema de interrelación entre los productores primarios y las plantas industriales, a objeto de asegurar el éxito de las operaciones manufactureras.
4. La planificación integral de la producción, consecuentemente no sólo debe tener en consideración los aspectos económicos y tecnológicos, sino también los aspectos sociológicos.
5. También se reconoce que el desarrollo industrial de estos importantes sectores requieren enormemente ser acelerados. El documento, en consecuencia, recomienda hacer un uso mucho mayor de las así llamadas "plantas elaboradoras piloto", como un objetivo operacional de pre-inversión, del cual pueda derivarse unidades de mayor escala, con el consiguiente aumento en cuanto a experiencia.

6. Los fabricantes de equipo y maquinaria, están haciendo accesibles, en la actualidad, en un número creciente, este tipo de unidades, a un costo razonable. Algunas indicaciones acerca de las inversiones necesarias se exponen en el presente documento.
7. El estudio, finalmente, describe el tipo de servicios y facilidades técnicas que FAO podría contribuir, a petición del Gobierno.
8. Una lista de algunas publicaciones de FAO se adjunta al documento.



## I. INTRODUCTION

### Industrial Development

1. Industrialization is not an end in itself. As part of the total economic growth process, the development and utilization of all available natural resources must result in an increasing improvement of the socio-economic conditions of the people concerned. Processing industries as referred to in this paper are therefore one of the key growth points in the economics of developing countries and offer, in many instances, a basis for eventual self-sustaining development. They are sometimes the only conceivable forerunners to a wider development of other industries, and in particular to the potential contribution to the diversification of economies and to the expansion of foreign exchange earnings, leading to greater prosperity.
2. Industrial development can possibly best be appreciated in both a broad and a restrictive sense. In the broad sense, industrialisation would include the entire process by which a country develops from a predominantly agrarian structure into a diversified one, based on a continuously increasing industrial production. In the more narrow, restrictive sense, the term industrialisation would be used as the equivalent of the development of the industrial sector.
3. Participants in this Symposium will become the future promoters for the development of small-scale industries. It is hoped for that due attention will be given to the development of such small-scale industries which are based on raw materials from agriculture, forestry and fisheries (including agricultural inputs).

### Nature of Small-scale Industries

4. Several attempts have been made to define the term "small-scale industry". Such definitions are often very useful and serve a variety of purposes, such as the collection of statistical information and data (e.g., counting the number of handlooms, HP in use, labour, etc.). Other definitions or terms in use refer to the environment, such as home and village industry, or handicraft and so permit that particular sociological aspects receive further attention. FAO sometimes also uses

the term rural industry; the word rural in connection with industry has a particular significance with respect to the people involved.

5. More specifically, it appears in this respect appropriate to remember in this period of time showing an overwhelming approach toward international aid and development programs a few words which so often were used by the great leader of India, Mahatma Gandhi, namely: "The Heart of India is in its Villages", which is still true at present for many areas of the world.

6. For the purpose of this paper, a rigid definition of the term "small-scale industry" does not appear to be useful, but attention will be given to a few characteristics of the type of industry under discussion.

#### Characteristics

7. As a first characteristic, it has to be recognized that the planning and development of small-scale industries based on agriculture, forestry and fisheries cannot be dealt with independently of the various aspects of production, or catch, the handling of the raw materials and also the social considerations affecting the people.

8. Thus, farmers, fishermen and forest workers are directly concerned with such activities all of which take place predominantly under rural environmental conditions as processing plants can never operate effectively unless full participation of the primary producers in the entire chain of operations is guaranteed, from production, or catch, through handling to the processing plant.

9. Forestry, where crops in some instances take only a few years, but in others many years to mature, offers a striking example of the need to avoid divorce between planning for the raw material and planning for the ultimate product, such as, for instance, pulp and paper. In the case of the Usutu Forest Operations carried out by the Government of Swasiland and involving the planting of 100,000 acres under pines, the first seedlings were planted in 1949 and a mill processing 100,000 tons of pulp per year based on these plantations came into operation in 1967.

10. Reference could be made to similar examples in the planning and development of fisheries and food processing industries which encounter additional problems due to the perishable nature of the raw materials upon which they are based.

11. Thus, although processing industries referred to above are very diversified due to the nature of the raw materials used, a common characteristic is that most of the raw materials are produced in those areas where the greater part of the population still lives under predominantly rural conditions.

12. Consequently, the development of such industries demands an effective interaction between primary producers and the industrial enterprise or processing plant. Such an intimate relationship actually constitutes a requisite for successful industrial operations which is highly beneficial for and will greatly encourage the primary producer.

The fact that such relations in most instances do not yet exist in the non-industrialized countries, or are at least poorly developed, is a major factor which stands in the way of the accelerated development of processing industries. It is obvious that governments need to become more active in this respect.

13. Another characteristic which often is overlooked when making plans to establish industries based on agricultural, forestry and fisheries products are the methods and processes of production which almost invariably need adaptation to meet specific requirements as demanded by industrial processing, regardless of scale of operations. A few examples, with particular reference to food and food products industries, may be useful here.

14. Food processing, and particularly canning of food, is expanding in many countries, especially in countries where costs of cold storage and refrigerated transport are still prohibitive. The basis for a successful processing plant (of any type) is the availability of raw material. The security of supply at a reasonably low price and the quantity and quality of deliveries for an extended period are the

most important factors. Under present conditions of agricultural production prevailing in many non-industrialized countries, this really is a major difficulty.

Variations in yield due to poor quality seed, weather condition, diseases, etc. often restrict the availability of the produce even for the fresh market. The processor in order to be sure of his supply must be in a position to contract with farmers or be permitted to establish his own estate where he can grow the produce specifically designed for processing.

15. With particular respect to the operations mentioned below, raw product requirements in the industrialized countries have been established during the last twenty-five years. Thus, for each product, i.e., peas, beans, tomatoes, etc., and for each type of process, i.e., canning, freezing, or dehydration, specific requirements have been formulated. Shape, size, texture, colour, flavour, odour, acidity, pH, viscosity, maturity, specific gravity, soluble solids, total solids, vitamin content, etc., are all factors for which standards have been established. It requires careful planning in plant breeding and cultivation practices to produce a raw fruit or vegetable suitable for canning, freezing, dehydration or concentration. (Earlier strains of fruits and vegetables have also been modified and new varieties have been developed to meet technical requirements of canning and freezing.) In this respect, it is necessary to warn against over-enthusiasm when it is thought that seasonal surplus guarantees a successful processing industry.

16. Another example calling for adaptation to meet specific requirements as demanded by industry and consumer is in the field of livestock industry which has led to entirely new methods of rearing livestock and poultry of which the battery breeding of chickens is an outstanding example.

17. In short, modern industrialists, including food processors, are not prepared to accept whatever raw material is offered by the farmer or livestock producer and, as a result, a feed-back system between agriculturist and industrialist has developed.

18. In contrast, the utilization of some other natural resources, such as minerals and oils, does not depend on the care of the primary producer, neither is the quality of these raw materials influenced by adverse weather conditions, but has to be accepted as delivered by nature, or made by man (steel, synthetic chemicals, plastics, etc.).

19. It will have to be recognized that an accelerated process of industrial development based on raw materials derived from agriculture, forestry and fisheries must take into consideration the changes which are involved both at the technical (production, processing, but also consumption and distribution) and at the socio-economic level. In most instances, a basic change in the pattern of production is required for which the primary producer will have to be given guidance. To this end, technical services and facilities for small-scale rural industries, these being the subject of this Symposium, have to be created.

20. Such a change must provide the necessary incentives, i.e., a guarantee for the continuous delivery of raw material to the industrial processing plant at prices fully commensurate with the additional care the producer has to exercise. This, in turn, depends entirely on the establishment of adequate conservation, storage, processing, packaging and distribution facilities which, in most instances, are also lacking thus leading to a very high percentage of waste and losses, especially in the perishable food sector.

21. This altogether shows that industrial development, and more particularly industrialisation of rural areas, as part of economic development processes, deals with a great variety of aspects, often of a complicated and complex nature, whilst in most cases these aspects are intimately inter-related.

22. Although in this paper it is only possible to touch on some of the problems and aspects involved, the impression may have been created that it is altogether a desperate and most discouraging affair. It is, however, true that industrialisation of rural areas has taken place along the pattern as described above. At a later stage, a more

encouraging picture will be given on how to eventually accelerate such development processes, but prior to discussing the matter of pilot processing plants, a few paragraphs will now indicate how the industrial use of agricultural resources can stimulate other types of industries.

#### Supporting and Related Industries

23. Almost invariably does the establishment of processing industries based on raw materials derived from agriculture, forestry and fisheries lead to the development of supporting and related types of industries.

24. Accelerated agricultural and forestry production requires provision for, and a regular supply of, improved seeds, fertilisers, insecticides and pesticides, vaccines and other animal medicaments, a wide range of tools for agricultural and forestry production, tractors and auxiliary equipment and machinery. The same is true of fisheries where gear, boats, vessels as well as appropriately designed fishing harbours and ice plants are needed. Furthermore, equipment and machinery for handling, processing, storage, packaging (man-made polymers) and a great variety of other products have to be manufactured for use in the processing industries.

25. Reference can also be made to the necessity of local workshops required for repair and maintenance and the eventual assembling of requisites.

26. Furthermore, it has to be recognized that industrial development, especially when the process develops in rural areas, requires adequate supplies of water and energy, improvement and development of farm access roads, suitable transportation facilities, including refrigerated transport for perishable food, establishment of improved farm services and market structures, organisation of co-operatives and credit systems, and development of managerial competence, development of rural housing, etc. The role co-operatives can play in the development of small-scale industries cannot be stressed strongly enough.

27. It appears appropriate to illustrate the development of such supporting and related industries with some practical examples.

28. A slaughterhouse will always create some waste, condemned meat, hooves, claws, intestines, blood, bones, and other offal to dispose of which often represent a great problem. Consideration will therefore have to be given to the utilization of waste and by-products. If available in sufficient quantity, it may be found economically feasible to install a small dehydrator or destruction plant, either to manufacture bone, blood or meat meal separately, or to make a mixture which by-product, in turn, can be used as chicken feed. The minimum size of such a plant available from manufacturers can, for instance, handle 400-500 kilograms of such by-products in one operation.

29. Oil bearing fruits or seeds once subjected to processing will leave us as residue a presscake, containing some oil and all the rest of the fruit or seed, mostly of a fibrous nature. Every effort should be made to have these presscakes used in the immediate area of the oil expeller, or to see how other waste or by-products eventually could be added to set up a feed mix plant. Converted animal offal from neighbouring slaughterhouses, bran from rice mills or from a pineapple canning plant, other dried residues of vegetable origin, etc., can then be combined, so that there is little or no loss.

30. Another example is a tannery, usually producing trimmings during the tanning process. These trimmings can be converted into glue at low cost.

## II. PILOT PROCESSING PLANTS

31. The importance of small-scale processing plants for the development of rural areas is nowadays fully recognized.

How "small" a processing plant may be is a question which may now be given some further consideration.

32. In general, it can be stated that for a number of agricultural products processing industries elaborate plants are not required and, indeed, are not advisable in the first instance since they need a long time for planning and implementation as well as involving high costs for equipment and machinery.

33. Not counting such specific industry types as large fish canning operations, pulp and paper mills, etc., requiring long-term planning and investment from 10 to 25 million dollars, the manufacturing industry nowadays makes available a great variety of equipment and machinery in various degrees of sophistication and suitable for the establishment of small to medium-size processing plants. Investment costs, depending on the raw material, range from some \$30,000 to a few hundred thousand dollars; for some raw materials, details are given in the Appendix.

Such pilot processing plants, as they could well be named, differ from larger units in size (thus cost), but the appropriate technique or technology (the industrial process to be applied) is the same.

34. Although in many cases capital investment thus is not the main limiting factor, there is still a genuine lack of knowledge of what such pilot processing projects and their implications might be and thus there is still need for specific enquiries concerning the viability of particular processing units or establishments.

35. This calls for a somewhat detailed project identification which will greatly differ with respect to the raw material to be processed and cannot be dealt with in too general terms. Problems to be taken into consideration are such as the more or less elaborate processing required, added value to be expected, magnitude of costs and benefits involved, the extent of export earning or import saving potential, and a number of other fundamental questions which we cannot deal with at the present.

36. It is presumed that expert advice be made available with respect to choice of equipment and machinery and technical or technological process involved in order to further reduce the risk factor. As compared with large-scale operations, it is recognized that such feasibility studies carried out at a practical level will not take many months of work which means that operation as a pre-investment study project can start soon, thus building up the required amount of detailed information when gradually moving towards an extended and larger project.



37. It has also to be remembered that it is relatively more economic, while technologically often also necessary, particularly when dealing with (perishable) food crops, to establish processing industries near the source of the raw material, especially when infrastructure is underdeveloped. This also leads again to small-scale industries, and it is desirable to use in the pre-investment period up-to-date modern units rather than elaborating in terms of "obsolete" and assembled bits and pieces of equipment and machinery.

38. It still is true that "adaptation" remains a problem and, as already stated before, in many instances production patterns need to be changed. Primary producers also will have to be guided in operations such as cleaning, trimming, grading, sorting, cutting, etc., in short, operations which preferably have to be carried out in the field thus resulting in delivery of suitable raw material of relatively standardised quality to the processing unit. Again, however, to make farmers aware of such needed changes a small plant obviously has greater advantages and, moreover, is greatly reducing the risk of failures.

39. In addition, in some instances it will still be necessary, especially during the first period of operation, to "adapt" equipment and machinery to proper functioning, but if carefully selected with expert guidance, this will not be too difficult a problem and will not increase the risk any further.

40. To summarise, small to medium-size pilot plants, as indicated above, are an investment of prime importance, and in order to accelerate industrial development they should be used to a much greater extent.

41. At reasonable investment costs, thus reducing the risk of failures, they are especially suitable:

- (1) to introduce and demonstrate modern techniques and technologies;
- (2) to gain experience in the handling of indigenous raw material production, processing, packaging, distribution and marketing of the end product;

- (3) to establish the required contact between primary producer and industrialist;
- (4) for in-plant training for a variety of technical and managerial personnel;
- (5) to prepare an investment climate with particular reference to local farmers' co-operatives and credit units.

42. Once experience has been gained, both in handling and management, but also in the successful technical operation of the pilot plant, duplication or enlargement of such types of plant is relatively easy.

43. With particular reference to food and food products industries, another extremely important problem for the solution of which small-scale industries can also be extremely useful need to be given some further attention now, although a clear-cut solution will need much broader handling of the subject which falls far beyond the scope of this paper.

44. Reference is now made to the alarming and often unplanned spread of urbanization occurring as a grave problem with which many governments are faced. Such a development makes adequate supplies of both fresh and processed foods in urban areas and towns increasingly critical.

45. One method to increase food supplies for the urban population is to reduce the degree of waste and losses now occurring all along the line between the primary producer and the ultimate consumer. All fresh food crops pass through the stages of field handling and transportation, including some grading and possibly some packaging, but any elaborate preservation or processing does not occur. Thus, prior to and again also during marketing and distribution, losses and waste accumulate. While it is often not possible to exactly assess the volume and value of these losses, they are nevertheless extremely substantial and result not only in a reduction of available food supplies, but also in increased cost to the consumer. It is essential that remedial measures be initiated at every point in this chain so as to control losses and eliminate wastage to the fullest degree possible. Although some simple and not too costly measures such

as for instance sheltering of public market places, cleaning and drying of suitable raw food crops and better handling will result in some considerable reduction of losses, with a further extension of supply lines in conjunction with a greater influx of people into urban areas and towns, a point will be reached at which the urban population and town people can no longer be fed adequately with fresh produce. This means that developing countries face a development similar to that which took shape in the industrialized countries already many years ago. Such a development leads to a far greater use of conserved and processed food and the consequent development of new food products made possible through new technological processes, including deep freezing.

(For a few indicative figures, see the Appendix to this paper.)

46. It is obvious that such a development will be forthcoming and small to medium-size food processing plants to be established in the primary production areas are only a first step in this direction.

47. Another essential step is to improve transportation, particularly refrigerated transport, cold storage, marketing and distribution facilities.

The measures required in all these fields, and the necessity that for maximum effect they should be implemented simultaneously clearly points to the ultimate development of a vertically integrated system which would have elements of, and be comparable to, in several aspects, an "adjusted" or "adapted" supermarket chain which system is becoming increasingly popular in developed countries.

48. The development of such a chain naturally requires a high level of investment, both in the actual processing industries and the institutional and organisational structure serving agriculture, including the development of improved storage, distribution and market structures. The potential returns in respect of this investment, however, are substantial and occasionally rapid as has been shown in developed countries. Such a development also permits a better use of waste and by-products, thus leading to the establishment of complementary industries.

49. Of far greater importance, however, is the fact that by virtue of its technological processes and facilities such a chain of industries increasingly makes available highly nutritive, protective and balanced food and new food products at lower costs with particular reference to protein rich food products.

#### Grade Standards

50. It is appropriate to refer to grade standards. The pilot processing plant being introduced here as a pre-investment operational project is also remarkably suitable to assist in the development of grade standards.

51. Grade standards have been developed in the United States of America for more than 300 agricultural commodities. Such standards describe the entire range of the quality of a product and, among other things, provide a common language for use in purchase and sale negotiations and agreements, and for the development of quality control programs.

52. Standards, and grade standards in particular, mean different things to different people. Standards for farm products can beneficially affect sales promotion, quality control, trading over distances, and thus contribute a great deal toward aiding processors, sellers and buyers.

53. It is obvious that there must be product quality consistency in such products as processed fruits and vegetables, including canned, dried or low-moisture dehydrated, frozen or chilled, and others such as sugar, honey, molasses, peanut butter, pickles, and many other foods, in order to reach high marketing prices. It may be said that the standardisation of agricultural produce typically leads to the adoption of industrial systems of processing.

54. FAO, in co-operation with WHO, through the Codex Alimentarius Commission, is actively engaged in the development of international standards covering all types of food products, including subjects such as additives, food hygiene, pesticide residues, labelling, sampling procedures, and methods of analyses.

55. Technological changes, as a result of research and development in the processing industry, or in marketing, often demonstrate a need for a new standard or a revision of a current one. In addition, new varieties of the raw material, improvements or changes in processing techniques or in process equipment and, furthermore, trends in consumer acceptance as distinct from the traditional trend, frequently indicate the need for changes in standards.

56. Thus, grade standards for processed food products are of equal importance to industry and consumer to reflect different quality levels for different needs, they serve as a convenient basis for sales, furnish guiding principles for in-plant quality control, provide a basis for purchase specification, etc. A pilot processing plant as a pre-investment operational project, therefore, needs to have a well established and practical quality control laboratory so that during such a pre-investment period suitable standards may be systematically developed. Such standards naturally are subject to continuous review and improvement in order to promote the development of agricultural industries.

57. An example of such a development may be given here. In view of the rapid development of dairy industries throughout the world - many pilot projects of the type as described before are operated and handled by FAO at the request of governments - the need for international agreement on the terminology applicable to milk and milk products becomes obvious. Although proper definitions of milk and milk products are essential for international trade, they also have to be incorporated in the legislation of countries in order to protect both producers and consumers.

58. FAO therefore organizes every year a meeting of the Committee of Government Experts dealing with the Code of Principles concerning milk and milk products. Such a Code dealing with the use of proper designations, definitions and ethical practices in international trade was formally accepted in 1966 by 71 countries. Sixty-five countries have accepted a standard for milk powder, 45 countries have accepted standards for butter, butterfat and evaporated milk, 46 for condensed milk and 31 have accepted a general standard for cheese. Standardized methods of analysis and sampling for milk

and milk products have also been accepted by 45 countries. Other milk products for which standards are being elaborated are processed cheese products, milk ices and international individual cheese standards.

59. Although the greatest progress to date has been made with international standards for milk and milk products, a number of draft standards such as for sugar, cocoa products and chocolate, fruit juices, frozen foods, fish products, fats and oils, processed fruits and vegetables, etc. have been sent by FAO to governments for approval or observation.

### III. SERVICES AND FACILITIES

#### Role of Governments

60. Before indicating the services and facilities FAO can render in order to assist in the development of small-scale processing industries, it is appropriate to recognise that FAO can only act upon request of Member Governments who, through a biennial Conference, establish the FAO Program of Work and Budget the overall mandate of such activities being covered by the FAO Constitution.

61. Thus, the processing of raw materials derived from agriculture which, in addition to crops, includes animal husbandry, forestry and fisheries has been part of FAO's Program of Work and Budget since FAO's inception in 1946.

The activities on industrialisation are fully integrated within the Program of Work, and are reviewed at regular intervals by FAO's Governing Body.

To be fully effective, the funds derived from a variety of sources, such as Regular Program, UNDP-SF and -SA, Funds-in-Trust, FPIC funds, etc., are allocated in the light of the overall program requirements and subject to priorities set by the recipient governments and by the FAO Conference and Council. The guidelines issued by the Governing Body of the UN Development Program are also taken into account.

62. The work is carried out by the appropriate parts of the Organization and spread throughout Departments, Divisions, Branches and to various subject matter specialists, together comprising the Technical Department, the Department of Fisheries and the

Department of Economic and Social Affairs, as well as other programs and units, such as the FAO/IBRD Program and the FAO/Industry Co-operative Program.

63. The integrated program also takes into account the work on the Indicative World Plan, involving co-operation throughout the Organization in order to relate the growth of agriculture, forestry and fisheries with that of industry in the context of production, processing, consumption and trade.

64. During the past few years, FAO's work as a whole has increasingly concentrated on field action programs and projects. Thus, during 1966, out of about 80 million dollars more than 55 million were devoted to action projects and the implementation of field operations, and about one-third to one-quarter of all FAO-operated UNDP-SF projects involving during 1966 around 10 million dollars, were dealing with one or another area or sector of industrial development.

65. The scope of this paper does not permit reference to the large number of operational field programs and projects which governments have entrusted to FAO. Details for the operational year 1966, however, may be found in the "Second Consolidated Report of the Industrial Development Activities of the United Nations System of Organisations", Paper ID/B/3, Addenda 2 and 3 (FAO's Activities in the Field of Industrial Development. 1966 Annual Report).

From this report it may be noted that a large number of pre-investment operational projects is of the small-scale pilot plant type as referred to in this paper.

66. Rather than dealing with too many details on types of technical services and facilities which FAO on Government request could render - which details may better be discussed during the Symposium - a short description of specific areas now follows.

#### FAO's Specific Role

67. FAO's role and responsibility in the field of industrial development is to assist its Member Governments in such matters as:

- (a) the formulation of policies and review of plans in order to accelerate industrial development based on renewable natural resources;
- (b) analysing economic, social and institutional, organizational and administrative aspects required to implement such plans, and examination of the problems affecting implementation. This includes feasibility studies, raw material assessment, compilation of data regarding relevant economic characteristics of the processing industries such as value added, import content of inputs, optimum size, possibilities for regional economic co-operation, etc.;
- (c) development of programs and projects aimed at the education and training of personnel at different levels, and in a variety of disciplines, to accelerate the rate at which qualified skills become available to implement industrial development projects;
- (d) development of specific demonstration and research projects, leading to the operation of pilot processing plants that make use of the most appropriate modern techniques and technologies as determined by the raw material concerned, taking into due account new products and marketing development, consumer preference, social habits, and other factors that require consideration in order to arrive at profitable operation;
- (e) fostering products processing investment projects through preparation of investment plans, feasibility studies and raw material assessment, etc.

### Sectors of Industry

68. Sector-wise, FAO assists in the development of the following categories of industries:

- (a) Food and Food Products Processing Industries, including those based on both animal and plant products.



- (b) Industries Processing Agricultural Products other than Food (e.g. cotton, wool, tobacco, natural fibres, hides, skins and leather, agricultural residues such as cereal straw, bagasse, agricultural by-products and waste, etc.).
- (c) Forestry and Forest Industries, including Pulp and Paper.
- (d) Fisheries Industries.
- (e) Industries for the Supply of Essential Requisites to develop Agriculture, Forestry and Fisheries.

69. Therefore, the technical services and facilities for small-scale processing industries which can be extended by FAO upon request by governments cover a wide variety of industries, as indicated above. It may also be useful here to give some further information on another type of service which recently has been established.

#### FAO/Industry Co-operative Program

70. Following the approval of FAO Member Governments and Non-Governmental Organizations during the Thirteenth Session of the FAO Conference 1965 and subsequent to the meeting of the then FAO/Industry Relations Steering Committee held at Headquarters on 20 January, 1966, the FAO/Industry Co-operative Program was established within the framework of the FFHC.

It is this Program's responsibility to maintain day-to-day contacts with interested sectors of the Organisation through an internal Working Group on FAO/Industry Relations. Co-operation with Industry has been established through the General Committee of the FAO/Industry Co-operative Program. The General Committee, through its Chairman or on the recommendation of its Executive Committee, advises the Director-General on the activities of the Program. Its work is based at FAO Headquarters in Rome; and direct contact is maintained with the members of the Program.

Members provide the funds necessary to maintain the work of the Program's secretariat by subscribing annually in equal shares (as determined by the General Committee) to a Freedom from Hunger Campaign Sub-Trust Fund established for this purpose.

The Director-General, on the advice of the Executive Committee, invites senior executives of such industrial firms as are prepared to participate actively in developing FAO related industries in developing countries; these industries include: processing industries requiring materials derived from agriculture, including animal husbandry, forestry and fisheries; and industries supplying essential requisites for the development of agriculture, forestry and fisheries, such as seeds, fertilisers, insecticides and pesticides, vaccines and other animal medicaments; a wide range of tools for agricultural and forestry production, tractors and auxiliary equipment and machinery and packaging materials; also equipment for fisheries, gear, boats, vessels, and for appropriately designed fishing harbours and ice plants.

The General and Executive Committees stressed their desire not to form a closed membership group but to secure the participation of all industrialists who would contribute to the objective of the Program. This approach constitutes an indispensable condition for the fruitful association of Industry with FAO.

71. The following methods, to achieve the objectives of the Program, were suggested in the Declaration of Intent which the General Committee adopted on 28 June 1966:

- (a) to be the main but by no means the exclusive contact between FAO and Industry, and to be available for consultation with industrialists interested in investment;
- (b) to constitute a point of reference for FAO staff with regard to the development and implementation of investment projects by Industry;
- (c) to keep fully informed of FAO activities likely to be of interest to Industry;
- (d) to collect and bring to the attention of FAO the views of Industry on matters which might facilitate and expedite the implementation of investment projects;

- (e) to seek to interest in investment projects at the appropriate stage, which may well be at the moment of conception, but in any case should be earlier rather than later, industrialists who might be capable of implementing or taking the lead in implementing such projects;
- (f) to report to the Director-General on these activities and to respond to his recommendations.

FAO's co-operation with Industry is directed along four major lines:

- (a) to implement FAO's pre-investment field work jointly with Industry and Governments by mobilising managerial ability, scientific and technical competence and capital resources;
- (b) to assist Industry and Governments in implementing project proposals initiated by them;
- (c) to organise country reviews and missions jointly with Industry in order to clarify and, if possible, improve the climate for co-operation with foreign enterprises in developing countries, and to identify priority projects in the FAO sector as proposed by Member Governments;
- (d) to exchange technical and economic information on development activities, and to co-operate in research, demonstration and training programs.

.It is understood that, while industrial initiatives are bound to be based on the interest and support of private business, it will be left to the government of each developing nation to decide whether, and in what form, it wishes to take advantage of these possibilities, and what guarantee it is prepared to offer for the security of foreign investment and for the efficient operation and maintenance of new industrial plants.

CHARACTERISTICS OF SOME PILOT PROCESSING PLANTS(1) Canning Plant

	<u>A</u>	<u>B</u>	<u>C</u>
Capacity in kilograms/hour	50 - 100	500	5,000
Capital Costs USA\$	56,000-90,000	180-290,000	600-850,000
Labour requirements, man/years	28 - 56	42 - 100	66 - 300

As may be seen, a relatively small capital investment is sufficient to provide significant levels of employment for non-agricultural workers. It is difficult to define precisely the labour requirements for various sizes of canning plants because this figure is dependent on the nature of the foods to be processed, and even more so upon the labour costs of the area. In case wages are high, equipment is available which reduces the manpower requirement so that fewer people may still produce the same output. This great flexibility in the choice to be made between capital investment and labour requirements occurs in the field of food products processing. A number of operations, such as weighing, cleaning, trimming, grading, sorting, cutting, slicing, coring, etc. can be performed in an entirely satisfactory manner by manual labour. On the other hand, where the situation warrants its use, highly sophisticated equipment is available to carry out the functions with only a minimum amount of manual labour.

(2) Rice Milling

	<u>A</u>	<u>B</u>	<u>C</u>
Capacity in tons of paddy per hour	0.5	2	6
Plant Equipment in USA\$	560-2,800	22,000-31,000	126,000-170,000
Labour Requirements, man/year	2-3	6-8 per shift of 8 hrs.	8-10 per shift of 8 hrs.

(3) Cassava Processing

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
Capacity in tons of tubers	0.3/8 hours	25/24 hours	40/24 hours	100/24 hours
Plant Equipment in USA\$	8,000-10,000	80,000-120,000	150,000-160,000	300,000-350,000

(Ratio: 5 tons of tubers to 1 ton of starch)

(4) Approximate Construction and Operating Costs of Flour Mills in Western Europe (1964) <sup>1/</sup>

Grain milling capacity (tons/24 hours)	Construction costs per ton milling capacity 24 hours <sup>2/</sup>	Investment	Operating costs per ton grain milled <sup>3/</sup>
	(..... in US\$ .....		
up to 10 tons	19,000	190,000	30 - 40
up to 50 tons	9,000	450,000	18 - 22
up to 125 tons	6,000	750,000	13 - 17
up to 200 tons and over	5,000	1,000,000	11 - 14

<sup>1/</sup> Sample data obtained from one of the largest European companies manufacturing grain and rice mills and feed mixing plants.

<sup>2/</sup> Cost without building silos and power plant.

<sup>3/</sup> Based on 250 working days/year; excluding cost of grain but including wages, depreciation, interest, duties. These costs, however, are only applicable when the capacity of the mill is fully utilised; they would increase with degree of excess capacity.

(5) Canning/Bottling of Fruits and Vegetables

	Scale of Processing/Manufacturing Facility		
	"Small"	"Medium"	"Large"
Fixed Capital Requirements	145,000 US\$	400,000 US\$	2,000,000 US\$
Working Capital Requirements	75,000 US\$	150,000 US\$	700,000 US\$
Sales ex factory per working year	200,000 US\$	600,000 US\$	2,750,000 US\$
Period of production served by Working Capital	60 days	60 days	45 days
Average period of production per year	100 days	150 days	250 days
Direct labour, average number of workers	40	60	170
Raw material input, gross	700 tons	1750 tons	7000 tons
Finished goods output, net	150 tons	400 tons	1800 tons

(6) Coffee Processing

Processing Method	Capacity of plant in lbs. of dry coffee per day	Total cost of plant and building US\$	Manpower required
Small-scale processing	50	56	3
Co-operative dry processing	720	4,500	8
Co-operative wet processing	1800	5,600	12
Modern wet method coffee processing	9000	56,000	20

Estimated World Production of Conserved Food

1938 .....	6,550,000 tons
1948 .....	10,140,000 "
1953 .....	12,670,000 "
1965 .....	20,000,000 "

Deep Freeze Industry U.S.A.

1938 .....	120,000 tons
1956 .....	2,350,000 "

Consumption Deep Freeze United Kingdom

1946 .....	2,000 tons
1959 .....	90,000 "

Consumption Deep Freeze Netherlands

1938 .....	Nil
1958 .....	6,500 tons

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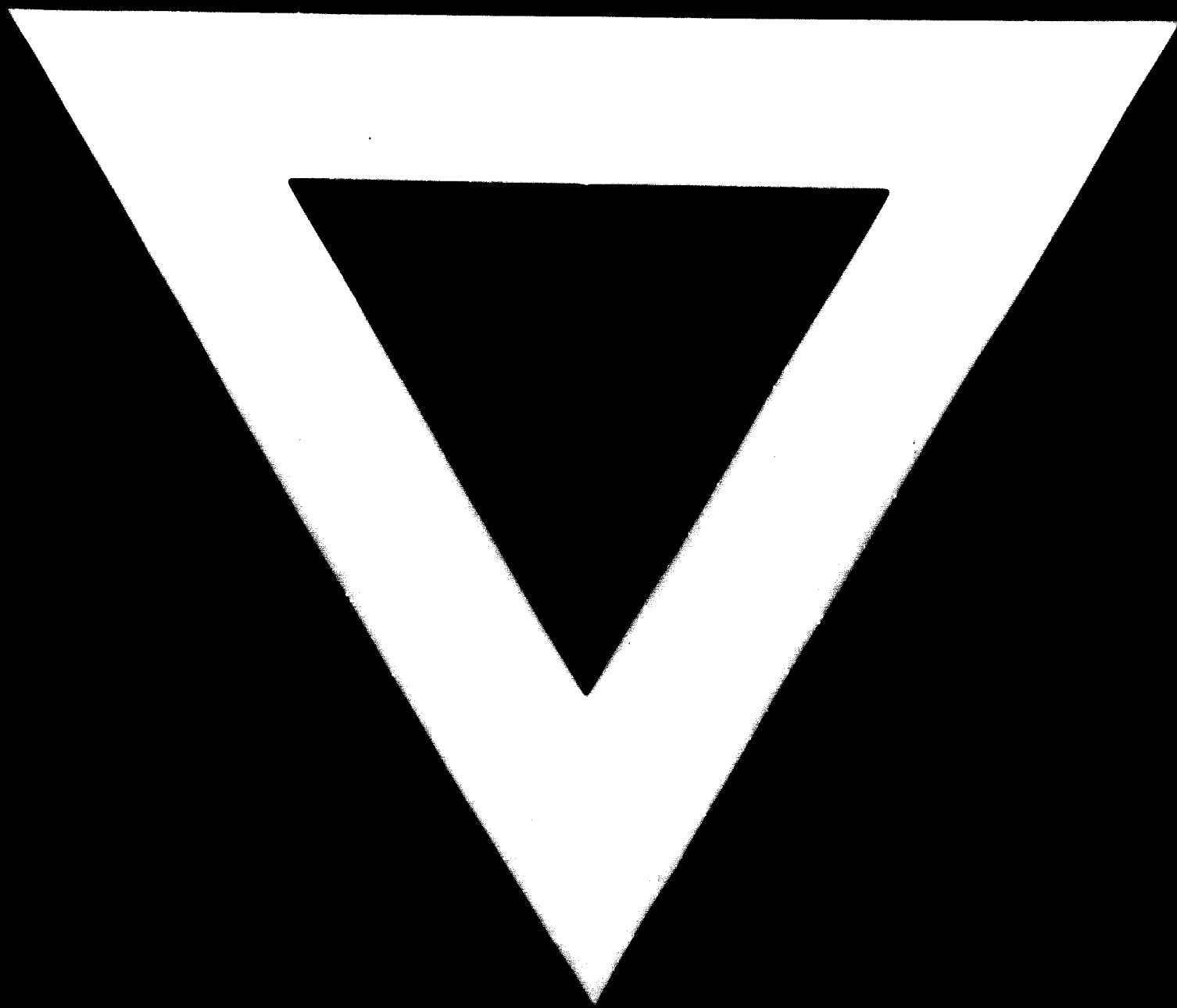
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