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Central Organization
for Applied Scientific Research
in the Netherlands

1968-1973

TNO

5 Years of Technical Assistance in Africa, Asia and Latin America

TNO
4570

5 YEARS OF TECHNICAL ASSISTANCE
IN AFRICA, ASIA AND LATIN AMERICA
(period 1968 - 1973)

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1. BUILDING MATERIALS

Kenya
(1971/19..)

In 1971 a project for the development of the building materials production in developing countries was started, which is carried out jointly by the Netherlands Foundation "Bouwcentrum" and TNO.

This project is carried out along mainly two lines:

- (a) It is tried to set up a general schedule in which facts about the availability of raw materials, production facilities (skilled and unskilled personnel, water, power, transport, etc.), on the one hand, and the need for materials and elements, on the other, are assembled and ultimately tuned to each other. Such a scheme should be made generally applicable to any developing country. In order to give this approach a realistic basis, Kenya was chosen as a "test country".
- (b) In a more pragmatic approach, feasibility studies for some materials or elements will be carried out.

- Netherlands Foundation "Bouwcentrum" (= Building Centre)
- Institute TNO for Building Materials and Building Structures.

2. HOUSING PROJECT

Kenya
(1971/1976)

In 1971 an agreement was settled between the Kenyan and Netherlands Governments regarding a project in the field of housing, building and physical planning in Kenya. The project is planned to last approx. 5 years; its purpose is threefold:

- . to assist in the implementation of Kenya's housing policy;
- . to increase the efficiency of the existing units in the field of research and standardization;
- . to expand and improve the activities of the Kenyan Building Centre and to promote in that way the transmission of knowledge.

TNO is mainly in charge of the research and standardization part of the project. Increase of efficiency is sought to be realized by further strengthening of the units, improving the coordination of the units and creating a better link between their activities and the Kenya Government policy. Twice a year a Netherlands mission visits Kenya to review the follow-up of the project and to advise on successive steps to be taken.

- Institute TNO for Building Materials and Building Structures
- Netherlands Foundation "Bouwcentrum" (= Building Centre)
- Netherlands Ministry of Housing.

3. SHEET GLASS PRODUCTION

Uganda
(1971/1972)

For the supply of sheet and plate glass for use in houses, offices and shops, the East African Market, including Uganda, has so far been dependent on manufacturers in overseas countries. Imports have shown a dramatic rise since 1963, and substantial foreign exchange savings could be realized by a sheet glass manufacturing industry in one of the EAC member countries.

The TNO field study, carried out at the request of the Uganda government, comprised: pertinent market research, studies on location and evaluation of raw materials, selection of process, plant size and location, profitability analysis and government trade rules. The final report presents positive recommendations as to the viability of the project.

- Bureau for International Projects TNO
- Institute of Applied Physics TNO-TH

4. GLASS RESEARCH

Indonesia
(1973/1976)

The glass industry in Indonesia has grown rapidly in recent years; production of container glass, sheet glass and other glass types has increased considerably. Both traditional, existing and modern, new industries need technological support for low cost production and adequate quality. It appears feasible to establish a glass research and development department in the Institute of Ceramics, Bandung, because of its environment in terms of technological facilities. The glass section should be able to serve the whole glass industry and the users of this product with R&D and affiliated activities, i.e. technical information, routine tests, analyses and trouble shooting.

A project of technical cooperation and training between the said institute and TNO has been initiated. It relates to short term visits and supervisory trips, a long term assignment of a glass expert, fellowships and equipment.

- Institute of Applied Physics TNO-TH.

5. SISAL REINFORCED POLYESTER SHEETS

Tanzania
(1971/1972)

To partially offset the negative effects of weakening outlets for sisal, investigations have been carried out that were based on a Tanzanian idea to process sisal in polyester sheets with emphasis on sisal reinforced polyester roofing products.

In view of the diversity of the problems presented, a multi-disciplinary approach was deemed necessary. Six TNO institutes participated in the investigations. Recipes for optimal composition were evolved, especially taking into account weather resistance requirements. The newly developed sheets were tested and compared with other corrugated sheets. Orientations were carried out on the use of sisal fibres for the manufacturing of board-like materials with other binders. Termite resistance was also investigated.

Economic investigations were carried out, including market research on cost of raw materials, selling prices and cost benefit analysis. The final report contained proposals for the lay-out and set-up for pilot plant production.

After solving some remaining technical problems, the pilot plant production seems economically viable, though not very promising.

- Forest Products Research Institute TNO
- Plastics and Rubber Research Institute TNO
- Central Laboratory TNO
- Institute TNO for Building Materials and Building Structures
- Economic Technical Department TNO
- Bureau for International Projects TNO.

6. TEXTILE INDUSTRY

Uganda
(1969)

In view of difficulties in the Uganda textile industry regarding production and trade of man-made fibre cloth, for which solutions were urgently needed in connection with development in the textile field in the EAC, the Uganda Ministry of Planning and Economic Development asked for a study to be made on the factual situation in the textile industry, which should form the basis of recommendations on policies to be adopted.

In the course of the investigations carried out by two TNO-economists together with a private management consulting bureau, it became clear that the fiscal measures taken in Uganda (excise duty and sales tax) and Tanzania (transfer tax) hampered a profitable development of the textile industry.

Recommendations were made with relation to differentiation of taxes imposed, EAC licencing measures and administrative regulations regarding transitional periods and inter-state trade.

Measures were also indicated to improve the efficiency of production organization and marketing of the industry.

- Bureau for International Projects TNO
- Private textile consultant bureau.

7. COTTON MILL
Ethiopia
(1970)

A TNO economist assisted a private textile consultant bureau in investigating the economic prospects of a joint venture proposition with a local cotton mill.

The investigation embraced an extensive survey of the existing and future textile market in Ethiopia, and a thorough financial analysis of the pertinent cotton mill.

- Bureau for International Projects TNO
- Private textile consultant bureau.

8. TEXTILE TECHNOLOGY
Indonesia
(1969/1977)

In view of the need for technological support of the rapidly growing Indonesian textile industry, intensive contacts have been established in recent years between the Institute for Textile Technology, Bandung, and TNO within the framework of bilateral cooperation between the Indonesian and Netherlands Governments. Technical assistance has been given through mutual visits, exchange of experts, including supply of equipment, scientific literature and training.

Further upgrading of IIT to an adequate level for proper consultation of textile mills will be of the utmost importance to promote efficiency of processing, reduce production costs and improve the quality of the products.

A more intensive cooperation between the two institutes will now be implemented through fellowships and supervising assistance in R&D and testing services by a TNO expert during the next four years.

- Fibre Research Institute TNO

9. TWISTLESS JUTE SPINNING
India
(1973)

Processing of jute fibre is of great importance to India as well as to its neighbour, Bangla Desh. The competition of synthetics, however, is very strong in certain fields of application. Applied research is needed to overcome, regarding price and quality, disadvantages of jute applications. Studies carried out by TNO resulted in the development of a new twistless spinning system which leads to savings in raw materials and improvement in quality.

Close cooperation between TNO and an Indian jute research association is being considered; the project concerned would relate to long and short term experts, fellowships and laboratory testing assistance. The major aim would be to improve the position of jute on the world market.

- Fibre Research Institute TNO.

10. INSTANT COFFEE PLANT

Uganda
(1971/1972)

To obtain more insight in alternative processing and marketing prospects for Uganda's coffee production, a study has been made at the request of the Ugandan Government of the technical and commercial feasibility of instant coffee production; the research team consisted of TNO engineering and economic experts.

Advice was given on the eligible techniques and extensive research was done on potential markets. A prospective investor was indicated.

- Bureau for International Projects TNO
- Central Technical Institute TNO.

11. COLD CHAIN

Morocco
(1968)

In 1968 an extensive feasibility study was carried out by a TNO-team of experts specialized in economics, engineering, storage, horticulture, fish processing and veterinarian aspects, on the complex problems of drafting a structural pattern of a cold chain, proper to handle Morocco's rapidly growing demand for perishable produce such as citrus fruits, vegetables, meat, fish and other seafood for the consumption at home and for the export market. In view of the far reaching social and economical consequences, the original terms of reference, which concentrated mainly on technical aspects, had to be extended considerably. The results of the study of the TNO experts have been critically scrutinized by an interdepartemental committee of the Moroccan Government, preparing the ground for policy decisions based on their common findings.

- Central Technical Institute TNO
- University of Utrecht
- Institute for Research on Storage and Processing of Horticultural Produce
- Institute for Fishery Products TNO
- Economic Technical Department TNO.

12. BISCUITS FROM MILLET AND SORGHUM FLOURS

Niger
(1970)

Upon request of UNDP, TNO developed procedures for the production of biscuits from sorghum and millet flours. It was shown to be possible to make millet biscuits with conventional rotary moulders, whereas for the production of sorghum biscuits a dough depositor is required. Variations in the baking properties of the raw materials may necessitate adaptations in dough composition and in certain details of the biscuit making procedure.

- Institute for Cereals, Flour and Bread TNO

13. BAKERY PRODUCTS FROM COMPOSITE FLOURS
Colombia
(1970/1973)

Studies on the use of nonwheat flours for the production of bread and other bakery products have shown that starchy flours from root crops and various cereals combined with high-protein flours from defatted oilseeds constitute a good basis for composite flours to be used as such, or as a diluent of wheat flour. The quality of such composite flours, especially when soya flour is used as the protein component, may exceed that of common white wheat flour in terms of nutritional protein characteristics.

In 1971, a pilot-plant bakery with a capacity for a daily production of 500 kg bread was established in the Instituto de Investigaciones Tecnológicas (IIT) in Bogotá; it is to supply composite-flour bread for a one-year feasibility study, carried out by a TNO-IIT-FAO team of bakery and marketing experts. It was shown that local wheat flour diluted up to a level of 30 % with nonwheat components (rice, maize, soya) could quite well be used for the production of various bread types, as it calls for no more than slight adaptations in the local breadmaking procedures. Market surveys moreover indicated that the diluted-wheat bread was readily accepted by the consumer. Economic studies were made to explore the implications for Colombia of a large scale composite flour programme with regard to future availability of suitable raw materials and the costs of supply and processing local raw materials.

- Institute for Cereals, Flour, and Bread TNO
- Bureau for International Projects TNO
- FAO, Food Policy and Nutrition Division.

14. LOCATION, OPERATION, SIZE OF FISHING HARBOURS
Ghana
(1971/1972)

Following the recommendations of a 1967 FAO/IBRD identification mission, a Dutch engineering firm together with TNO experts on processing, economics and finance made a study on the need for new fishing ports development and expansion works along the Ghanaian coast.

On the basis of technical surveys, cost estimates and evaluation of economic consequences, detailed recommendations have been made on port and marketing organization, shore facilities, new ports required and extension of an existing port (phase A). The next step in the project will be the preparation of the engineering designs of relevant harbour works, additional field surveys, hydraulic model studies, etc. (phase B). A study of operational aspects in relation to the financial consequences and feasibility analyses will also form part of the proposed follow-up.

- Institute for Fishery Products TNP
- Bureau for International Projects TNO
- Engineering firm.

15. FISH TERMINAL
Nigeria
(1969)

At the request of a private firm, TNO participated in a study on the development of a fish terminal in the port of Lagos. In the context of this mainly hydrological project, TNO gave detailed advice on size and design of shore constructions, auction buildings, cold stores and extent of quays needed.

- Institute for Fishery Products TNO
- Private consultants.

16. COLD CHAIN FOR FISH AND FISHERY PRODUCTS
Cameroun
(1968)

This project covered the erection and arrangement of a central cold store in port Douala, and of twelve cold rooms up-country which were constructed to improve the distribution of frozen fish to the important population centres. Assistance was also given with respect to the purchase and rebuilding of a shrimp-trawler. The project has been very successful so far. Recently, a doubling of freezing and storage capacity has been realized.

- Institute for Fishery Products TNO

17. FISH PRESERVATION THROUGH IRRADIATION
Ivory Coast
(1968)

At the request of Euratom, TNO, in cooperation with a Dutch institute for the use of nuclear energy in agriculture, investigated the prospects for prolonged shelf life of Ivory Coast fish through irradiation. The favourable results of the investigations led to a feasibility study on the concrete prospects for application in the said country.

- Institute for Fishery Products TNO
- Institute for Atomic Sciences in Agriculture.

18. EXPERIMENTAL FISH PROCESSING
Tanzania
(1966/19..)

The fishing grounds of Lake Victoria offer a vast potential source of protein-rich food for the Tanzanian population. In order to make optimal use of this potential, the Tanzanian Government established in 1966, next to its fisheries training institute, an experimental fish processing station. In collaboration with TNO, investigations and experiments have since been carried out with several methods of fish preservation to adapt these to local conditions. The station's programme of work includes investigations of the types of fish considered to be commercial value, taking into account local climatic conditions, permissible costs, and it also schedules marketing studies.

One of the station's most significant activities is that of educating and training Tanzanians to put fishing & processing on a modern basis. The experimental station has meanwhile developed into a research and training centre for all freshwater fisheries in Tanzania. TNO took care of the purchase, upgrading, overseas and overland transport, as well as continuous management of a fishing boat for the execution of the station's programme. Both for the technical and economic programme, a TNO team has been contracted for prolonged support of the largely Tanzanian staff.

- Institute for Fishery Products TNO
- Bureau for International Projects TNO.

19. FISH PROCESSING PLANT
Uganda
(1971/1972)

The assessment of setting up a freshwater fish processing industry was the object of a techno-economic study undertaken at the request of the Uganda Government.

Following the results of preliminary TNO investigations, special attention has been given to the processing of haplochromis, a small species of fish abundant in Lake Victoria's deep waters. Production and marketing of sun-dried fish seems feasible. Some aspects of the supply of fish were also covered in the study. The experience and data thus obtained proved to be important elements for the investigations on stream in the Tanzanian freshwater fishery centre.

- Institute for Fishery Products TNO
- Bureau for International Projects TNO.

20. FISH PROTEIN CONCENTRATE
Indonesia
(1970)

Within the framework of an extensive study regarding the prospects of improving protein-intake and quality in Indonesia, TNO studied, in cooperation with a marketing expert and a dietician, the feasibility of setting up a fish protein concentrate processing industry. Special attention was geared towards the availability of raw material supply. For the present an industry processing fish protein concentrate was deemed to be not feasible.

- Institute for Fishery Products TNO
- Marketing consultant
- dietician.

21. FISHERIES DEVELOPMENT
Yemen
(1973)

The development of fisheries is of vital importance to the economy of the P.D.R. Yemen. TNO was invited, by a consulting engineering firm with an interest in this matter, to provide assistance in a study of the possible development of fisheries and the financial consequences.

- Institute for Fishery Products TNO
- Private consultants Lebanon.

22. SLAUGHTERHOUSE
Indonesia
(1971/1972)

A Dutch slaughterhouse expert and a TNO-economist made three studies regarding the feasibility of setting up three slaughterhouses in Djakarta and Jokjakarta, Indonesia. On the basis of the results of these studies, a slaughterhouse for pigs and one for ruminants are being built in Djakarta. For the existing slaughterhouse in Jokjakarta were suggested some renovations combined with structural improvements in the supply of cattle.

- Slaughterhouse management expert
- Bureau for International Projects TNO.

23. FOOT AND MOUTH DISEASE CONTROL
Tanzania
(1971)

Veterinary experts of the Netherlands Government, together with a TNO economist, studied the possibilities of the arrangement and exploitation of certain FMD-free areas in the country. The conclusions of this study denied the feasibility of a partial approach regarding FMD control. Only within the context of an overall project, directed at the general increase of Tanzania's meat exports, can the expenses of FMD control be economically justified. As the Tanzanian Government has meanwhile started the organization of a cold chain, export opportunities may be expected to improve in the next few years. FMD control will then become an economic necessity.

- Veterinary experts
- Bureau for International Projects TNO.

24. STORAGE AND PROCESSING OF MEAT
Chile
(1973)

One of the aims of the Chilean Corporation for Agricultural Constructions and Operations (SOCOAGRO) is the improvement and rationalization of the processing and marketing of meat in Chile; for this purpose SOCOAGRO exploits a chain of slaughterhouses and meat factories.

TNO's feasibility study inter alia covered:

- the state of the art regarding SOCOAGRO's current activities and the institutional and structural situation;
- the cattle-breeding situation, i.e. origin of cattle, supply lines, quantities supplied and future developments;
- existing expertise in SOCOAGRO;
- necessary expertise and training.

A TNO meat expert made recommendations regarding organizational problems and technical know-how and equipment. Technical assistance will be provided by way of fellowships, equipment and various consultants.

- Central Institute for Nutrition and Food Research TNO

25. NUTRITIONAL STATUS OF POPULATION GROUPS
Surinam
(1966/1969)

TNO participated in a team for food research aiming at investigating the nutritional status of various population groups in Surinam. TNO's experience has been built up through a variety of other surveys in this field embracing chemical, somatometrical and bio-chemical aspects, e.g. on the nutritional status of pregnant women and pre-school children, nutritional consequences of bilharzia infection, preparation of children's food from such local materials as fish and pulses. The nutritional status of the respective population groups has now been studied thoroughly, and recorded; future developments will be relatively easy to follow.

- Central Institute for Nutrition and Food Research TNO

26. LACTOSE INTOLERANCE
Kenya
(1970/19..)

The Netherlands Medical Research Centre in Nairobi co-sponsored a project of TNO which comprised investigations on measures aiming at control of kwashiorkor through supply of fish protein and milk protein and, in this context, R&D on lactose malabsorption. Results suggested that children in the age group of 1 to 3 years, recovering from malnutrition, grew better with lactose-poor milk than with ordinary milk.

Research on the causes of poor resorption of carbo-hydrates is continued.

- Central Institute for Nutrition and Food Research TNO.

27. FOOD QUALITY CONTROL
Saudi Arabia
(1967/1973)

Invited by FAO, TNO managed since 1967 a food quality control project whose main objectives were:

- . establishing of two food control laboratories;
- . training of Saudi-Arabian personnel;
- . assistance in drafting food standards.

In Jeddah and Damman, food control stations have been set up by a multidisciplinary team of TNO experts whose work also included the drafting of standards methods of analysis and the training of local staff in daily routine matters. The laboratories have been operational since 1968/69, and analyses are made at a rate of about 500 a month. Fellowships have been granted to a total of 12 students with satisfactory results.

TNO's assistance in the drafting of food standards consisted in sending high level experts to meetings of the two Ministries of Food Legislation and Consumer Protection.

The technical assistance project was rounded off after implementation of the successive steps in 1973, i.e. after a period of 6 years of intensive cooperation.

- Central Institute for Nutrition and Food Research TNO.

28. DEVELOPMENT OF ANIMAL REPELLENT
General
(since 1965)

Rodent and insect attacks on cereals and flours in transport, or storage, are responsible for considerable damage and loss of revenue in developing countries.

One method that seems to hold promise to curtail this pest activity involves the use of repellent systems of needle-shaped crystals of calcium oxalate, called raphides, found in specific subtropical and tropical plants as araceae. FAO requested TNO to study the possibilities for practical use of these raphides in stored cereals.

In the course of the pertinent investigations it became clear that the use of pain inflicting deterrents which form the active agents in the raphides is promising. Further research, however, is necessary to obtain commercially feasible repellent. For this purpose i.a. a plantation to grow repellent supplying plants will have to be established in a tropical area.

- Institute for Physical Chemistry TNO.

29. SHRIMPS
Surinam
(1970)

In view of the expansion of the Surinam shrimp industry, a study was carried out to decide on preferable locations for future shrimp processing plants.

In its considerations, TNO's study paid attention to technical, economical and town planning aspects.

- Institute for Fishery Products TNO
- Civil Engineering Consultants
- Town planning consultants.

30. TUBERCULOSIS SURVEILLANCE

General

(since 1962)

In cooperation with the World Health Organization and the International Union against Tuberculosis, TNO coordinates the activities of a world-wide tuberculosis surveillance programme.

The programme aims at assistance to countries all over the world, DC's as well as IC's, to measure their tuberculosis problem by means of tuberculosis infection rates in samples of the population.

Research teams visit participating countries to implement tuberculosis programmes, which include the training of local personnel. During return visits, test samples are taken; the information obtained is centrally processed at TNO.

Consultory work is carried out regarding methods of vaccination, and on the tracing of tuberculosis sources.

- International Tuberculosis Surveillance Centre
- Organization for Health Research TNO
- Institute TNO for Mathematics, Information Processing and Statistics.

31. NATIONAL INSTRUMENTATION INSTITUTE
Indonesia
(1967/1971)

Because of the lack of skilled personnel and well-equipped workshops, repair and maintenance of instruments in Indonesia is difficult. As Indonesia obtains instruments from many different countries, there are many types of instruments for which dealer service and spare parts are not locally available. For this reason a National Instrumentation Institute has been established in Bandung with two main tasks:

- repair and maintenance, installation and development of instruments (workshops);
- education of technicians to perform these services (schools).

In cooperation with the University of Technology, Delft, TNO assisted in setting up the Instrumentation Institute by sending out an electronics expert for three years, and through back-stopping activities and after care.

The institute, now completely managed by the Indonesian counterparts, appears to supply the country's growing needs very satisfactory.

- University of Technology, Delft
- Institute of Applied Physics TNO-TH.

32. SETTING MACHINE FOR ARABIAN CHARACTERS
Arabian Countries
(1970/1971)

There is a need in Arabian countries for simple text setting equipment to be used in connexion with small offset presses. Especially universities, schools and scientific institutes have indicated the necessity of equipment which will enable them to multiply their publications in a cheap way.

TNO designers and instrument makers developed a kind of typewriting machine with which a fine running handwriting can be achieved using only a limited number of 'letter'-types. The characters are composed in a special procedure developed by a private designer.

The machine had to meet a number of very strict requirements inter alia related to: tropical conditions in which the machine is to be used, the number of lettertypes which should lie between 180 and 240, special provisions to apply accents and points on the characters, and such solid workmanship and design that no repair service would be needed.

- Instrumentum TNO.

33. LEATHER SUBSTITUTES
Romania
(1973)

Because of the reduced stock of live cattle the tanning industry in Romania cannot meet the leather requirements of the footwear industry. The production of substitutes has to be developed, the raw material being locally available. In 1972, the synthetic leather factory started to produce synthetic leather but some problems arose for which solution expertise is needed.

TNO has been invited by UNIDO to assist the factory.

- Plastics and Rubber Research Institute TNO
- Institute for Leather and Shoe Research TNO.

34. COPPER BY-PRODUCTS
Uganda
(1970).

As a by-product of the copper smelting process, used in the production of blister copper, a slag waste remains.

A TNO technologist and an economic expert undertook a study on the feasibility of a processing plant of copper slags. The initial terms of reference for this study were limited to the processing of an insulating material, and had soon to be extended to a wider range of possible applications as the technical prospects for such a material appeared to be nil. Based on an analysis of the composition and the properties of the slag, a great variety of applications for non-processed and processed slag were investigated. Technical and economic factors, however, restricted the prospects for viable application to only a few suitable products with but a limited marketability.

- Institute of Applied Physics TNO-TH
- Bureau for International Projects TNO

35. NODULAR CAST IRON
India
(1969/1971)

Because of the high cost of investment, and that of raw materials needed to produce high quality nodular cast iron, combined with foreign exchange problems in connection with the importation of equipment and necessary alloys, the production in India of nodular cast iron has until recently relatively stayed behind. In view of the drawbacks of the existing process, TNO has developed a special process (T-nock) which enables one to obtain high yields with relatively simple and cheap equipment, thus avoiding importation and high capital outlay. The process has been introduced in a private steel corporation in India, thus offering prospects for an increased production of this type of cast iron.

- Metal Research Institute TNO

36. DUCTILE NODULAR GRAPHITE IRON CASTING
Bangla Desh
(1973)

Technical assistance has been required by the Planning Commission of Bangla Desh to set up local production of nodular cast iron, using the T-nock process; this forms a relatively cheap substitute for various types of steel. In a proposed study to investigate the feasibility of this project, two metal experts and an economist of TNO are planning to include a review of the state of the art of the country's conventional iron casting techniques, as these should be stepping stones towards sophisticated T-nock process. Problems of available raw materials, investments needed, seat, size, economic effects for the country and other questions will also be covered.

- Metal Research Institute TNO
- Bureau for International Projects TNO.

37. RIVERCRAFT DESIGN AND INSPECTION

Bangla Desh

(1973/1977)

Transport on the extensive waterways of Bangla Desh is carried out by a variety of passenger and cargo craft with wide ranging specifications to meet the demand of the changing traffic and conditions. However, these craft are generally uneconomic to operate, rather unsafe in operation and not very well suited to the needs.

The main conclusion of a field study carried out by a TNO-expert on shipbuilding, implied that it is necessary to carry out studies of the different types of vessels and of the existing traffic and waterways. Next, one would thus be able to design standard types of craft which are easy to build, efficient to operate and optimal for their tasks. To this end, the establishment has been recommended of a local Design and Inspection Office for Inland Waterway Transport and Mechanized Craft. To assist in the creation and arrangement of this Office, a team of experts (naval architect, marine engineer and draughtsman), together with a supply of the necessary equipment to set this Office going, should be sent to the country.

It is envisaged that, two years later, the continuation of the project will be decided upon through an evaluatory procedure.

- Netherlands Ship Research Centre TNO

38. LOW COST AUTOMATION

Philippines

(1966/1972)

As part of an extensive programme of levelling up, a section for low cost automation has been established in the Institute for Small Scale Industries at Manila as part of the University of the Philippines; it is a training institute at post graduate level for experts who specialize in assisting and promoting small and medium scale industrial enterprises.

So far automation had been applied solely in the bigger industries. This type of automation, however, is in general not suitable for the smaller industries, because of its high capital outlay and employment effects. Application of low cost automation in the small/medium sized enterprise should indeed allow interestees to arrive at making the best use of existing production techniques rather than aiming at eliminating labour.

An LCA-expert of TNO was appointed project manager. By mid 1970 the section had successfully carried out the following tasks:

- dissemination of knowledge to industry;
 - practical training of managers and engineers in the automation laboratory;
 - direct assistance to industry through on-the-spot consulting;
 - demonstration projects;
 - advice on equipment;
 - cooperation with educational students.
- Industrial Liaison Department TNO

39. APPROPRIATE TECHNOLOGIES

Colombia

(1973/)

A four-man multidisciplinary TNO-team studied the feasibility of a programme for evaluation, selection, adaptation and development of technologies in terms of their suitability. The programme had been submitted by the Institute for Technological Research, Bogotá. During the investigations, selections of specified research projects were made according to criteria regarding the prospects of applying the research to activities of direct socio-economic significance, the local institute's scope of research and the prospects for short term implementation of the adapted technologies.

The project submitted for further consideration aims at:

- introduction of new soybean-based food with high protein content for human consumption;
 - exploitation of Colombia's natural resources, i.e. phosphates and/or fine chemicals;
 - production of hydraulic lime for the building industry;
 - promotion of transfer of know how to the country's industry.
- Bureau for International Projects TNO
 - Central Technical Institute TNO
 - Organization for Nutrition and Food Research TNO
 - Institute TNO for Building Materials and Building Structures.

40. TRANSFER OF TECHNOLOGY

Latin America

(1973/1974)

Through the Regional Programme for Scientific and Technological Development of the Organization of American States, a pilot project is being developed for the transfer of technology. Its objective is to experiment with national and regional mechanisms to improve the process of transfer of technology to and within Latin America.

In the first stage two parallel activities will be carried out:

- efforts to satisfy the explicit demand for specific technology transfer as will be defined by the users of this technology (private enterprises or government agencies);
- diagnostic efforts to identify implicit demand for new technology in productive units or industrial sectors at the national level.

The latter efforts will provide sets of technology requirements to be satisfied in a second stage.

TNO will assist in obtaining the required technological profiles through the TNO-family. TNO will moreover be enlisted in the efforts of identifying demand for new technology, especially in fields of food technology and synthetics.

- Bureau for International Projects TNO.

41. PARTNERSHIP NATIONAL RESEARCH INSTITUTE
Paraguay
(1972/)

UNIDO is assisting the Government of Paraguay in the operations of an institute of industrial research studies (National Institute for Technology and Standards, INTN). This Special Fund project is already in an advanced stage of implementation.

The Institute carries out a number of activities including industrial feasibility studies, identification and preparation of industrial projects, examination of appropriate technologies in specific fields for the establishment of new industries and the necessary economic analyses for such activities. Upon expiry of the special fund project, INTN, to avoid the crucial danger of technological isolation, needs further technological assistance channelled in an appropriate flexible system. Based on a preliminary TNO consultancy advice, an affiliation between INTN and TNO by way of a type of retainer arrangement is under consideration. Currently, INTN activities are mainly concentrated on food, wood and leather research; the planned affiliation with TNO aims at broadening INTN's manoeuvring capacity.

- Bureau for International Projects TNO
- other TNO facilities.

42. INTERNATIONAL RESEARCH MANAGEMENT COURSE
Netherlands
(1973/1975)

Under the auspices of UNIDO, and in cooperation with a Dutch research institute for management sciences, TNO has prepared a programme of courses for the "In-service training of managers and senior executives of industrial research institutes in developing countries". In the courses, which will last three months each, a variety of specific management problems inherent to research institutes will be covered in a series of lectures and practical work. Such as: programming of research, financial and personnel management, marketing of research, etc. Some 15 TNO-institutes participate in the project; this reflects the diversity of the subjects concerned.

- Industrial Liaison Department TNO
- RVB, Research Institute for Management Sciences.

43. TECHNICAL INFORMATION SERVICES
Netherlands
(since 1971)

UNIDO's Special Industries Service to the benefit of developing countries involves the furnishing of pertinent factual information with regard to industrial questions and problems. Within this framework, TNO acts as an information network correspondent and provides economic technical information on manufacturing industries in all sectors.

- Bureau for International Projects TNO.

44. ORGANIZATION OF APPLIED SCIENTIFIC RESEARCH
Brazil
(1969)

At the request of the Federal Government of Brazil, a TNO team headed by the then president of the Central Organization TNO, visited the country in May 1969 to discuss organizational aspects of her applied scientific research facilities. The investigations focused on problems and needs for improved use of the existing R&D capacity in view of economic development. In its report to the Brazilian authorities, the TNO team commented on major topics of science policy. It appears that the report has stimulated the re-shaping of governmental approach in matters of science and technology.

- Economic Technical Department TNO.

45. WORKING PROGRAMME FOR DEVELOPMENT OF TECHNOLOGY
Latin America
(1970)

At the request of the Economic Commission for Latin America (ECLA), a TNO-expert made a study to prepare outlines for the Commission's working programme for development of technology in Latin America and transference of techniques to this region. The said consultant's task included a review of the programmes of several international and national S&T organizations. He drafted outlines for an appropriate programme of activities for ECLA in relation to the application of S&T to industrial development. The report contained pragmatic recommendations regarding the organization of a technological development division and procedures for cooperation among research institutes in Latin America.

- Economic Technical Department TNO

46. ORGANIZATION OF RESEARCH UNIT
Turkey
(1973)

With reference to problems in their materials research unit, a Turkish industrial research institute requested TNO to send a trouble shooting expert. Upon arrival he soon found that apart from the unit's installation problems and growing pains, management and organizational factors threatened to become considerable drawbacks in the smooth running of the institute.

Advice has meanwhile been given regarding project management, accounting systems, cost price calculation programming and budgeting. Follow up is planned to be met through traineeships, special consultancies and managerial questions and organization of information processing.

- Industrial Liaison Department TNO.

47. GROUNDWATER SURVEYS
Colombia
(1972/1974)

As part of a plan regarding the development and integration of Upper and Middle Guajira, the Colombian Government requested technical assistance for geophysical surveys of that region. In cooperation with Colombia's National Institute for Geological and Mining Research, TNO-experts are carrying out surveys in the (semi-) arid areas of Guajira in order to obtain geological data for groundwater hydrology with prospects of exploitation of water bearing layers for irrigation.

In the course of the two years that the project will last, an important part of the activities are to be geared to training of Colombian counterparts in the application of geophysical methods, programming of calculators and use, maintenance and repair of geophysical equipment, such with a view to founding a geophysical department for geohydrological surveys.

- Groundwater Survey TNO

48. FEASIBILITY OF DAM CONSTRUCTION
Chile
(1968/1969)

In a feasibility study regarding the construction of a dam to be located in the Maule river at Colbun (which project aimed at the generation of hydro-electric power, the irrigation of 150,000 hectares of new land and improvement of the irrigation security to 90 % of 314,000 hectares), TNO contributed with seismic investigations in the main and irrigation regulating reservoir areas, and at the powerhouse and railrace channel for the determination of bedrock depths and properties.

- Groundwater Survey TNO.

49. WATER SUPPLY SURVEY
Tanzania
(1972/1973)

At the request of Tanzania's Ministry of Water Development and Power, TNO participated in the preparation of an integrated masterplan for the Shinyanga region, which involved investigations of the surface and groundwater resources of the area plus an inventorial record of water demand. By application of geo-electrical and magnetic methods and geophysical well logging, a study has been carried out to obtain information regarding the geohydrological conditions of the subsoil.

Note: TNO has been involved in other groundwater studies in Colombia (Cesar), India and Iraq.

- Groundwater Survey TNO

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