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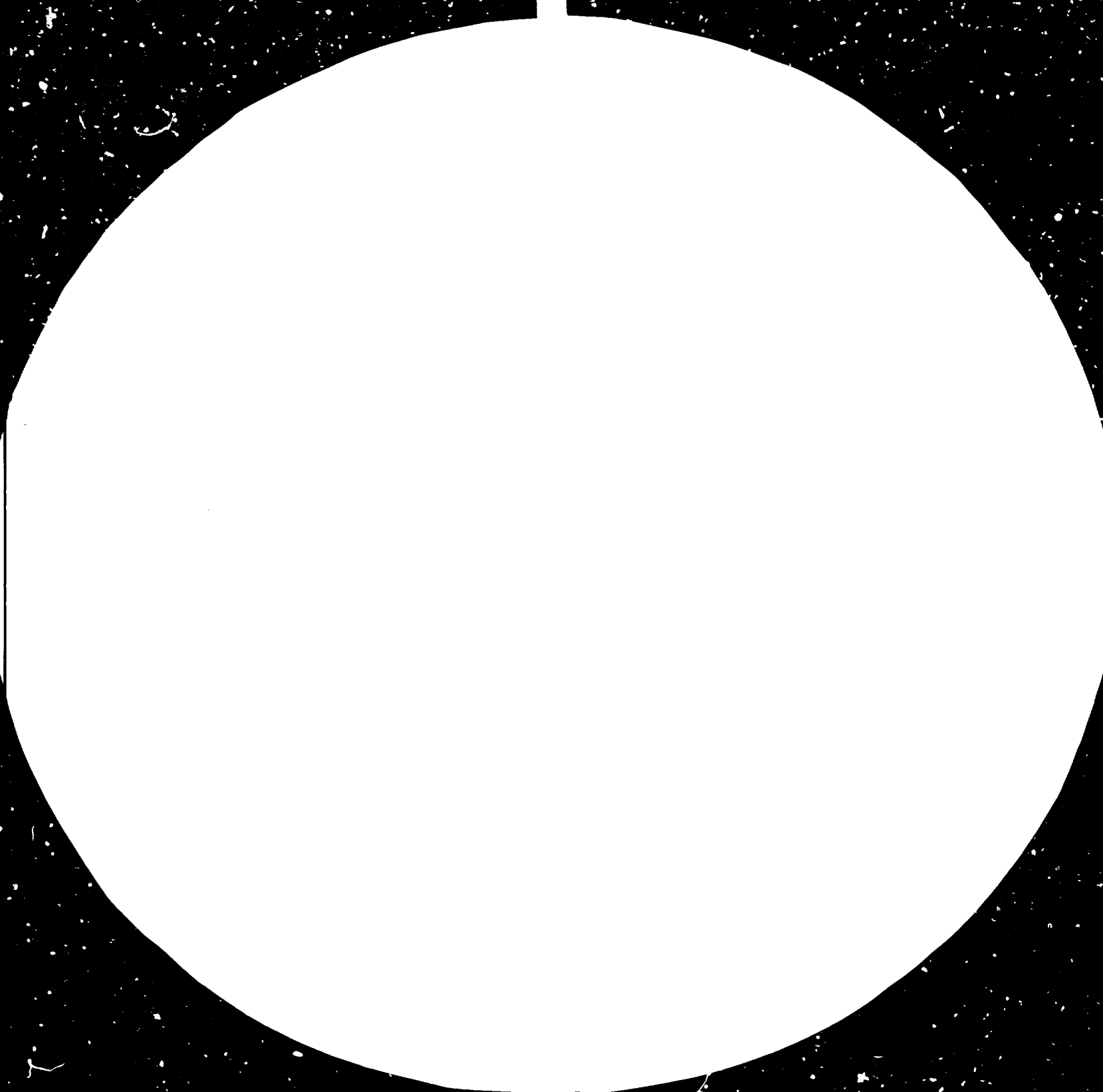


Preface

Since 1967, the United Nations Industrial Development Organization (UNIDO) has adhered to its mandate "to promote and accelerate the industrialization of the developing countries" by responding to requests for technical co-operation in all aspects of industry from the Governments of those countries.

This commitment to industrialization as a means of improving the living standards of nearly three quarters of the world's population, which was first outlined in November 1966 by the United Nations General Assembly in its resolution 2152 (XXI), has since been intensified. The Lima Declaration and Plan of Action on Industrial Development and Co-operation, which was adopted by the Second General Conference of UNIDO in 1975, called for an international effort to increase the developing countries' share of world industrial production to 25 per cent by the year 2000. This goal was further emphasized at the Third General Conference of UNIDO, held at New Delhi, India, in early 1980, with the adoption of the New Delhi Declaration and Plan of Action on Industrialization of Developing Countries and International Co-operation for their Industrial Development.

In the series of booklets *UNIDO for Industrialization,* of which this is one, an attempt is made to describe briefly the contribution of UNIDO, through its Division of Industrial Operations, to the industrialization of the developing world and to give examples of what has been done and will continue to be done to accelerate the process.

FINANCING UNIDO ACTIVITIES

The bulk of the costs of UNIDO administration and research, now approaching $US 48 million annually, is met from the **regular budget** of the United Nations, as are some lesser expenditures reserved for certain advisory and training activities. Once UNIDO achieves the status of a specialized agency within the United Nations family, it will cease to be funded from central sources of the United Nations and will rely on its own budget based upon contributions from its member States.

Technical assistance programmes for projects in developing countries, however, are funded from varied sources, the most important of which are summarized below.

By far the largest share of the field activities of UNIDO, some 70 per cent of the total, is funded from the **United Nations Development Programme (UNDP).** Thus, a high proportion of UNIDO field projects are subject to UNDP approval before implementation. Since the ultimate source of this money is the contributions of the member States themselves, both developed and developing, it can truly be said that UNIDO field activities are self-help programmes, initiated only at the request of Governments of developing countries and using funds to which many developing countries themselves contribute. These funds are allocated to particular countries from UNDP sources up to a predetermined amount known as the indicative planning figure (IPF). They cover the whole spectrum of United Nations assistance to those countries, industrialization being only one of many programmes needing financial support.

Country programmes normally have a five-year span; and the available funds, which vary from country to country and are weighted in favour of least developed countries, must be allocated to specific projects within a country during the five-year period.

Special Industrial Services (SIS) funds are confined to a narrow range of expert services provided for unexpected high-priority projects that are called for from time to time. The programme is restricted to short-term projects of limited cost, and during recent years $US 3.5 million has been set aside annually to support it.

The **United Nations Industrial Development Fund (UNIDF)** was created to finance innovative projects, preferably projects having a multiplier effect. The Fund consists of contributions pledged by individual Governments, and in some cases the purpose of the contribution is specified. Pledges are made in convertible and non-convertible currencies.

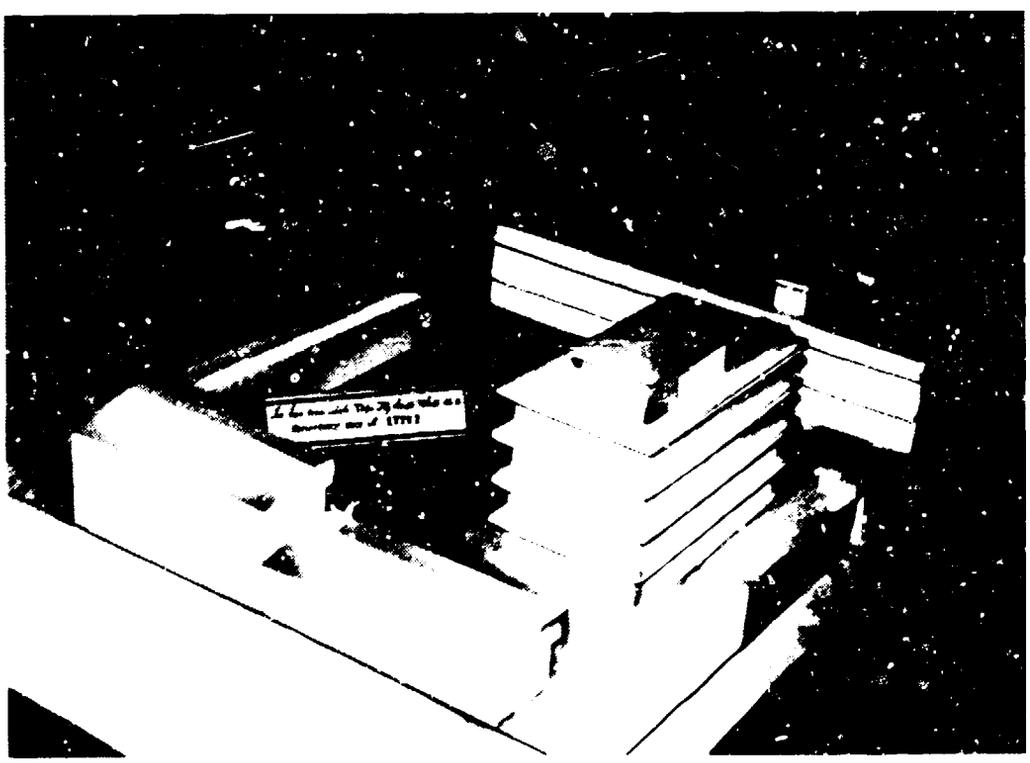
Trust funds are provided by participating Governments for specific projects to be executed by UNIDO in accordance with agreements reached with the contributing countries. They are used, typically, for technical assistance, expert services and specialist training.

The small **regular programme of technical assistance** provides funds for types of technical assistance that either complement other programmes or do not lend themselves conveniently to alternative means of financing. In particular, this type of funding permits a certain degree of flexibility in spending, since the allocation of the funds available is entirely under the control of the principal policy-making organ of UNIDO, the Industrial Development Board. Programmes are designed to reflect the emphasis on special measures for the least developed countries, on technical co-operation among developing countries and on establishing and strengthening industrial training facilities in developing countries.

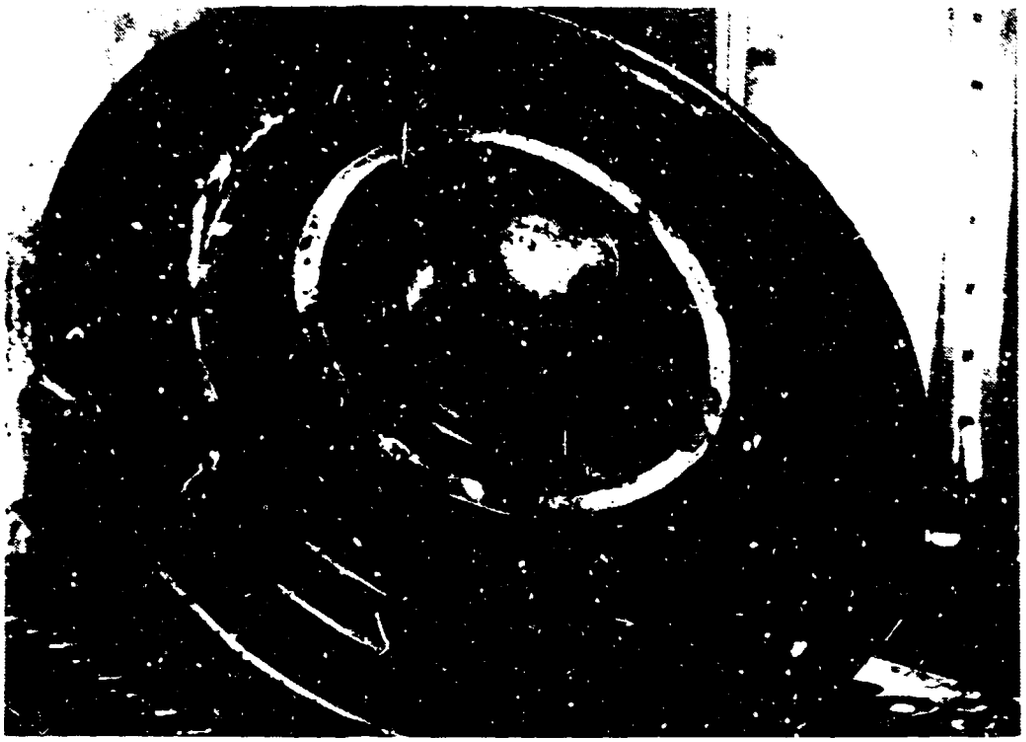
Tropical technology

The problems of tropical technology affect, directly and indirectly, nations whose geographical position and tropical climates play commanding roles in their overall development and industrialization. By describing the experience of one country in tropical technology, UNIDO hopes to provide information and assistance to other countries that encounter similar situations.

On 13 October 1977 the General Assembly of the United Nations called for world assistance in the reconstruction of Viet Nam, listing that nation among those with the most acute developmental problems. In 1978, the Government of Viet Nam requested assistance from the United Nations Development Programme (UNDP) in providing technical advice and equipment to the Institute for Tropical Technology in Viet Nam (ITTV). In December 1980 the project DP/VIE/76/010 went into effect with ITTV as government co-operating agency and UNIDO as executing agency for UNDP.



Institute for Tropical Technology in Viet Nam (model)



Corroded transformer being tested in ITTV laboratory

THE EFFECTS OF A TROPICAL CLIMATE ON MACHINERY AND EQUIPMENT

Viet Nam is a country whose climate plays a dramatic, sometimes devastating role in its industrialization efforts. Because Viet Nam is situated in the tropics, has a long coastline and has a constant high humidity, almost every type of equipment is susceptible to rust, corrosion and microbial infestations. Steel plates on ships corrode within one year; small rotary motors often break down within a few months; electrical insulation deteriorates rapidly, with power failures as a result; and radio and television sets often must be repaired before they have been used. Even microscopes can be irreparably damaged by moulds that grow rapidly under conditions of high humidity.

The primary causes of corrosion and deterioration of equipment and materials in tropical areas are related to climatic factors. Among these are:

- Air temperature
- Humidity
- Sea salt
- Dust and sand, combined with high humidity
- Atmospheric impurities such as ash, ozone, nitrates and smoke
- Ultraviolet and infrared solar radiation
- Microbial infestations from moulds, bacteria and insects
- SO_2 from industrial pollution

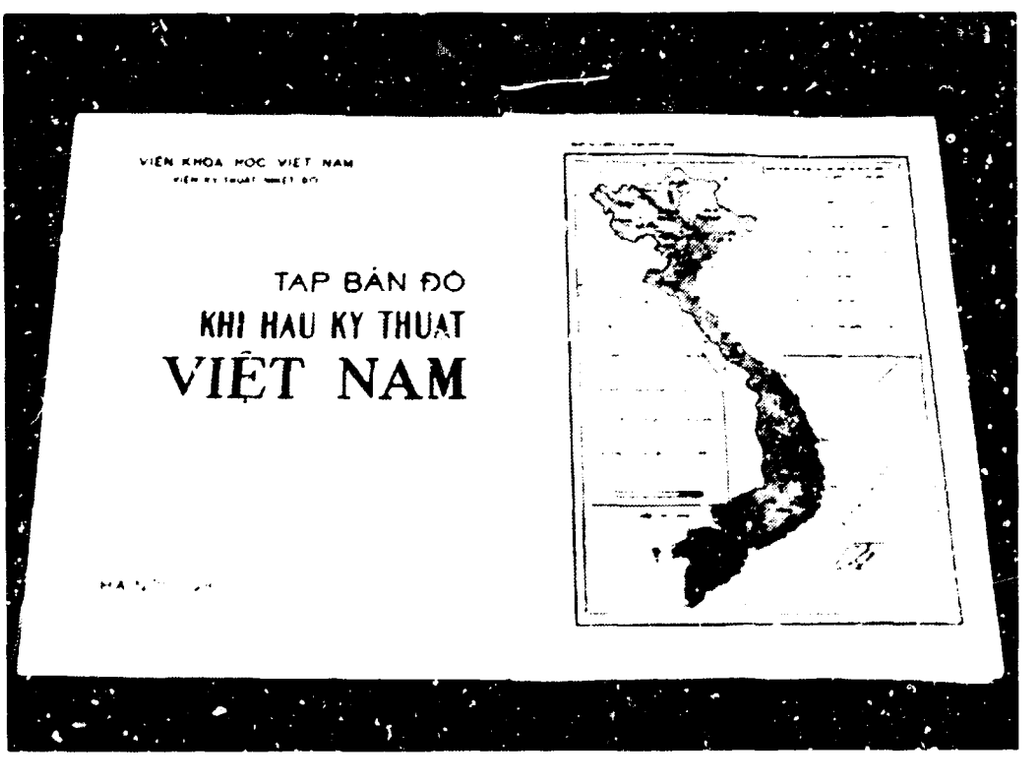
Serious economic problems add to the climatic ones. Although it does not have sufficient foreign exchange, Viet Nam must import most of its materials and equipment. Moreover, Vietnamese technicians, while highly skilled, do not possess sufficient knowledge of imported equipment to repair it. At the same time, experience has shown that much of the imported equipment either arrives in Viet Nam in a damaged condition due to rust and corrosion or breaks down after only a few months of use. If spare parts are imported along with the equipment, they are likely to be damaged by the tropical climate by the time they are needed. In the south, for example, it is estimated that only 25 per cent of the small imported appliances arrive in usable condition. In Haiphong harbour ships that are only one year old stand at dock, no longer seaworthy owing to the salt water that rusts them almost immediately.

In order to avoid deterioration, it is necessary to develop a technology for producing "tropic-proof" materials and equipment. Suppliers must be aware of the importance of proper packaging to ensure that products arrive in tropical countries undamaged. It then becomes the responsibility of the importing country to provide proper storage and transportation facilities for the imported goods. Maintenance and repair are also of major importance.

Ultimately, the long-range ambition of a country will be to produce its own tropic-proof materials and equipment, which will be less costly in every respect.

ACCOMPLISHMENTS OF ITTV

The basic objectives of the Institute for Tropical Technology project were to strengthen, and to make available to industries the results of the research



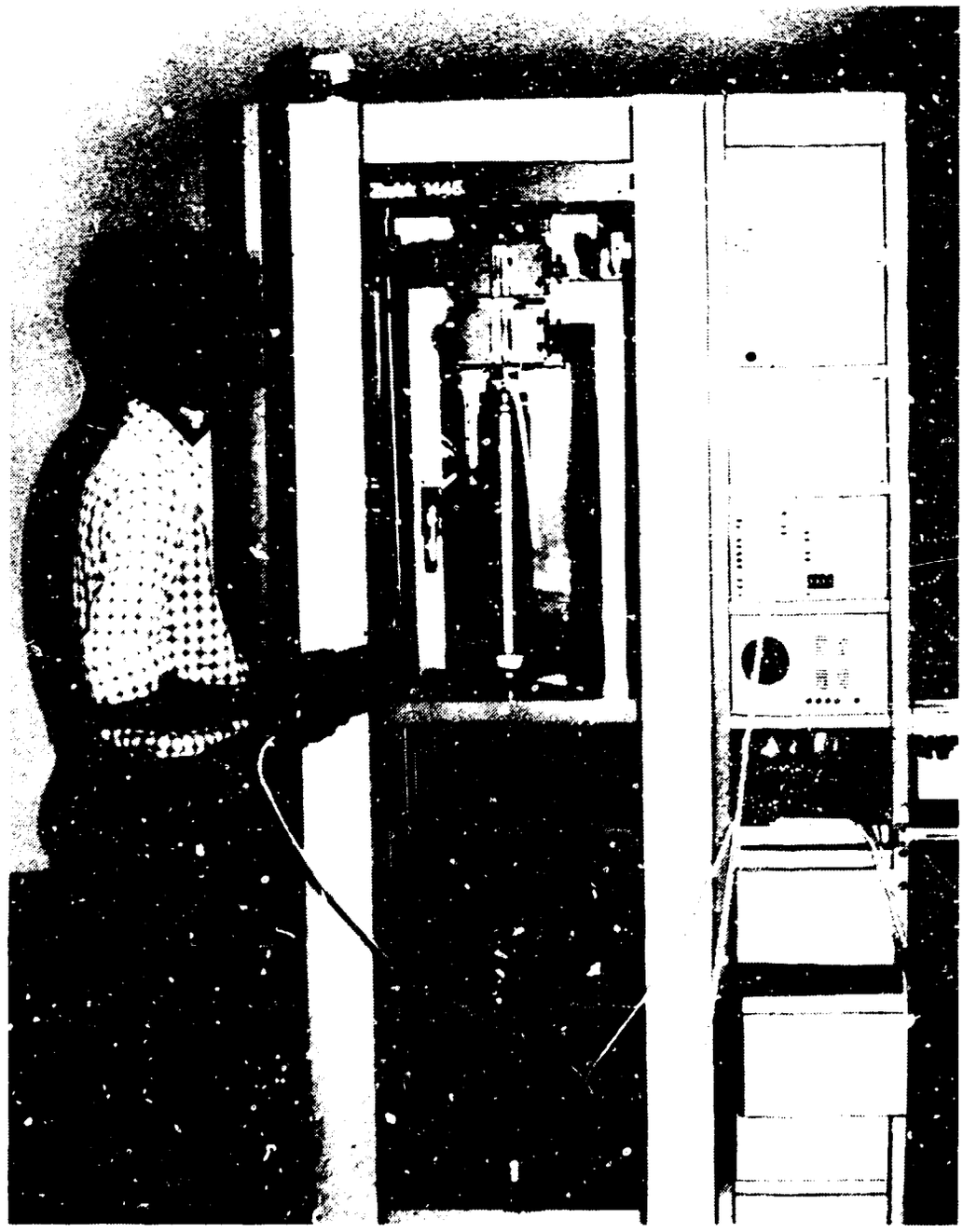
Map of Viet Nam

and development programmes of the Institute. A total amount of $US 1,191,432 and 16,500,000 Vietnamese dongs was allocated to assist ITTV.

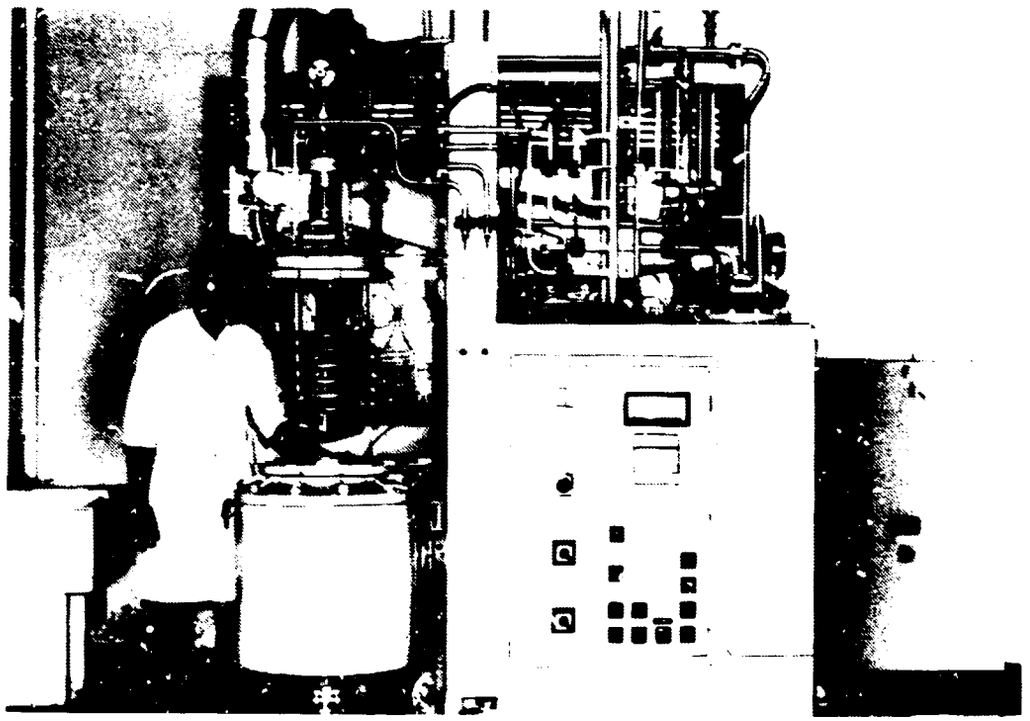
The work of ITTV is centred in 10 laboratories in Hanoi and Ho Chi Minh City. Approximately 200 persons are employed. Each branch has a pilot production plant that produces, on a small scale, the materials developed in the Institute's laboratories.

The work of the laboratory is divided into five categories:

- Electro-chemical and corrosion testing and metal protection
- Physical and physio-chemical testing of non-metallic materials to improve their resistance to tropical climates



Tensile testing of plastic material



Checking over newly installed equipment

- Development of new technical materials
- Tropic-proofing of electrical equipment and environmental testing
- Tropic-proofing of electronic components and equipment

During the period of the project, ITTV received over 180 pieces of equipment from UNIDO, including:

- Salt spray chamber
- Potentiostat with computer
- Temperature-shock test cabinet
- Climate testing cabinet
- Splash-water test unit
- Dust test unit
- L-type thermometer, range −70° to +20° C
- L-type thermometer, range +10° to +100° C

The total cost of the equipment, which was financed from the UNDP components, was $US 830,000.

As a direct result of the research and development activities of the ITTV laboratories during the project period, numerous significant achievements were realized and are being put to use by industries or are in the process of being standardized for use in the immediate future.

Among the most important developments are:

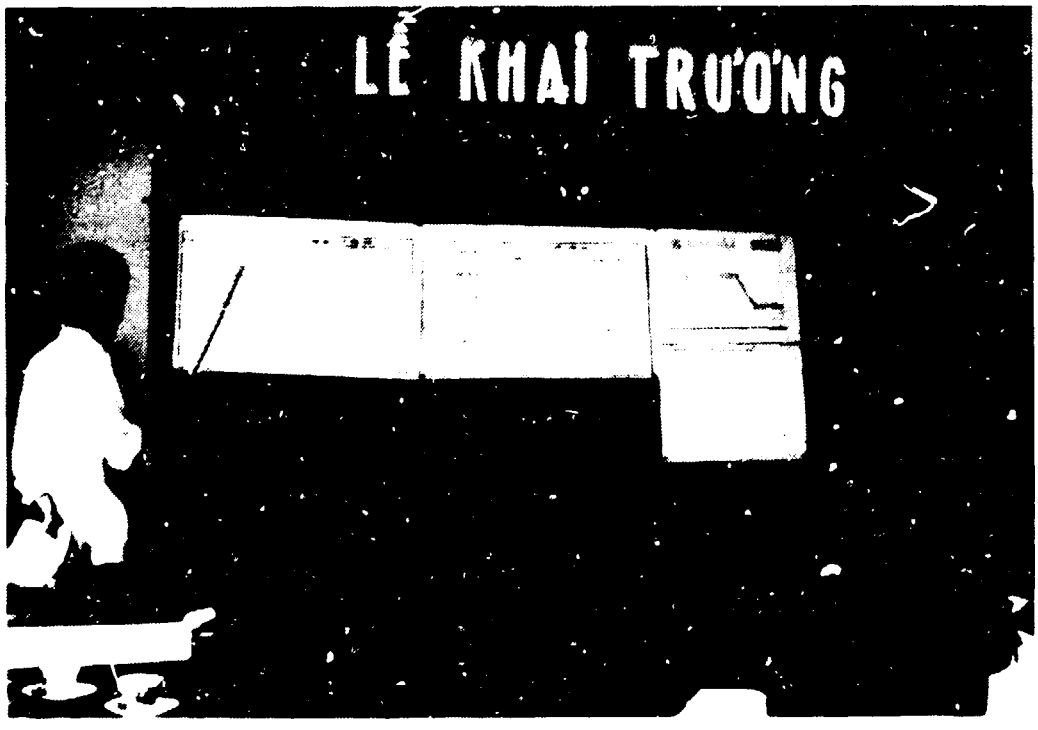
- A steel-picking process to remove rust from steel parts

- A nitration process of industrial oils AC 10 and DC 11 to be used as protective agents for storing stee. equipment
- A phosphate bath to provide temporary protection for small rotary motors during the production stage
- A mixture of casein, taken from soya oil, and ceme it to produce a more durable and climate-resistant cement
- A new impregnating varnish (class B insulation) with a phenolic and alkyd resin base
- A nitrogen barrier for impregnating transformers
- A varnish for use in the canning industry, using an alkyd-epoxy and phenol-epoxy composite resin base
- An enamel based on alkyd-epoxy resin for copper winding wire
- A techno-climatological atlas with 17 detailed maps of various areas of the country

The laboratories of ITTV have defined, translated and adapted 65 new standards for industrial application in tropical countries.

Relationships with Government, industry and academic institutions

One of the most important aims of the ITTV project was to establish close working relations between the Institute and industry, universities and the Government with a view to transmitting new knowledge into channels that would be able to apply it to further the country's development. There have



ITTV Inaugural Conference for Tropical Technology: Applications for Production

been over 40 contracts for various activities between ITTV and industries. The Institute held over 65 conferences and seminars, disseminating information about its work to over 1,000 people during the project period. In addition, 34 staff members from ITTV have received fellowships for study, usually of a two-month duration, in 11 countries.

Applicability to other countries

The work of ITTV and its accomplishments in the field of tropical technology have been significant and hold promise for the future, not only for Viet Nam but also for developing countries with similar problems.

ITTV is confident that it has developed the confidence and experience to continue its progress in solving the problems imposed on industrial development by climatic factors. It has offered, in principle, to share its findings with developing countries that face similar difficulties.

A complete account of the ITTV project (DP/VIE/76/010) is available from UNIDO.

For further information on UNIDO activities in the field of tropical technology contact:

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