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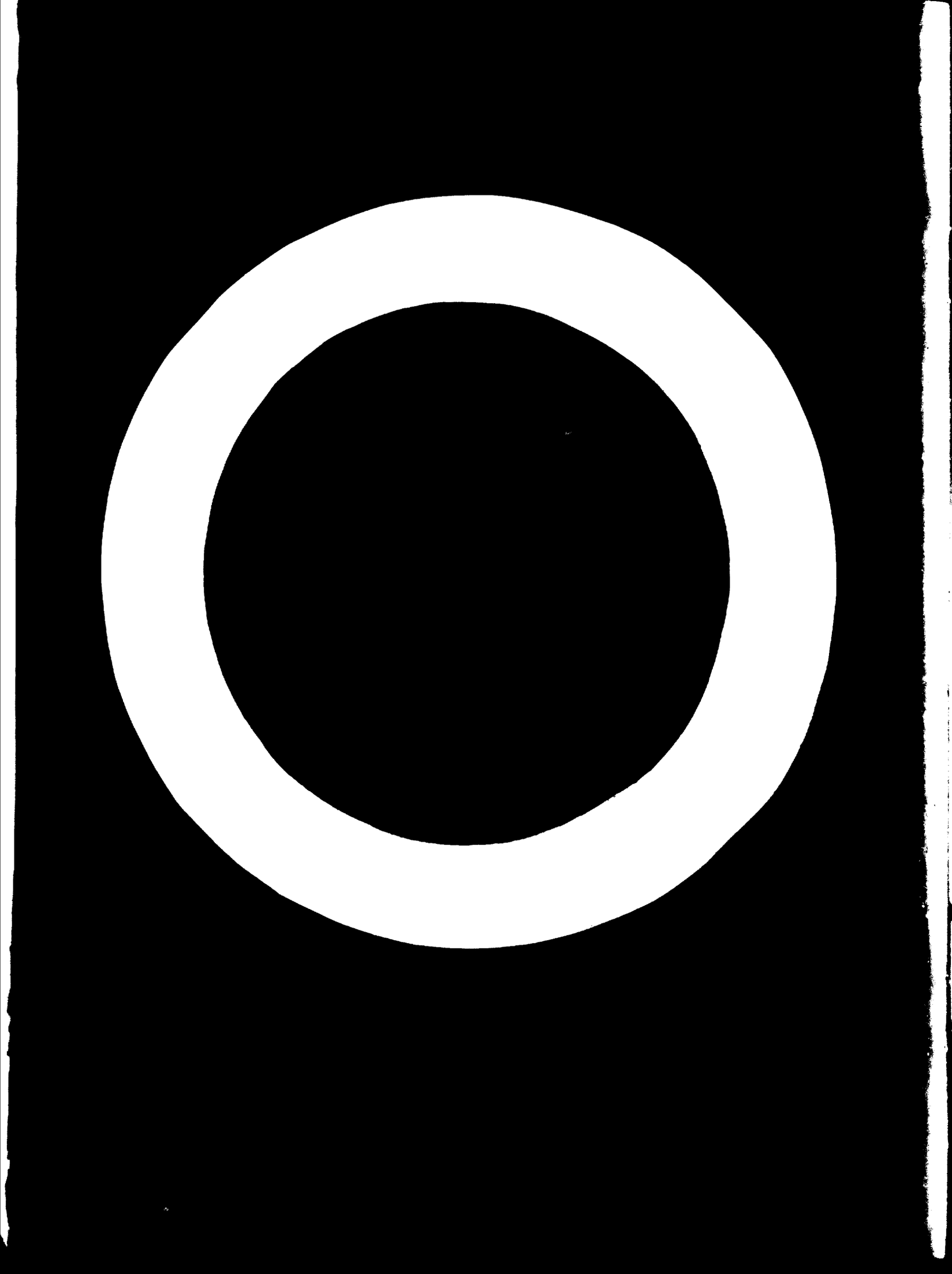

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Capital Is Not Enough

THIS SERIES of articles on the aims and work of development banks, sometimes known as agencies or corporations, in developing countries, continues with a profile of the Banco Industrial S. A.

Development Banking in Bolivia: The Banco Industrial S.A.

By René Ballivián Calderón

Bolivia, with an area of over 415,000 square miles and rich in mineral resources, cannot, however, claim to be one of the leading countries of Latin America economically. It is a land-locked country and most of its territory is a great plateau at an altitude of 5,000 to 12,000 feet above sea level where the greatest part of the country's mineral wealth is found. Lake Titicaca, the highest and one of the largest navigable lakes in the world, several magnificent rivers, temperate valleys and lush, tropical vegetation help to compensate for the country's lack of access to the sea.

The population comprising white, cholo (mixed) and Indians is an estimated 4.7 million, only 30 per cent of which is urban. La Paz, the capital, has a population of over 500,000 and there are two other cities with populations of more than 100,000. The annual *per capita* income is US$175, one of the lowest in Latin America.

The Author: *René Ballivián Calderón was educated at St. John's College, Washington, D. C. and became Undersecretary, Minister of National Economy of Bolivia in 1940. Two years later he was made Economic Counsellor to the Bolivian Embassy in Washington where he remained until 1945. From 1946 to 1948 he served as the Bolivian Governor to the World Bank and International Monetary Fund. Subsequently he became a lecturer in Economics and Business. From 1963 to his retirement in April 1969 Mr. Ballivián Calderón held the post of General Manager of the* Banco Industrial S. A. *and is now on its Board of Directors. He is also Vice President of the* Banco Hipotecario Nacional, *La Paz; President of the Bolivian Committee for Private Enterprise, and President of the National Commission for the Alliance for Progress.*

Development of banking

As Bolivia is a developing country, a comparatively large number of financial institutions have been established in recent years to promote its industrial and economic growth. The first and largest, the Bolivian Development Corporation (BDC), was founded in the early 1940s. Apart from the BDC, Bolivia has four banks: the Central Bank, the Commercial Branch of which is, to an extent, engaged in development; an Agricultural Bank; a Mining Bank; and an Industrial Bank, founded 1963. The Industrial Bank is the only private institution in the country with resources of over $8 million.

It is unusual to find so many development institutions in a country with such a small population. This made it possible to organize an Association of Development Banks and Institutions, the first in Latin America; a co-ordinating body that has proved its efficacy in a number of ways.

Each of these institutions has a clearly defined area of action such as mining, industry, agriculture or the financing of the infrastructure of the country. The Bolivian Development Corporation and the Industrial Bank of South America engage in more eclectic activities including mining and the financing of construction companies, small hotels and transport.

The principles under which these institutions operate are common to development banking generally. They entail a study of each project, from the point of view of both its inherent merits and its impact on the economy of the country as a whole; they provide rates of interest;

adequate repayment terms and liberal policies with regard to collaterals.

The Bolivian Development Corporation administers a $3 million fund from which the cost of feasibility studies and pre-investment expenditures may be defrayed by promoters of new industries. The technical divisions of development banks are also active in the preparation of this type of report. It has often been said that Bolivia is the country most frequently under examination, but it still remains at the bottom of the list of Latin American countries regarding economic development.

The Banco Industrial S. A.

The performance of the Banco Industrial S. A., a private development institution has, so far, proved much more successful. It is, therefore, worthwhile to focus attention on this Bank, set up mostly by institutions, local and foreign commercial banks, industries and a number of individuals. Its largest shareholder is ADELA Investment, incorporated in Luxembourg, with $125,000 in equity, which represents 12.5 per cent of the Bank's authorized capital of $1,000,000. $210,000 remains unsubscribed, but it must be borne in mind that this Bank is relatively new having opened its doors to business on 5 July 1963.

Since then, its growth has been both encouraging and solid. An assessment of its size in relation to the Bolivian economy is given in table 1 below:

Table 1

Year (December 31)	Total assets (US dollars)
1963	520,000
1964	1,260,000
1965	1,900,000
1966	2,800,000
1967	3,676,000
1968	4,560,000

Resources

The Bank has four main sources of capital: the two most important being the Agency for International Development (AID)/Washington, and United States Agency for International Development (US/AID), Bolivia, with a combined total of $4 million; Inter-American Development Bank (IDB) with $1 million; Banco Central de Bolivia (rediscount margin) with $1,150,000; and the Bank's own capital resources of $1 million. To these funds must be added $1 million that the Bank administers as trustee for US/AID, Bolivia (earmarked for soft loans to countries in the process of rehabilitation), and $200,000 in lines of credit of New York banks. This makes for Bolivia the not insignificant total of $8.35 million.

The financing of the Banco Industrial S. A. by US/AID, Washington, US/AID, Bolivia, and the IDB is in the form of long-term credits (between fifteen and twenty years) at rates of interest that vary from 4.5 per cent to 6 per cent *per annum*. The loan from US/AID, Washington, of $2.4 million and the IDB loan of $1 million are to be repaid in dollars. US/AID, Bolivia loans, totalling $1.6 million, are in Bolivian pesos (US$1.0 = Bol. Ps. 12.0) and are repayable in local currency. The Bank, however, inserts the so-called dollar clause in all its sub-contracts because of the problems that discrimination would entail.

The $2.4 million loan in dollars from US/AID, Washington, is being amortized after a five-year grace period. This will not be difficult in view of the liquidity the Bank enjoys at present. However, towards the middle of 1970, adequate refinancing will become imperative.

Sub-loaning of the Banco Industrial S. A.

Obviously, the Industrial Bank channels the greater part (82 per cent) of its loan and equity participation to industry. It participates, however, in other activities such as transport, building, communications and hotels to which smaller contributions have been made: these are included in the item "Various" in table 2. Excluded from the table are 60 soft (rehabilitation) loans totalling over $1 million.

As the Industrial Bank is a national bank, it has been particularly active in the urban areas of Bolivia, areas that gravitate naturally towards the Bank. Thus, the La Paz, Cochabamba and Santa Cruz regions absorbed 93 per cent, or $7,840,000, of the total amount of sub-loans; of this amount, 68 per cent, or $5,700,000, went to La Paz.

The headquarters of the Banco Industrial S.A. in La Paz

Table 2

Loans extended as of 31 December 1968

Industry	Number of loans	Total (US$)	Percentage
Food processing	129	2,036,514	24
Beverages	19	210,203	3
Textiles	41	1,745,586	21
Shoes and clothing	31	260,082	3
Sawmills	35	413,415	5
Furniture	14	67,117	1
Publishing	20	499,219	6
Tanneries	19	116,307	1
Building materials	26	274,730	3
Pharmaceutical	21	490,320	6
Metals and Rolling mills	46	740,558	9
Various	59	1,519,310	18
Total	460	8,373,361	100

Portfolio and finances

The portfolio of the Bank was liquid as of 31 December 1968. Of a total of nearly $4 million, only 8 per cent ($324,000) was in arrears. This is not a high proportion when it is considered that the Bank, being a development bank, must take risks and that of the total in arrears only an approximate 15 per cent is in jeopardy. In any case, adequate provisions have been made to cover losses.

The Balance Sheet of the Bank, as of 31 December 1968 (table 3), shows its sound financial position:

Table 3

	Assets (thousands of pesos)[1]		Liabilities (thousands of pesos)
Statutory reserve	700	Short term	1,328
Cash and in banks	4,815	Long term	11,495
Loans	44,243	Long term foreign currency	31,221
Investments	2,493	Current foreign currency	2
Fixed (building)	1,445	Capital	9,432
Current	2,177	Reserves	1,389
		Profit	1,006
Total	55,873		55,873

[1] US $ 1.0 = Bol. Pt. 12.0

The Bank has shown an annual profit of about 20 per cent on its equity since 1965. It should be borne in mind, however, that of the authorized capital of 12 million pesos, 3.6 million pesos were subscribed by US/AID, Bolivia, in the form of a 30 year non-interest bearing credit with a fifteen year grace period, construed by the Bolivian Superintendency of Banks, to be quasi-capital. However, beginning with its sixth year of operations, the Bank must set aside 10 per cent of its net profits until the reserve thus accumulated equals the amount of the quasi-capital. Another provision under this agreement is the appointment by US/AID, Bolivia of an observer with the power of veto.

Since 1966 the Banco Industrial S. A. has declared a yearly dividend of 12 per cent payable in cash or script.

Organization

The Bank is controlled by a Board of eight Directors appointed by the stockholders annually. Three directors represent class A shares held by the local banks, including local branches of foreign banks; three represent class B shares held by industrialists and individuals; and two represent class C shares held by foreign institutions such as ADELA. All shares, however, have the same rights. The Board elects from among its members a President and a Vice-President in addition to the General Manager of the Bank, its managers and assistant managers.

The main operations of the Bank are divided into the two departments of Operations and Loan Administration. The Legal, Accounting and Supervision of Loans are staff divisions under the Manager of the Bank.

The processing of loan applications is initiated in a meeting with the Loan Officer in the Operations Department. The Economic and Engineering divisions in this Department participate later in the feasibility study of the application. In the case of applications for over $50,000 a draft of the application is prepared for consideration by the Projects Committee. This Committee, apart from the Loan Officer who is present as an advocate of the project, includes the General Manager of the Bank, its Manager, its Operations Assistant manager and a representative of the Board of Directors. The final draft of the study is then agreed upon and, if its conclusions are favourable, submitted to the Board of Directors. The Board may approve loans of up to $100,000. Loans that exceed this sum must be approved by AID or the IDB, depending on the origin of the funds. This final approval, in the case of loans in excess of $100,000, is, however, perfunctory.

Credit policies

The credit policy of the Bank may be summarized as follows:

Purpose of loans. Loans are made for both fixed and working capital requirements, though whenever IDB funds are involved, fixed capital financing only can be undertaken. This is a limitation that, in undercapitalized countries such as the majority of those in Latin America, has caused considerable problems to development banking. Sub-loans with AID funds can, within limitations (usually in a 50/50 per cent proportion), be channelled towards both fixed and working capital requirements.

Interest rate. The interest rate amounts to 12 per cent *per annum* on outstanding balances. In the case of loans made with IDB funds there is a 1 per cent commission for undisbursed funds. The interest rate of 12 per cent net is, by Bolivian standards, reasonable, as the rate for commercial loans ranges from 18 to 21 per cent *per annum*. The Bank may also guarantee credits extended by third parties in which case it charges a commission that varies from 1 to 3 per cent on outstanding balances, depending on the amount involved.

Terms. The terms are: up to one year (short term); from one to five years (medium term); and from five to twelve years (long term). Short term loans are usually made to meet working capital requirements. Grace periods of up to one or one and a half years, in the case of new enterprises or of expansions of existing ones, are granted.

Guarantees. Guarantees may assume the form of mortgages on real estate, liens on equipment, promissory notes, insurance policies covering fulfilment of contracts and even personal guarantees. In the case of mortgages, 50 per cent of the assessed value of the property is taken as collateral and 40 per cent of that of equipment in the case of liens.

The Bank may also assist new or existing enterprises either with loans or by taking an equity position (which in no case may exceed 25 per cent of the capital of the company). However, the absence of a local security market renders the latter alternative less attractive as it may, at a given moment, jeopardize the Bank's liquidity, even though this type of financial backing stipulates that the promoters must redeem from the Bank the securities taken up by it. Also, in order to assure income on money for which the Bank is obliged to pay interest, cumulative preferred shares with a fixed rate of return are looked upon with favour.

The Industrial Bank at its inception endeavoured to organize a security market, but its efforts proved unsuccessful. The number of sound securities is too limited and those who hold them are not eager to sell them.

Summary

In general, the performance of the Banco Industrial S. A. has been of great significance in retrieving Bolivian industry from the doldrums into which the abolition of artificial exchange rates in 1957 had plunged it. Up to that year, when a Monetary Stabilization Law was put into effect, a variety of exchange rates and exchange controls had been in force and the spread between them was considerable: from the official rate of 190 Bolivian pesos to the dollar to 12,000 Bolivian pesos on the black market. As a number of industries had been subsidized with grossly overvalued official dollars the adoption of one rate of exchange drove many an industrialist to bankruptcy. In 1952, Bolivian industry was operating at 50 per cent of capacity. Since then its recuperation has been steadily rising from 111 per cent of the base year (100) of 1952 to 150 per cent in 1967. In absolute terms this means $46.3 million (in contrast values) or 7 per cent of a Gross National Product of $661 million in 1967.

With a steady political climate, the permanence of incentives and the continued growth of the local market, the Bank may look to the future with hope. It can also expect that if and when larger regional markets work together (the Andean and the River Plate Groups in both of which, because of its geographical location, Bolivia participates) bigger industries will be established with the assistance of the Banco Industrial S. A. At such time a new and more dynamic chapter will open in the history of Bolivian economic development.

Answers to Industrial Inquiries

The UNIDO Industrial Inquiry Service receives requests from developing countries for possible solutions to a wide variety of industrial problems. In order to give readers an idea of the range of the topics covered, each issue of the Industrial Research and Development News *publishes a selected list of questions recently received by the Service, in addition to an answer to a specific inquiry.*

Readers are invited to write to the Industrial Inquiry Service for further information on answers to any of the questions published below, quoting the reference number, or to submit inquiries on similar or other industrial problems.

Information is required on the establishment of a food-canning plant (industrial methods, relevant equipment etc.). The factory is to produce:

(*a*) Canned fruit juice (passion-fruit, pawpaw);

(*b*) Jam (quince, guava); and

(*c*) packed fresh vegetables (celery, carrots, cabbage, peppers).

The production should be up to standards which meet international quality requirements to enable the inquirer to export the finished products. The initial processing capacity of the plant is planned for five tons of raw material per day (493).

A manufacturer in Peru

Documentation on the following subjects is requested:

(*a*) The definition of brewer's barley and the varieties that are commonly used;

(*b*) A description of the processes of malting;

(*c*) Malting equipment;

(*d*) The coefficient of barley-malt transformation;

(*e*) Approximate total cost price of malt in accordance with the capacity of the malt house; cost of production factor, scale economy trend (495).
An information centre in Africa

A firm wishes to procure a sound formula for cadmium plating on the cases of radio sets and on loudspeakers for use by the assemblers of radio sets (496).
A radio manufacturer in Pakistan

Documentation is requested on the problems of water pollution and the treatment of liquid residues (502).
A ministry of a country in South America

Data is required on:
(*a*) Regional, urban and town-planning techniques;
(*b*) The co-ordination and integration of the means of transport; economic studies and an analysis of the operation of transport services; planning of urban transport (504).
A university in Colombia

Information is sought for the preparation of a preliminary study on the utilization of solar energy (505).
A North African study centre

Information is needed for setting up a small factory to produce wax candles with a planned annual output of 70 tons; the equipment necessary (type, cost and names of suppliers); the personnel required; expert studies already made, and data on minimum profit-earning capacity (508).
An industrial study centre in Africa

Information is requested on the procedure, substance and machinery to bind exfoliated vermiculite into sheet (board) form (592)
An inquirer from Nairobi, Kenya

Assistance in the formulation of implementation procedures for both large and small projects in a developing country. It is intended to formulate a guide for project implementation covering market and resource surveys, feasibility studies, project elaboration, specification, contracting, cost and quality control, selection and training of personnel, problems of product marketing (595)
An agency in Ethiopia

Data is requested on:

The potential for manufacturing and marketing razor blades of superior quality in India and the cost of machinery for such a project (596)
An inquirer from Kenya

Names of manufacturers and suppliers of automatic flat and jackograph machines are requested with their charges and catalogues (598)
A company in India

Information is requested on:
the manufacture of Nylon 6 from caprolactam in a plant of an estimated capacity of 2,640,000 pounds of Nylon 6 per year, working 350 days per year, regarding the following items:
1. List of equipment and its approximate cost
2. Electric power and steam requirements
3. Labour requirements
4. Building area
5. Terms of payment and time of delivery
6. Technical assistance cost (600)
An industrial institute in El Salvador

Technical advice about the establishment of:
(*a*) a factory for the production of butter, cheese, powdered milk and, at a later stage, condensed milk (601)
(*b*) a factory for the production of ham, sausages and similar foodstuffs (602)
An inquirer in Angola

Relevant details are asked for with regard to the practical assistance provided by training of personnel abroad, types of training that are available, technical qualifications of personnel nominated for such training and details regarding maintenance and other expenditure abroad (603)
A company in India

Information on whether hard coke is being manufactured from non-coking coal on a commercial scale and if so, the names and addresses of the organizations that are utilizing this process (606)
A company in India

Complete machinery to granulate soap blocks into fine powder, including motor with ¼ horse power on 230 A/C current (607)
A company in Ceylon

Making studies to develop the production of leather shoes, to raise the productivity rate of industries and to promote export, would like to have the following information:
1. What is the sale programme in Italy, Czechoslovakia, Spain and France which enables them to export substantial quantities of leather shoes to foreign countries?
2. Is it possible to export leather shoes when there are only numberless small industries with limited production? If so, which method would be used to reach the objective?
3. What are the rates of production of large, medium or small tanned leather shoe industries in the above-mentioned countries?
4. What is the shoe industrialization system utilized in these countries?
5. What are the stages of leather shoe manufacturing which should be mechanized in a country where labour is plentiful and relatively cheap?

What are the most up-to-date types of machinery in general use? Would you please send us the names of the respective manufacturers and, if possible, the literature and booklets on the matter.

6. What types of leather shoes are most frequently imported by the big importers, and what are the prices for import and consumers? (608)

A ministry in Brazil

Machinery for rubberizing woven hoses made for fire extinguishers or for water irrigation (610)

An inquirer from Iraq

Information on solar electrical water-coolers and solar cookers is required (729)

A firm in Baghdad, Iraq

Sodium or potassium of dichromates from chromite ores

A Burmese institute requested information concerning the establishment of a plant for the manufacture of sodium or potassium of dichromates from indigenous chromite ores. The dichromates are intended for use in chrome tanning and the requirement is for 100 tons per year.

UNIDO sent the following reply:

The manufacture of potassium dichromates requires considerable processing, first the "roasting" of chromite ore with specific chemicals to produce the basic intermediate potassium chromate, and second, the treatment of potassium chromate with a number of chemicals and the utilization of specific techniques to produce the dichromates which are the chemicals used in tanning.

The economics of manufacture will depend upon a number of factors, none of which we in UNIDO have information on. This would include the quality and quantity of ore in Burma, the availability of chemicals and so forth and the domestic market conditions. In general, a 100 tons per year plant for potassium dichromate represents a product value of only US$40,000 (based on the price of this material at US$400 per ton). The capital cost alone of such a plant would be high, and such a venture would be considered a poor risk. If the quantity required were several thousand tons per year, then perhaps some economic advantage could be considered.

Should Burma wish to pursue a feasibility study of an indigenous production of chrome tanning chemicals, we would suggest that you consider contacting the UNDP Resident Representative (Mr. M. A. El Maraghi, P. O. Box 650, Rangoon) regarding possible UNIDO assistance in supplying an expert to assess the possibility of producing chrome tanning chemicals in your country, and to evaluate the economies of scale of production based on the potential demand for these products.

Activated charcoal for bleaching purposes

Information was requested from a member of the United Nations Development Programme (UNDP) in Ceylon on the feasibility of producing activated charcoal for bleaching purposes from coconut shell charcoal, and also on the processing techniques, as the island possesses no known sources of fullers' earth, diatom earth, bentonites or similar inorganic materials that could be used as bleaching agents or filter aids.

The following is an extract from a letter received from the Tropical Products Institute, 56/62 Gray's Inn Road, London, W. C. 1., United Kingdom:

Coconut shell charcoal is produced by heating the shells to drive off the volatile constituents, in an atmosphere free from oxygen. This can be done by the slow combustion of shells in large heaps, carried out in the open, when the yield of primary charcoal is small. Another possible method is by placing the shells in specially designed retorts when the yield will be increased and the quality of the charcoal can be easily controlled. The physical properties of the charcoal will vary considerably if the operating conditions used during the carbonization process are altered.

Charcoal is activated in retorts by the circulation of air, oxides of carbon, superheated steam or mixtures of steam and air, the effect being to remove residual hydrocarbons on the internal surfaces of the charcoal to increase its power of absorption.

Coconut shell yields a fairly dense charcoal and while this will make an excellent gas absorbent, it may not prove as effective as a decolourizing agent.

Information on the manufacturers of suitable equipment for the production of activated charcoal can be obtained from the National Association of Charcoal Manufacturers, c/o Shirley, Aldred & Co. Ltd., Worksop, Nottinghamshire, United Kingdom.

Research Projects

Combustion Research

Pulsating combustion is one of the most interesting phenomena so far discovered in the field of combustion science. The idea of pulsating combustion was brought to light by accidental observation of the oscillatory combustion that resulted when a burning matchstick was thrown into a methylated spirit reservoir. The phenomenon afterwards found some application notably in some early gas turbine burners and in the notorious German "buzz bomb" of the Second World War. Pulsating combustion, unlike the combustion oscillations of the system, or acoustic type, that are undesirable, is produced deliberately in the system by means of a suitable valve arrangement. The mechanical energy contained in the pressure waves of combustion oscillations is used to induce the flow of air and fuel needed for combustion and to eject the products of a combustion system through an exhaust pipe. The pulse combustion system thus virtually becomes equivalent to a forced draught burner working without any external energy source for the intake of combustible fluids and the ejection of combustion products.

The Central Mechanical Engineering Research Institute (CMERI) at Durgapur has conducted some recent investigations on this subject. The theoretical analysis of the phenomenon has given a further stimulation to the design and operation of pulse combustion systems. A mathematical model based on thermal theory has been proposed for the investigation of the system leading to the prediction of design criteria such as frequency, amplitude and temperature-time variation at a point in the combustor. Dr. J. C. Leyer of the School of Combustion at the University of Poitiers, France, has remarked that the theoretical analysis of pulsating combustion seems to be an entirely new and very successful approach, and it offers further explanations on operating conditions of pulsating combustion devices.

Based on this analysis, a pulse engine has been developed by CMERI using only Indian materials. This engine, which is working satisfactorily in the Power Laboratory of the Institute, may be used as a heat generator or for a sprayer and also, with some modifications, for thrust production. Further, with the considerable reawakening of interest in steam automobiles in the United States to avoid atmospheric pollution, the pulse engine may act as a burner for the generation of steam in a motorcar. Mr. H. D. Garner of the United States, who is researching the idea of steam automobiles, thinks that the pulse combustion system investigated at CMERI "might be ideally suited for heating the boiler of a steampowered automobile. Since it not only induces its own draft without the need of electrical power, but evidently is able to burn more than ten times the amount of fuel per cubic feet of combustion space as compared with the current steam car combustion system."

The pulse engine developed at CMERI

Source: The Central Mechanical Engineering Research Institute, Durgapur, India.

Creep Testing Equipment Developed at CMERI

Creep is the plastic deformation with the lapse of time that materials suffer when they are subjected to stress, especially at high temperatures; if the stress is maintained for a long period of time, material failure can result. Creep properties of material depend upon the amount of stress applied, the temperature involved and the metallurgical composition of the material.

With the availability in India of high temperature alloys, it is imperative to provide facilities for obtaining creep design data, in the absence of which the materials will not be accepted on the domestic or foreign markets.

Creep testing requires considerable time. A testing period may extend over years, and it is common for tests to last 100,000 hours. Testing involves the installation of a number of machines for different types of materials. It is estimated that providing even preliminary creep design data on Indian materials requires a minimum of 250 creep testing units for carrying out tests over a period of three years. To provide reliable design data and subsequently to draw up quality control procedures, the scatter that is invariably present in creep test results must be recorded. This information is essential to prevent material failure in service which could in some cases result in loss of life. Creep design data necessitate testing in at least several testing laboratories to determine and record average values.

Assuming that three such laboratories are engaged in this task, a total number of 750 such units would be required to provide reliable basic design data for the engineer.

Creep testing is a costly enterprise both in terms of specialized scientific manpower and capital outlay. One unit costs approximately Rs. 50,000 (US$1.00 = 10 Rs.) and the total cost of 750 such units would be in the region of approximately Rs. 40 million. In the absence of domestic production of this equipment and reliable data on the Indian material, the provision of such equipment is essential even at a cost of valuable foreign exchange.

With a view to developing this quality control equipment and thereby saving valuable foreign exchange, the Central Mechanical Engineering Research Institute (CMERI) embarked on a development programme.

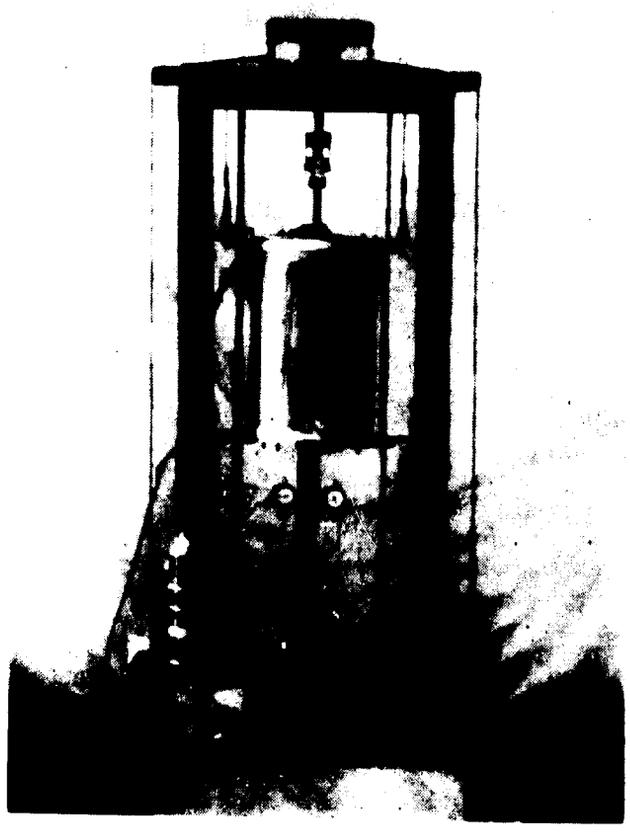
Basic design

The equipment designed must be able to give correct load application and maintain exact temperatures of tests. In obtaining creep design data for commercial applications the strains encountered are often only a few interatomic distances per hour. These dimensional changes would also be recorded should the stress application pass beyond a certain point or the temperature fluctuations reach the order of 10^{-4} deg. C. The recording of these dimensional changes would have to be carried out by sensitive strain measuring extensometers capable of reading strain up to 10^{-8} in/in. Even with the present sophisticated system it is not possible to control temperature fluctuations to less than ± 0.5° C and extensometers with that sensitivity have not yet been designed. A compromise has to be sought therefore in the practical redesign of the equipment. The necessity for such design has been recommended by the International Organisation for Standardization. The equipment manufactured at the Institute is designed after the incorporation of the standards in temperature as well as in load tolerances.

The machine

The machine is made of channel sections and is a single lever type. Load is transmitted through a lever by means of a set of knife edges placed at right angles to each other in the same plane onto the lower adapter into which one end of the specimen is screwed. This minimizes errors resulting from the non-axiality of loading. Between the knife edges and the specimen-holding adapter, a flexible coupling is introduced to facilitate assembly. The top end of the specimen is screwed into another adapter carried in a ball and socket joint which, in its turn, is carried on a threaded spindle resting on a spherical seating on the top plate of the frame. The accuracy of the loading as determined by an elastic proving ring is accurate within a tolerance of ± 0.5 per cent at each load from 100 to

The CMERI prototype creep testing machine with temperature controller



3,000 kg. Measurement of strain within the elastic limit at diametrically opposite locations of a specimen has given an average ratio of 1 : 1.03.

For the measurement of strain an extensometer made from a heat resistant material is attached to the collars provided in the specimen. The distance between the collars defines the gauge length. The extensometer consists of two parallel limbs that project beyond the furnace used for heating the specimen. Between each pair of limbs a dial gauge calibrated in units of 0.0001 inch is provided. Two extensometers are normally used in diametrically opposite locations.

The furnace

For maintaining a uniform temperature along the length of the specimen gauge, a multizone tubular electric furnace was designed at the Institute and constructed in eighteen months with indigenous materials. The furnace has uneven windings in its various zones and the power input in each zone can be varied at will, thereby giving a temperature variation not exceeding ± 0.5° C at any temperature from 20° C to 1,300° C. Except for heating coils, all the materials are of indigenous origin.

A proportional temperature controller to control temperature to ± 0.5° C has been designed by CMERI. This controller is now undergoing various performance tests.

Cost of unit

The cost of the CMERI developed creep testing unit consisting of machine and temperature-controlled furnace is estimated at Rs. 17,000. This includes the cost of material, labour and overhead charges. Cost of similar items imported into the country and having the same accuracy is approximately three times this price.

Source: The Central Mechanical Engineering Research Institute, Durgapur, India.

For Your Information . . .

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Following a series of regional symposia in 1965 and 1966, the International Symposium on Industrial Development was convened by UNIDO in Athens in 1967. It was the first major international meeting devoted exclusively to the problems of industrialization of the developing countries and paid special attention to the scope for international action and for co-operative efforts among the developing countries themselves in order to solve these problems.

The series entitled "UNIDO Monographs on Industrial Development—Industrialization of Developing countries: Problems and Prospects" comprises 21 monographs devoted to the main issues of the Symposium agenda. Some monographs deal with specific industrial sectors, some with general industrial policy and others with aspects of international economic co-operation. All of them are based on the discussions in Athens and the documentation prepared for the meeting. Since economic, technological and institutional aspects of each subject are described with particular reference to the needs of developing countries, it is hoped that the monographs will make a distinctive contribution in their respective areas and, in particular, will prove useful to Governments in connexion with the technical assistance activities of UNIDO and other United Nations bodies concerned with industrial development.

Notices of the first three of these monographs are published below.

Fertilizer Industry.

No. 6, 76 pages (Sales No.: E. 69. II. B. 39, Vol. 6; $0.50.)

The fertilizer industry occupies a unique position in the developing countries. Its establishment adds a major element to the structure of manufacturing industries and is an important contribution towards the development of agriculture, which is still the main sector of economic activity in most developing countries. The application of fertilizer is one of the most effective means of increasing the yield of foodstuffs from a given land area. It is fitting therefore that the monograph dealing with the fertilizer industry is one of the first to appear in this series.

The first chapter reviews trends in the production and consumption of fertilizers, which increase every decade by 100 per cent or more. Though the growth rate is faster in developing than in developed countries, the level *per capita* is generally very low in the former group. Targets at which developing countries should aim are suggested for the *per capita* consumption. Many developing countries could not afford the foreign exchange to import on the suggested scale. The second chapter analyses the factors that can inhibit the development of a domestic fertilizer industry.

Following the chapters that analyse the economic and technical aspects of manufacturing the three basic groups of fertilizers—those based on nitrogen, phosphate and potash—the monograph goes on to examine the practical economic issues to be faced in creating a domestic fertilizer

industry. For example, to use low-grade or high cost indigenous raw materials rather than to import concentrated intermediate materials can be an unprofitable policy. Regional co-operation offers many advantages and is suggested to achieve larger markets.

A further chapter reviews the problem of investment finance for fertilizer projects and the possible sources of funds.

The monograph concludes by reporting the highlights of the discussion and the recommendations that were approved at the International Symposium on Industrial Development, and examines the action taken by the United Nations and through bilateral assistance programmes to promote the fertilizer industry in developing countries.

Promotion of Export-Oriented Industries,
No. 19, 46 pages (Sales No.: E. 69. II. B. 39, Vol. 19; $0.50).

A central point of discussion at the Athens Symposium was the decline in the share of developing countries in world exports, a decline both in total exports and, of particular importance to the Symposium, in exports of manufactured products from developing countries. In these countries, the expansion of manufactured exports failed to keep pace with the increase in the output of manufactured products.

With this in mind, the monograph examines industrial policies introduced in a number of developing countries in relation to export development, and specifically the emergence of import substitution policies in developing countries is traced. While drawing attention to the benefits of such policies in terms of accelerated industrialization and increased employment, the monograph points to the limitations with regard to the eventual establishment of viable export industries. Stress is placed on the need to establish export-oriented industries as an integral element in a well balanced long-term development programme.

The monograph goes on to consider the various policy measures open to governments endeavouring to increase the level of manufactured exports. This includes a general survey of the types of financial and fiscal incentives, export credit arrangements and promotional techniques that might be introduced.

An outline of the operations of UNIDO and those of other international agencies and of the regional commissions to promote exports of manufactured products from developing countries is given in the monograph. Examples of the projects being carried out through the United Nations Export Promotion Programme indicate the scope of the assistance available to developing countries.

Being based on the discussion at the Symposium, the monograph should prove of considerable interest to those directly concerned with policy decisions in developing countries. It reflects the growing emphasis being placed on the establishment of viable export-oriented industries and draws attention to the various measures to achieve this objective. At the same time, it serves as a useful guide to the type and source of assistance available from the United Nations in the sphere of export development.

Small-scale Industry,
No. 11, 46 pages (Sales No.: E. 69. II. B. 39, Vol. 11; $0.50.)

The issues presented to the International Symposium in the field of small-scale industry related to five main types of measures, most of which should be included in the programmes of developing countries for the development of the small-scale industry sector: (*a*) the need for industrial extension centres providing assistance in technique, management and marketing, and the international assistance required for their establishment and operation; (*b*) the need for financing small industrial enterprises on liberal conditions, mainly in the form of supervised credit in which technical and managerial assistance are closely linked to financial help; (*c*) the need for industrial estates offering standard factory buildings and common service facilities to small entrepreneurs, and the international co-operation required to assist such projects technically and financially; (*d*) the measures needed to facilitate co-operative action among small-scale industries and to promote subcontracting relationships between them and large industries; and (*e*) the scope for the establishment of regional and subregional centres for small industry development and the international action needed for that purpose.

The monograph on small-scale industry deals with these and other problems within the broad framework of policies and programmes for the development of these industries.

The first chapter discusses the special problems of small enterprises and the need for government intervention to promote and assist them.

The second chapter analyses the objectives of governments in promoting small-scale industry. These include: the stimulation of indigenous entrepreneurship; the channelling of skills of traditional craftsmen into new lines suited to a modern economy; the provision of increasing opportunities for employment with many small industries lending themselves to the use of labour-intensive techniques; the geographical decentralization of industry; and the diversification of the industrial structure.

In the third chapter, the monograph discusses the contents of assistance programmes, and lays stress on such services and facilities as: industrial advisory services, including training schemes for entrepreneurs and managers; credit on reasonable terms; and factory accommodation with supporting services and utilities in industrial estates.

The fourth chapter gives an account of the issues presented to the International Symposium, the discussions held and the recommendations approved.

The last chapter discusses United Nations action for the development of small-scale industry and outlines possible future developments in UNIDO's activities in this area.

The monograph was prepared by Mr. P. C. Alexander, Joint Secretary, Ministry of Foreign Trade and Supply, Government of India, as consultant to UNIDO, in co-operation with the secretariat.

For reference . . .

Below is a short review of a recent book which serves as a reference book in the UNIDO Industrial Documentation Unit.

Economic Interdependence in Southeast Asia, edited by Theodore Morgan and Nyle Spoelstra, University of Wisconsin Press, 424 pages, US$12.50.

The recent report of the Commission on International Development, under the chairmanship of Mr. L. B. Pearson, added a further voice to those in favour of a greater degree of regional co-operation among developing countries. The Commission recommended that "bilateral donors and international agencies provide financial assistance to institutions such as development banks and clearing and payments unions which are designed to promote trade among developing countries on a regional scale". It also urged those who provide aid to pay special attention to projects which have the effect of strengthening old or forging new economic links among groups of developing countries.

These proposals lend additional interest to the publication of *Economic Interdependence in Southeast Asia* in which the problems and prospects for regional co-operation in that area are examined. The book is made up of a series of papers prepared by economists of the region. The papers, and comments on them, were presented at a conference in Bangkok in January 1967, held under the auspices of the University of Wisconsin with the support of the United States Agency for International Development.

While virtually all contributors recognize the benefits resulting from an acceleration of regional co-operation and integration, considerable stress is placed on the difficulties in achieving these aims in Southeast Asia. In addition to the problems normally associated with regional co-operation, such as concepts of national economic independence and the location of regional industrial projects, this area also suffers, in this regard, from a variety of cultural and social groupings, language barriers, political differences and strong trading ties with former metropolitan powers.

In part II of the book, which outlines industrial and commercial policies followed by the various countries, it is clearly demonstrated that considerable trading differences exist within the region. The strong export orientation in Hong Kong and China (Taiwan), for example, contrasts sharply with the past tendency in India and the Philippines to concentrate more on the domestic market. These differences in themselves present obstacles to achieving an agreement on regional trade liberalization and specialization projects.

It is not surprising with this background that Southeast Asian intra-regional trade is a relatively small percentage of total Southeast Asian trade and this percentage has been falling in the post-war period. Attempts have been made to reverse this trend at a sub-regional level; The Regional Co-operation for Development, the Association of Southeast Asia and the Mekong River Project have each stimulated a greater awareness of the possibilities resulting from co-operative groupings, while at a wider level, the newly established Asian Development Bank holds considerable potential for promoting regional projects.

Looking to the future, a number of possibilities are raised. They range from the formation of a Southeast Asian Common Market to the harmonization of development plans for countries within the region. Opinions are divided as to the merits of the arrangements suggested and the extent to which such programmes could be introduced at this time. The editors and several of the contributors sound a note of caution against the current formulation of over-ambitious co-operation ventures which would encroach unduly on national planning.

All in all, *Economic Interdependence in Southeast Asia* gives a realistic assessment of the possibilities of regional co-operation in the area and provides a valuable insight into the economic planning and export achievements of countries in this region. It serves as a starting point for those directly concerned with the promotion of regional co-operation, while clearly stating the benefits associated with this form of co-operation, and emphasizes the numerous political, economic and social hurdles which have to be overcome before a viable and lasting co-operation agreement can be established. **R. N.**

A limited number of copies of the following publications may be obtained free on request from: Industrial Documentation Unit, UNIDO, Vienna.

UNIDO's Industrial Investment Promotion Programme,
18 pages (ID/31)

This booklet outlines the assistance the Industrial Investment Promotion Programme provides in the promotion of the flow of external resources in specific industrial projects; the improvement of existing and/or establishment of new investment promotion machinery; the training of nationals of developing countries in techniques of investment promotion; and securing the services of expert advisers.

Utilization of Excess Capacity for Export,
42 pages (ID/38)

This publication is the report of the Expert Group Meeting on Excess Capacity which met in Rio de Janeiro in March 1969.

The main points of the discussion are summarized in chapters 1 - 5 and concern the following: background and causes of excess capacity; assessment of the present situation with regard to capacity utilization in developing countries; problems of definition and measurement; capacity utilization and industrial policy in general; possibilities of using idle capacity for the production of manufactured goods for export and measures required to this end; and conclusions and recommendations.

The sixth chapter contains suggestions and recommendations. These are directed to government policy-making authorities, industries (at the enterprise level) and UNIDO.

Calendar of Meetings

Conference on Scanning Electron Microscopy in Materials Science

Newcastle-upon-Tyne, England, 7—9 July. The Institute of Physics and The Physical Society, 47, Belgrave Square, London, S. W. 1., United Kingdom.

Industrial Application of Computers, "Compcontrol 70"

Miskolc, Hungary, 7—11 July. Society of Mechanical Engineers, Gépipari Tudományos Egyesület, Szabadság tér 17, Budapest V, Hungary.

1970 International Powder Metallurgy Conference

New York, 12—16 July. Metal Powder Industries Federation, 201 East 42nd Street, New York, N. Y. 10017, United States of America.

2nd Symposium on Creep in Structures, International Union of Theoretical and Applied Mechanics

Goteborg, Sweden, 16—20 August. Professor F. K. G. Odqvist, The Royal Institute of Technology, Torstensonsvägen 71D, 18264 Djursholm, Sweden.

International Wool Textile Research Conference

Berkeley, California, 18—27 August. Doctor Harold P. Lundgren, General Chairman, c/o Wool and Mohair Laboratory, U. S. Dept. of Agriculture, 800 Buchanan Street, Albany, California 94710, United States of America.

Chemical Engineering Conference

Melbourne and Sydney, Australia, 19—21 August (Melbourne), 24—26 August (Sydney). The Secretary, Australian Academy of Science, Canberra City, ACT 2601, Australia.

2nd International Conference on the Strength of Metals and Alloys

Pacific Grove, California, 30 August—4 September. Dr. J. A. Fellows, Director of Technical Programming, American Society for Metals, Metals Park, Ohio 44073, United States of America.

Iron and Steel Annual Convention and Exposition

Cleveland, Ohio, 14—17 September. Mr. W. C. Friesel, Managing Director, 1010 Empire Building, Pittsburgh, Pa. 15222, United States of America.

Symposium on Design of Concrete Structures for Creep, Shrinkage and Temperature Changes (concrete, reinforced and prestressed concrete structures)

Madrid, 17—18 September. International Association for Bridge and Structural Engineering, c/o Ecole Polytechnique Fédérale (Swiss Federal Institute of Technology), CH-8006 Zurich, Switzerland.

43rd Annual Meeting of Water Pollution Control Federation

Boston, Mass., 4—9 October. Mr. R. A. Canham, Water Pollution Control Federation, 3900 Wisconsin Avenue, NW, Washington, D. C., United States of America.

Food and Dairy Processing Expo '70

Houston, Texas, 1—5 November. Dairy & Food Industries Supply Association, Inc., 1145 19th Street, Northwest, Washington, D. C. 20036, United States of America.

American Concrete Institute Fall Convention

St. Louis, Missouri, 2—6 November. Mr. W. A. Maples, Executive Director, American Concrete Institute, Box 4754, Detroit, Michigan 48219, United States of America.

Canadian Symposium on Communications

Montreal, Canada, 12—13 November. The Institute of Electrical and Electronics Engineers, Inc., Technical Activities Board, 345 East 47th Street, New York, N. Y. 10017, United States of America.

7th Inter-American Congress of the Construction Industry

Buenos Aires, Argentina, 15—21 November. Dr. A. O. Rodriguez, Secretary-General, Inter-American Federation of the Construction Industry, Agustinas 972, 516, Santiago, Chile.

2nd International Clean Air Congress

Washington, D. C., 6—11 December. Professor A. C. Stern, Department of Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, N. C. 27514, United States of America.

International Symposium on Circuit Theory

Atlanta, Georgia, 14—16 December. Ivan Frisch, Network Analysis Corp., Beechwood, Old Tappan Road, Glen Cove, N. Y. 11542, United States of America.

In 1970 the Industrial Research and Development News *will be published in three language editions, English, French and Spanish. For technical reasons, it is anticipated that there will be a time gap between the appearance of the English numbers and those of the other two languages in the first year of trilingual publication. The annual subscription rate for each edition is US$4.50. Readers in Africa and Europe who wish to subscribe should write to:*

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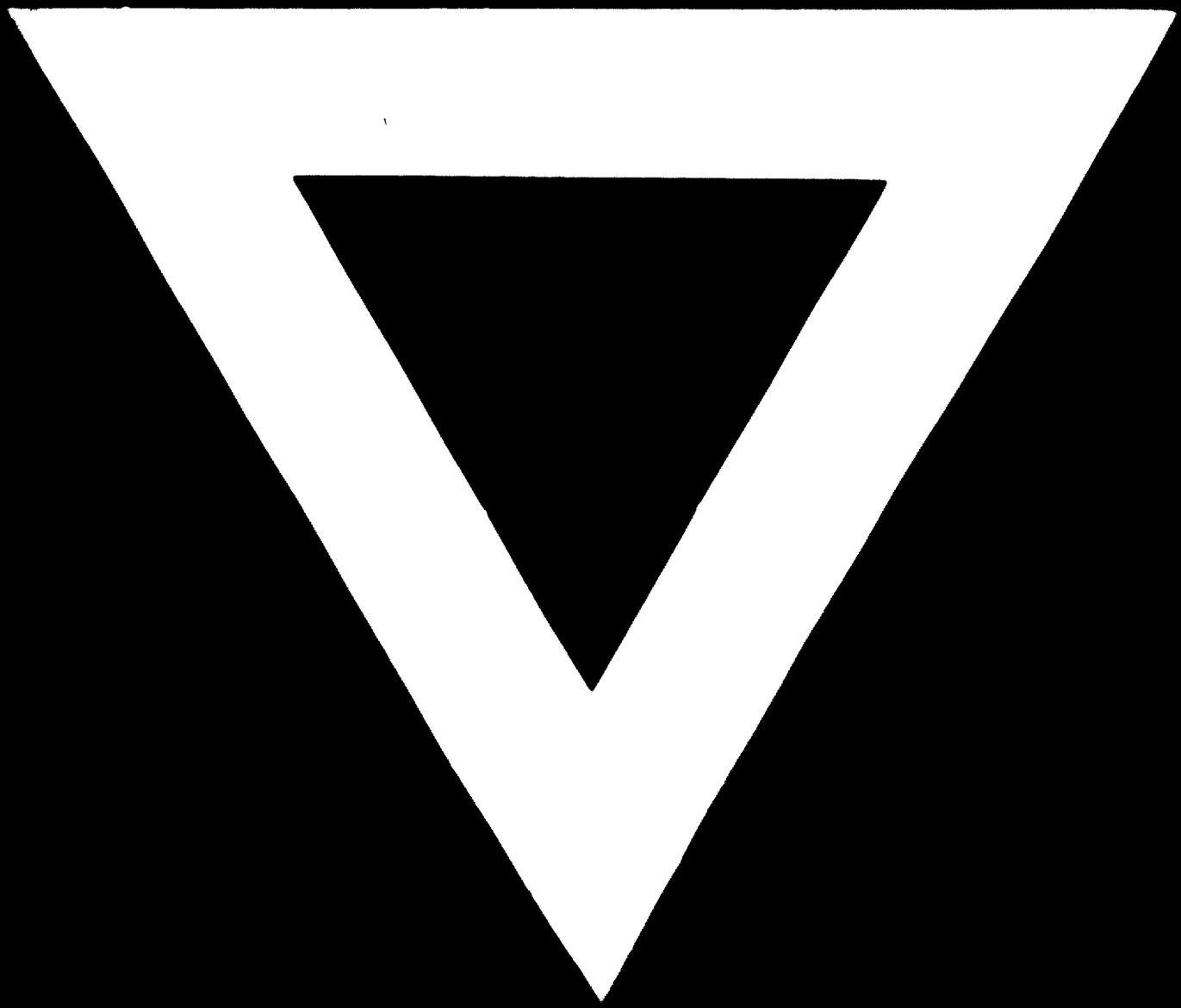

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