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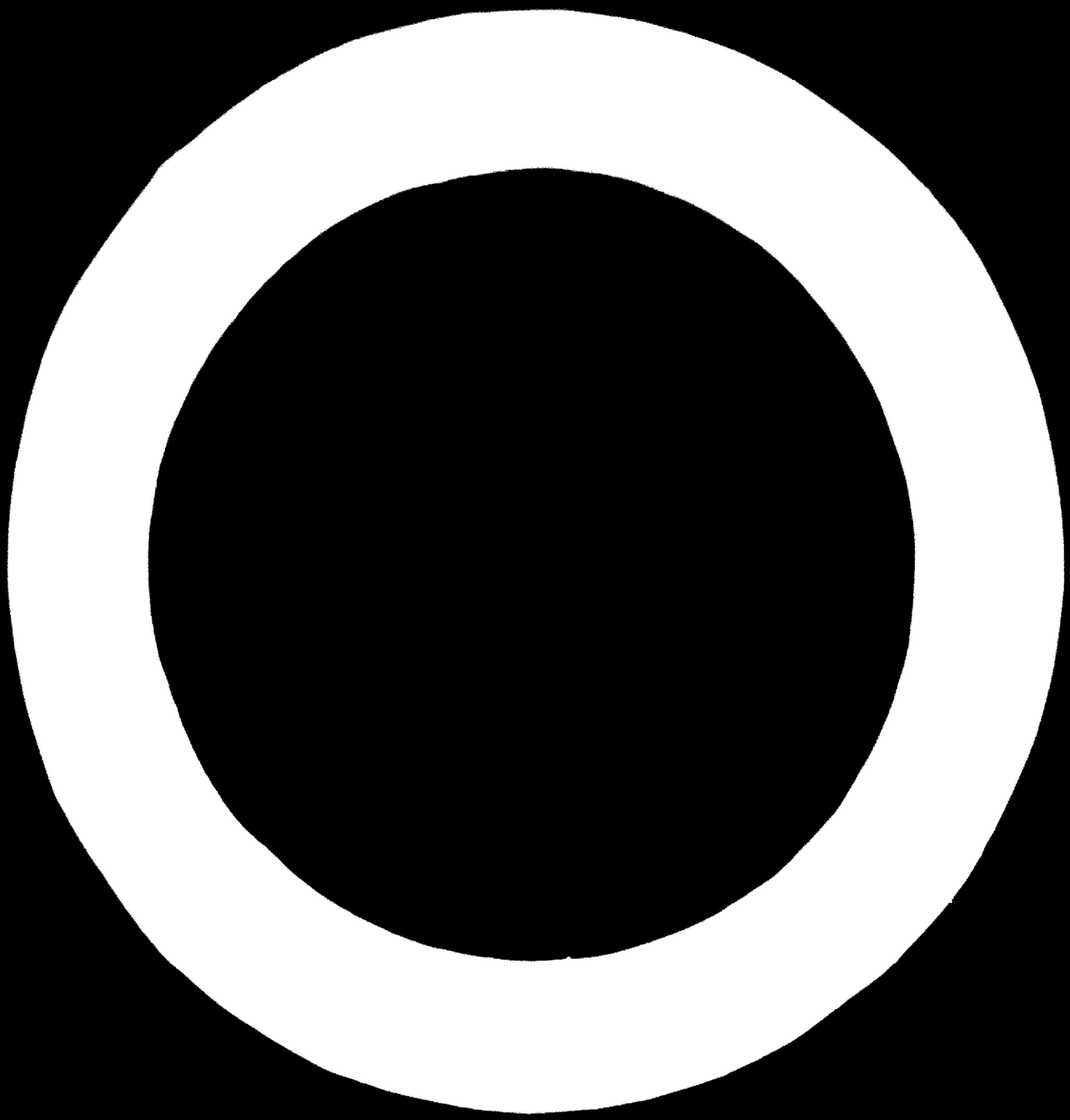


[illegible]

[illegible] a fairly wide range [illegible]

These projections are made in two [illegible] ways: the first [illegible] extrapolation of the growth trend in apparent consumption of a product noted in the past to the use of demand [illegible] and estimated on the basis of latest national data.

In drawing up the Ten-Year Plan, at the close of the [illegible] Government [illegible], the Institute of Economic and Applied Research of the Ministry of Planning remade these various demand projections in accordance with a standard methodology.

This methodology consists basically in [illegible] cross-section - of relating apparent per capita consumption of the product (or stock of products per capita in the case of durables) in each country to the respective per capita income. Independent variables, other than per capita income, that might also explain the variation in demand between countries were also studied.

Studies were made to determine whether the per capita consumption/per capita income function varied with time, that is to say, whether it depended on the date for which the data had been collected.

When the function had been determined by relating per capita consumption to per capita income, and also the time - taking account of any other relevant independent variables (the function being representative of the international standard), the Institute verified the discrepancy between the consumption indicated by the function and that observed in Brazil.

[illegible]

[illegible] and [illegible] industries, iron and steel, non-ferrous metals, the chemical industry, paper and pulp, textile industries, wood, tobacco, [illegible], cement and glass, leather and skins, and non-metallic minerals.

In the case of each of these industries demand projections were made for all major products.

The Strategic Development Programme recently drawn up, and published in June 1968 by the Ministry of Planning,[2] contains demand projections for the years 1968, 1969 and 1970 in respect of the following products: cement, tiles, engineering machinery, electrical machinery, industrial equipment, rolling stock, naval constructions, highway equipment, buses and lorries, tractors and tools, automobile parts, motor vehicles, iron and steel products, aluminium, copper, lead, tin, zinc, nickel, iron alloys and 16 chemical products.

In addition to these government publications on demand projections, there are various magazine articles dealing with demand projections for various products. Nevertheless, specialists at the Ministry of Planning have endeavoured to review these studies and include their findings in the works mentioned above.

After the Government's Strategical Plan had been drawn up, a market survey for some 100 chemical products was published in August 1968.[3]

1/ Ministry of Planning and Economic Co-ordination 1967. Ten-Year Plan for Economic and Social Development, Tome V (10 volumes).

2/ Ministry of Planning and Economic Co-ordination 1968. Strategic Development Programme - 2 volumes.

3/ Union of Industries for the Manufacture of Chemical Products for Industrial Purposes and of Petrochemicals in the State of São Paulo - Brazilian Association for the Chemical Industry and Derivatives - A Industria Quimica Brasileira - Limitacoes e Perspectivas ao seu Desenvolvimento - São Paulo 1968 - 217 pp.

[illegible]

[illegible] capacity in industry in the [illegible] of the [illegible].

Also in the sphere of [illegible] a new technique for measuring excess capacity, based on a constant product capital ratio, was introduced in the same year.[5] The proposed method is a variant of that used by the National Industrial Conference Board.[6]

Another event in 1966 was the publication of the research carried out in 1965 and 1966 by the Getulio Vargas Foundation on the Food Industry in Brazil,[7] dealing with measures of utilized capacity, causes of excess capacity and effect of the latter on production costs.

Also in the same year, as a result of the Ten-Year Plan, surveys were made of installed capacity in all the industries considered important to the country's development (cement, iron and steel, non-ferrous metals, chemicals, engineering and electrical industries). The results of these surveys were published in Tome V of the Ten-Year Economic Development Plan.[8]

5/ ANPES-Study No. 6 Indice ANPES de Conjuntura Industrial Brasileira - São Paulo.

3/ T. Onich, Determinação da Capacidade Ociosa de uma atividade industrial. Analise e Perspectivas Econômicas 109 - 20 November 1966.

6/ A. Phillips, "Industrial Capacity: An Appraisal of Measures of Capacity", American Economic Review Vol. 51, 1961, p. 275.

7/ A Industria de Alimentos no Brasil - Getulio Vargas Foundation - Rio de Janeiro, 1966.

8/ See footnote 1.

[illegible]

[illegible]

[illegible]

[illegible] and [illegible], there was a [illegible] in the number of publications on the question of capacity.

The present situation as regards information on the utilization of installed capacity can be summed up by dividing the industries into groups:

(a) Those [illegible] industries for which data are available in respect of 100 products comprising installed capacity, in 196[illegible] and in July 196[illegible], production up to 196[illegible] and the degree of utilization of this capacity in 196[illegible]. These data are reproduced in "Indústria Química Brasileira - Limitações e Perspectivas no seu Desenvolvimento" (Brazilian Chemical Industry - Restrictions on and Prospects for its Development).[9]

(b) Iron, steel and non-ferrous metals, for which the Strategic Development Plan[10] provides data on the installed capacity, and the degree of utilization of such capacity, verified in 1967 and forecast for 1968, 1969 and 1970.

(c) Mechanical engineering industries - part surveys of which are viewed with a lack of confidence. At present, the National Economic Development Bank is studying the possibility of making a survey of installed capacity in enterprises accounting for 90 per cent of the

9/ See footnote [illegible].

10/ See footnote 2.

[illegible]

(b) [illegible]

Previous studies, such as those on the [illegible] industry or the use of the textile industry, [illegible] data that are completely out of date. These studies show that on [illegible] indicators that have not [illegible] in subsequent [illegible] studies.

(c) In the industrial production [illegible] (weight, [illegible]), there is no information of [illegible] capacity, which is sufficient to meet [illegible] demand.

[illegible]

8. [illegible]

In Brazil there is no estimate of the degree of capacity utilization in the manufacturing industry as a whole.

In this respect, the best information we have at our disposal is that provided by the industrial survey made by the Getulio Vargas Foundation, which in the months of April and October plans to study a sample group of enterprises with regard to the possibility of increasing production in the event of an increase in demand.

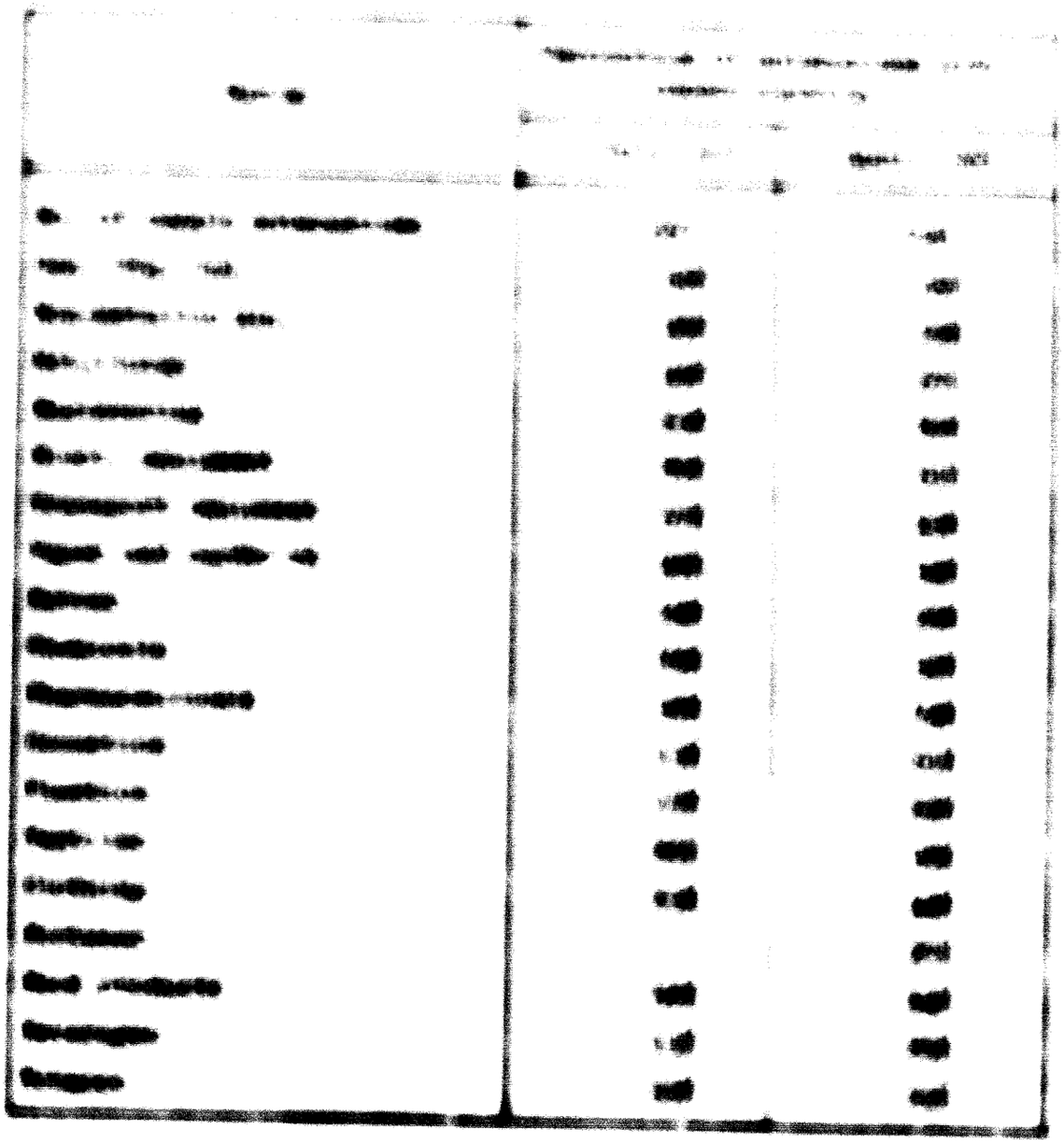
Two of these investigations have already been carried out, the first in July 1967 (outside the scheduled times) and the second in April 1968. The results for October 1968 have still not yet been processed.

11/ Economic Commission for Latin America - The textile industry in Brazil - Study of operating conditions in the spinning and weaving sectors. E/CN.12/623 - 1962.

[illegible]

[illegible]

[illegible]



[illegible]

[illegible]

[illegible]

[illegible]

Ranges of utilization of capacity	No. of products	Installed capacity t/year
[illegible]	1	0.4
[illegible]	1	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	4	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]

Although the list of products is limited, it includes all those of major importance in the Brazilian chemical industry.

[illegible] See footnote [illegible]

[illegible] degree of capacity utilisation varying between [illegible] per cent and [illegible] cent were the norm.

With a view to studying the dynamic aspect of capacity utilisation in the chemical industry, we are comparing the degree of utilisation during the years 1965 and 1967, in respect of products for which we have data covering both years.

From this analysis the following conclusions could be drawn:

(a) The twelve products for which the degree of utilised capacity was equal to or higher than 72 per cent in 1965, showed a lower degree of utilisation in 1967, as follows:

Product	Degree of utilisation of installed capacity	
	1965	1967
Titanium dioxide	100 %	60 %
Nylon 6/6	96 %	79.6%
Adipic acid	95 %	35.8%
Hexamethylenediamine	95 %	60.4%
Polyethylene	90 %	75.8%
Ammonia	80 %	80 %
Acetic anhydride	77.[illegible]%	63.7%
[illegible]	76 %	60 %
Acetic acid	75 %	63.5%
[illegible]	75 %	73.8%
Phthalic anhydride	74 %	47.6%
Phenol	72.5%	70 %

(b) In the intermediate group we have twelve products which, in 1965, utilized between 61 and 72 per cent of installed capacity. In this group three products showed a decline in the degree of utilization between 1965 and 1967 and nine products showed an increase or maintained the same degree of utilization.

Product	Degree of utilization of installed capacity	
	1965	1967
Styrene	72 %	80 %
Carbon bisulphate	70 %	59.3%
Toluene	70 %	83.9%
Sodium carbonate	70 %	84 %
Maleic anhydride	66.7%	66.7%
Vinyl chloride	66 %	77.8%
Nitric acid	66 %	84.2%
Acrylic resins	65 %	80 %
Lamp black	64 %	86 %
Vinyl acetate	64 %	61.3%
Ethylene dichloride	64 %	59.3%
Acetone	61.7%	61.7%

(c) For the thirteen remaining products the degree of utilization of installed capacity in 1965 was less than 60 per cent, there being either an increase or no change in utilization between 1965 and 1967:

Product	Degree of utilization of installed capacity	
	1965	1967
Sodium hydroxide	59 %	66.7%
Formaldehyde	59 %	64.9%
PVC	58 %	78.6%
Polyesterene	57.5%	81.6%
Sulphuric acid	56 %	64 %
Trichloroethylene	54 %	78 %
Urea formaldehyde	52 %	54 %
Zinc oxide	51 %	51 %
Ammonium nitrate	47.5%	49.4%
Carbon tetrachloride	37.5%	82.6%
BHC	30 %	52.2%
Nylon 6	13 %	94.2%
Polybutadiene	10.8%	27.5%

Although tentative, the data seem to indicate that the Brazilian chemical industry is seeking to expand so as to maintain a degree of capacity utilization of approximately 70 per cent.

ENGINEERING INDUSTRY

The degrees of capacity utilization in the engineering industry were studied in connexion with the preparation of the Ten-Year Plan,[14] the results being as follows:

Branch	Degree of capacity utilization		
	1963	1964	1965
Casting	94%	90%	97%
Forging	56%	59%	58%
Engineering machinery	72%	78%	68%
Electrical machinery	109%	92%	70%
Industrial equipment	72%	80%	89%
Railway stock	57%	83%	73%
Naval construction	25%	36%	39%
Automobile parts	109%	94%	95%
Highway machinery	64%	50%	46%
Vehicles	58%	61%	61%
Tractors and agricultural implements	58%	73%	65%
Domestic utilities	75%	79%	62%

Although the data are not entirely reliable, especially in the case of engineering and electrical machinery and industrial equipment, where the type of production - to order - makes it difficult to estimate capacity, we find a high degree of excess capacity since, with the exception of the casting and naval construction sectors, only one work shift was allowed.

Since 1965, no overall surveys have been made of the degree of capacity utilization, although a survey confined to the engineering machinery, electrical machinery and industrial equipment sectors is under study.

14/ Ten-Year Plan for Economic and Social Development, Tome V - Vol. 2 - Engineering and Electrical Industries - Ministries of Planning and Economic Co-ordination.

In its industrial statistics for São Paulo, ANPES originally intended to include the degree of utilization of installed capacity.

During 1967 this index was compiled for the machine industry, but was discontinued in 1968.

The data below were furnished by two of the enterprises consulted by ANPES, selected at random from among the various enterprises supplying data.

1968								
Ent.	Month	Jan.	Feb.	March	April	May	June	July
1	a	90	90	70	80	80	85	85
	b	100	80	111	97	118	114	123
2	a	50	50	50	50	50	50	50
	b	58	54	54	55	59	62	75

a - degree of capacity utilization (%)

b - number of hours worked (thousand hours)

As we can see, there is no connexion between the data on the number of hours worked and the percentage of capacity utilized.

In the case of enterprise 1, the lowest percentage (70%) was encountered during a month in which the greatest number of hours were worked (111). In the case of enterprise 2, the percentage (50%) is maintained throughout the entire period without reflecting the increase in the hours worked during the last two months.

In view of the inconsistencies it found in the information, ANPES stopped including figures for the degree of utilized capacity in its statistics.

2.2 Estimation of the degree of installed capacity in isolated companies and enterprises

There is, at present, some dissatisfaction in Brazil regarding the methods of measuring the degree of capacity utilization.

The method applied up to now has been to request the enterprises themselves to supply the percentage of capacity utilized.

In this way it is left to the discretion of the enterprise to define the working schedule (number of shifts, overtime) considered normal and used as a basis to define total capacity.

Our experience in advising industrialists has shown that most enterprises do not know their own degree of utilization of installed capacity.

Only where there is a single limiting factor (furnaces in the iron and steel industry, assembly lines in the case of serial production) does the industrialist know exactly how much capacity is utilized.

This situation is far more frequent in the chemical than in the engineering industry, because far more is known about the former than the latter sector.

We should like to mention an attempt made to measure the degree of capacity utilization in the automobile parts industry in São Paulo where, through the "work sampling" technique, attempts were made to obtain a measuring standard independent of the information provided by the industrialist.

The percentages of time for which each type of equipment was used (in production or preparatory operations) were taken for six enterprises producing automobile spare parts.

For each type of equipment the total capacity was considered to be the maximum percentage of utilization time encountered in the six enterprises, deducing - by a rule of three - the degree of utilization of the same equipment in the other enterprises.

The degree of utilization capacity in each enterprise was measured from the average degree of utilization of each type of equipment weighted by the number of pieces of equipment of each type.

The following degrees of utilisation were obtained by this method: 95.8 per cent, 65.7 per cent, 45.3 per cent, 28.6 per cent, 47.6 per cent and 36.1 per cent.

This method of measurement proved very slow and, moreover, was not readily accepted by industrialists. For this reason the study undertaken by the Faculty of Economic and Administrative Sciences of the University of São Paulo was never completed.

3.1 Main causes of under-utilisation

Analysis of replies to the questionnaires

Although it is out of date, being based on a survey carried out in 1963 and 1964, mention should be made of a paper on the Brazilian food industry prepared by the Getúlio Vargas Foundation (Brazilian Economics Institute).[19]

Of the enterprises interviewed, 85.4 per cent had excess capacity due to the following causes:

- Difficulty in obtaining raw materials 54%
- Insufficient demand 25%
- Lack of working capital 21%

We are giving these data merely in order to compare them with those obtained in the industrial survey carried out by the Getúlio Vargas Foundation in which, for the same industrial sector (food products), a full breakdown is given of the causes for excess capacity.

In April 1967, 64 per cent of the enterprises in that sector stated that they would expand production if there was an increase in demand. Only 13 per cent complained of raw material difficulties and 7 per cent of problems regarding working capital.

These data show that the causes of excess capacity vary considerably with time.

19/ See footnote 7.

As regards the manufacturing industry in general, in April 1968, 49 per cent of the enterprises were prepared to increase production if the market were larger. When asked if they had other problems limiting expansion besides the lack of a market or limited equipment and installations, 88 per cent mentioned no other restrictions, 5 per cent complained of difficulties in obtaining raw materials, 6 per cent of financial problems, 3 per cent of technical problems and 2 per cent of legal problems.

The technical problems have to do with the existence of obsolete equipment which, owing to the high cost of maintenance, would make any increase in production difficult, while the legal problems affect these enterprises that expand to monopolistic dimensions if not prevented by legislation.

As we can see, the absence of a market was the main cause of the existence of excess capacity in April of this year.

The other factors were less important, their significance varying according to the industrial sector in question.

Thus, scarcity of raw materials was found mainly in such branches as beverages (13%), food products (13%), clothing (9%), textiles (6%), plastics (5%) and non-metallic minerals (8%).

Financial causes were most prevalent in the sectors of beverages (21%), paper and cardboard (18%), clothing (16%), textiles (11%), non-metallic minerals (10%), footwear (5%) and food products (7%).

Even when we compare two close dates, such as July 1967 and April 1968, we find different distributions in the causes of excess capacity. Unfortunately, differences in the criteria for the industrial surveys carried out on the two occasions make comparison difficult. However we do find that the responsibility for excess capacity attributed to lack of a market dropped from 56 per cent in July 1967 to 49 per cent in April 1968.

While in April 1968 scarcity of raw materials and financial problems were practically equal in importance, in July 1967 financial problems predominated. But, considering only those enterprises which in April 1968

replied that they had other reasons for not expanding production besides lack of a market and limited equipment, we find that only 8 per cent complained of scarcity of raw materials, while 60 per cent complained of financial problems, 9 per cent of technical problems, 15 per cent of legal problems, 3 per cent of financial and legal problems and 2 per cent of financial and technical problems.

According to the three surveys mentioned above, the chief factors responsible for excess capacity are: absence of demand, financial problems and shortage of raw materials.

The second factor - financial problems - depends basically on credit policy.

The two other factors - scarcity of demand and lack of raw materials - vary in inverse proportion. When the importance of the former declines, the importance of the latter increases since, when all enterprises expand production in anticipation of an increased market, they bring about a shortage in the supply of raw materials.

This shortage is more acute in the branches of industry whose raw materials derive in part from the primary sector, such as food products, beverages, textiles and non-metallic minerals, because there is less elasticity in the supply of products from that sector.

Since Brazilian economic activity has been steadily expanding from April 1968 to the present date, it is to be expected that the industrial survey carried out in October - the figures for which have not yet been released - will show a lower percentage of enterprises with excess capacity due to lack of demand and a greater percentage of replies complaining of difficulties in obtaining raw materials.

In order to have at least an approximate idea of the current situation, we sent our trainee engineering students a questionnaire on the existence of excess capacity and its causes in the enterprises where they are training. The sample covered forty enterprises in various industrial sectors, located in the city of São Paulo or nearby municipalities.

Mention two exceptions, the questionnaires indicated an improvement in the degree of capacity utilization. In some sectors the absence of a market [illegible] affects all enterprises (equipment, electronics, railway stock). In others the lack of a market affects only a few enterprises (spinning and weaving, automobile parts, highway equipment). In other sectors no enterprise complains of the absence of a market (non-ferrous minerals).

Problems connected with the shortage of raw material arise only in enterprises showing an increase in the utilization of capacity.

Difficulties in obtaining supervisors and skilled labour, and lack of working capital, are the other factors mentioned as causes of excess capacity.

3.2 Main causes of under-utilization

Analysis of causes: lack of a market

The replies to the questionnaires show that in Brasil the main cause of excess capacity is insufficient demand.

This finding leads us to enquire into the reasons which prompt entrepreneurs to invest to the point of creating a capacity that exceeds demand.

We shall now examine the main reasons.

(a) Over-estimation of demand

During the period 1954 to 1961, in which imports were increasingly replaced by local production in Brazil, many Brazilian entrepreneurs believed that there was an unlimited market.

There was a general optimism, encouraged by Government policy emphasising development. Demand was abnormally high, partly through having been curbed - in the case of durable consumer goods - during the preceding period by restrictions on imports. Public works and the multiplying effect of investments were other factors responsible for this increase in demand. Protection for national industry caused income from agriculture to be channelled into industry. An acceleration of the inflationary process increased the

profits [illegible] of [illegible] [illegible] inflationary element in accounting profits [illegible] the entrepreneur the illusory impression that the situation [illegible] much better than it really was.

Investments were made without projections of demand. The low demand projections made during the period, as in the case of steel, although [illegible] taken by distinguished economists, suffered from the defect of over-estimation. These projections assumed that the high rate of growth in the national product - 7 per cent a year - would continue.

The good business done by the first enterprises to set up operations in each sector attracted new enterprises. Because of the time it took for investments to mature, mistakes in over-planning were only discovered when the last enterprises in each sector had been finally installed.

(b) <u>Advantages to encourage capital investment</u>

Favourable exchange rates, subsequently replaced by equally favourable tariffs and customs exemptions, as well as negative interest rates, provided strong incentives for enterprises to increase their capacity. They over-capitalised, taking advantage of the low cost of imports and of financing at negative interest rates, with the result that the real value of the amortisation decreased with time. The problem of the existence of markets for products is of no matter to an enterprise when it has an opportunity to increase its assets by means of subsidies.

The price mechanism leads to adequate employment of resources only when these prices reflect the relative scarcity of resources. Although capital is the scarcest resource, the existence of inflation, parallel with the presence of various mechanisms to prevent a rise in the nominal interest rate, meant that the cost of capital was low in some sectors. In these circumstances capital was used in abundance, causing excess capacity in these sectors of the economy, to the detriment of other sectors where this capital was far more badly needed.

While enterprises were over-capitalising on equipment, they were under-capitalising in respect of working capital, making the utmost use of bank loans obtained at negative interest rates to finance their stocks.

[illegible] the Government, to prevent the establishment of [illegible] and the emergence of serious competitors to supply a market which [illegible] would have been met by a single enterprise, with considerable economies of scale.

In some sectors, such as the automobile and domestic electrical appliances industries, margins provided a partial remedy to the problem. In others, such as the tractor industry, the problem persists to this day. In any case the last-mentioned sector calls for a special reference because it is probably the one that has had the greatest degree of excess capacity from the time of its installation until now.

According to a press report, emanating from the Ministry of Commerce, the development of this sector in recent years has been as follows:

Year	Capacity	Production	%
1962	19,100	7,586	39.3
1963	19,100	9,809	51.3
1964	19,100	11,534	59.8
1965	19,100	8,121	42.1
1966	19,100	9,069	46.9
1967	19,100	6,209	32.2

(4) Spreading of risks

Enterprises sought to spread their risks by increasing their lines of production. For these new products they acquired additional equipment which to some extent remained idle and caused established competitors to use still less of their capacity. In this respect we may cite the example of the excavator industry, for which the market was inadequate even for the one existing manufacturer. Nevertheless another enterprise that had made large profits from the manufacture of truck chassis, chose to expand its production by making excavators instead of enlarging its capacity for producing the original product.

(e [illegible] to eliminate their excess capacity

We have found that the existence of excess capacity can generate further excess capacity. Enterprises with insufficient demand to meet the [illegible] capacity sometimes believe that by expanding their range of production, which they can do with some additional equipment, they will succeed in finding a use for their existing equipment.

When this decision is taken by the various enterprises in a sector, the only result will be greater installed capacity for an insufficient demand.

Even the Government, partly to reduce excess capacity in the equipment industry, causes an increase in excess capacity in other sectors when it makes negative-interest financing available (the sale of equipment produced in Brazil is financed by a fund of the National Economic Development Bank, known as FINAME, at an interest rate lower than the inflationary rate).

(f) Regional problems

Regional problems have also been responsible for creating excess capacity in Brazil. A fairly striking example is the iron and steel industry, in which two of the three major factories were installed during the same year to meet the regional demand from two states - São Paulo and Minas Gerais. As a result, installed capacity increased over a short period by more than a million tons of ingot, creating excess capacity throughout the entire sector. Investments in the north-east of Brazil, promoted by fiscal incentives and financing facilities, which altogether reduce the need for capital in undertakings by 75 per cent, could, when they mature, create excess capacity in many industries located in the southern part of the country.

(g) Reserve market

It should be mentioned that many foreign enterprises have set up operations in Brazil in sectors where e[illegible]ss capacity already exists as, for example, in the heavy electro-mechanical equipment sector. We believe that this happens in the case of enterprises which are making sufficient profit internationally to be able to face temporary losses in Brazil.

Having installed plants before other competitors, they will bring know-how into their Brazilian branches, thus enabling them to reduce their costs and placing them in a privileged position with respect to competitors when there is an expansion of the Brazilian market or the market of the Latin American Free Trade Area.

3.3 Main causes of under-utilization - Analysis of causes: Export difficulties

Brazilian industrialists, not finding a sufficient domestic market for their products to make it possible to work at fuller capacity, have tried to place some of their products on the foreign market.

Apart from the obstacles, which we shall mention further on, efforts to export have been successful, as is indicated by the growth in the export of manufactured goods since 1964.

	1964	1965	1966	1967
Export of manufactured goods	155.8	250	216.7	285.6

Unit: million US$

Source: Report of Central Bank.

However, it must be noted that the very mechanism that promoted Brazil's industrial development - namely the substitution of imports by local production, through a high degree of protection for national industry - makes the conquest of the foreign market difficult.

The combination of a system of multiple exchange rates and customs tariffs afforded Brazilian industry protection that amounted to as much as 350 per cent (150 per cent in tariffs, plus 200 per cent in the exchange rate).

Between 1964 and 1967 the Government considerably reduced protection, which theoretically is now, on the average, one third of that prevailing in 1964.

Nevertheless, the margins of tariff protection are still high, as can be seen from the following figures, taken from a recent survey of industrialization in Brazil.[20]

20/ Joel Bergsmann: Brazil's Industrialization and Trade Policies - University of California, Berkeley - Preliminary Report 1968.

	Average tariff
Capital goods	41%
Construction materials	43%
Intermediate goods	38%
Components and parts	60%
Durable consumer goods	68%
Non-durable consumer goods	47%
Manufacturing sector	48%

Even with this degree of tariff protection there was a considerable rise in imports after April 1967 (43 per cent in the case of non-durable consumer goods, and from 340 automobiles per year to approximately 1,000 cars per month), so that the Government introduced a minimum tariff system, indicating that Brazilian industry required a protection rate similar to that prevailing prior to April 1967 which, in the case of the manufacturing sector as a whole, amounted to an average of 99 per cent.

With protection, there grew up in Brazil an industry characterized by a low level of organization.

As business consultants, we had occasion to observe the lack of production programming and controls, the absence of any rational quality-control system and of carefully studied lay-outs in Brazilian industry.

These deficiencies are due to the shortage of skilled technicians able to give suitable advice to industrialists. The few who do exist receive high fees for their services and confine their action to the better-off enterprises that can afford to hire them.

It is interesting to note that the level of organization is higher in industries which receive less protection in competing with imports, such as the equipment industry.

Nevertheless, even in this industry production costs are 40 to 50 per cent higher than international costs.

This higher cost is due, first of all, to the higher prices of raw materials, which often reach the ceiling allowed by tariff protection, plus the added cost of transporting the imported materials. In these circumstances the cost of raw materials is always 20 per cent higher than international costs. Secondly, the cost of the product is made higher by deficiencies in the infrastructure, especially as regards transport and communications as well as the high cost of electricity.

In well organized enterprises, only with respect to labour are costs found to be lower than international costs for products in the manufacture of which Brazilian industry has already acquired sufficient experience and for which the scale of production is similar to the international scale.

Information we have obtained on the engineering industry shows that costs are 45 per cent higher than international costs, even in the case of products for which the Brazilian scale of production is comparable to the international scale, but which require considerable know-how to produce (e.g. generators, turbines).

In the case of products requiring less know-how, and for which the Brazilian scale of production is also comparable to the international - such as equipment for agricultural development, plough discs, tilting parts for trucks - the costs in well organized firms are lower than the international costs.

The above-mentioned publication on the chemical industry[21/] contains a comparison of the average international prices and the prices of products produced in Brazil in the case of sixty items. Although this comparison was made at the exchange rate of NCR $3.65 (prevailing two months ago), we have the following figures which in themselves show the difficulties of increasing exports in the sector.

21/ A Indústria Química Brasileira - Limitações e perspectivas para o seu desenvolvimento - São Paulo.

Price of national products / International price	No. of products
Less than 1	4
From 1 to 1.5	18
From 1.5 to 2.0	20
From 2.0 to 3.0	15
Over 3.0	3

With regard to exports, mention should finally be made of the problem of Brazil's shortcomings in the matter of harbour facilities (high cost of loading products on board, long waits for ships). Since 1964 the Government has been trying to solve this problem, by reducing the wages of dock workers and improving harbour equipment. However, much remains to be done in this respect if shipping expenses are to cease being an obstacle to exports.

3.4 Other causes of under-utilization

We consider that the lack of a market is the basic reason for the existence of excess capacity. The mere presence of this fundamental cause can rule out such other causes as shortage of raw materials and difficulty in hiring labour.

Nevertheless, in many enterprises we find, during different periods, a capacity utilization that is even lower than the market demand, as will be seen from the following:

(a) Inadequate price policy

A number of Brazilian enterprises have adopted a "cost plus" price policy. Where the price of a product is lower than the total cost plus a tax, they prefer to cut down on production, leaving a margin of unused capacity.

In some enterprises, into which we introduced direct costing, we succeeded in increasing the utilization of installed capacity by establishing, for various products, prices lower than the total cost of production but higher than the direct cost.

It was, in fact, the application of this principle which increased the export of manufactured goods.

(b) Lack of working capital

The low interest rates applicable when inflation was on the rise, led Brazilian enterprises to immobilize a large share of their own resources, relying on loans to meet most of their working capital needs.

On the one hand, this policy resulted in the installation of equipment with a capacity higher than the market demand.

On the other hand when, in 1964, the Government started a steady campaign against inflation by restricting credit, interest rates became positive again, so that finance charges once again became a major component of the product cost.

The degree of utilization of installed capacity is thus a function of the Government's credit policy. If this is very restrictive, as was the case in 1966, it results in a drop in production and, consequently, an increase in excess capacity.

A more liberal credit policy, of the kind adopted from 1967 onwards, can raise the level of activity and the degree of utilized capacity.

Regardless of the fluctuations arising from Government credit policy, the lack of working capital has a negative effect on the use of capacity, especially in industries of a seasonal nature (the demand for the product or the supply of raw material varying throughout the year).

We had occasion to observe this phenomenon in the electronics industry, where sales mount at Christmas time.

In order to meet orders for the end of the year, the industry should accumulate large stocks of the finished product starting in September. However, commercial banks which lend at lower interest rates only make financing available by discounting "duplicates" - documents attesting to forward sales.

In these circumstances the enterprise would have to make use of loans from finance agencies, whose interest rate is far higher but which will take stock as a guarantee. To avoid incurring these financing costs, the enterprise usually prefers not to form adequate stocks in September, increasing its volume of production in subsequent months.

Since this policy was followed by the various enterprises in that branch of industry, by the end of the year there was not sufficient raw material for planned increases in production, and a large number of orders went unfilled.

(c) Lack of raw material

The industrial survey made by the Getúlio Vargas Foundation last April indicates that shortage of raw materials is a minor factor in the existence of excess capacity. The questionnaires filled out by our students show that this factor has grown in importance in recent months. Some questionnaires contain interesting information. On the one hand, the special steel industries claim to have excess capacity.

On the other hand, the consumers of these steels state that delay in deliveries of this raw material have been one reason for falling short of full capacity.

In our professional experience we have found that enterprises, which for lack of a market have reduced the number of their work-shifts, did not increase the number of shifts when demand expanded. They slowed down deliveries, retarding expansion, until it was certain that the increase in demand was permanent. Consequently lack of raw materials can be considered normal after there has been a rise in the level of activity throughout the country.

Some enterprises which answered our questionnaires said that they maintained surplus stocks so as not to be adversely affected by hold-ups in deliveries.

This comment shows the connexion between two factors responsible for excess capacity: lack of working capital and scarcity of raw materials.

A more liberal credit policy could reduce the problem of scarce raw materials, mainly in industries with a seasonal demand for products or a seasonal supply of raw materials.

At the moment the iron and steel industries are working at full capacity, without much delay in deliveries. Should the level of activity continue to rise, we will shortly have a shortage of iron and steel products in Brazil and will have to import. This situation already exists in the case of cement, imports of which have been permitted in recent months. An increase in imports will entail balance-of-payment problems which will force the Government to curb them.

It is therefore quite possible that, in the future, scarcity of raw materials will become one of the main factors responsible for excess capacity.

(d) Difficulty of obtaining labour and supervision

In the questionnaires used by our students, the problem of obtaining skilled labour is frequently mentioned as one of the causes of incomplete utilization of capacity.

We tried to investigate the problem more fully by interviewing some of the enterprises that had complained of this difficulty.

As a result of these interviews we concluded that the difficulty in obtaining labour is greater in cases where the worker has the most influence on the quality of the product, and less in cases where quality depends more on equipment.

In enterprises wishing to achieve a high level of quality, where this depends on the trouble taken by workers, only one work-shift is employed, since supervision for a second is usually found to be inadequate.

In any case, the complaints of difficulty in finding good foremen is fairly widespread, and there are enterprises which consider the difficulty in finding good foremen for the nightshift the main obstacle to working two shifts.

The quality of the product is apparently affected by two negative factors when there is an increase in shifts:

(a) The lower quality of the foremen who are prepared to work a second shift.

(b) The difficulty of finding engineers for a second shift.

The presence of engineers seems to be essential to offset inadequacy of supervision, as enterprises with more than one shift normally leave jobs requiring less responsibility to the night shift.

The problem of obtaining skilled labour and good foremen arises primarily from the deficiencies of the educational system in Brazil, where occupational training courses have still not won widespread popularity. Secondly, the labour legislation in force up to 1966 was an obstacle to the further training of workers to produce good foremen, since employees were systematically dismissed after eight years of service so that they would not acquire security of tenure after ten years.

Amendments to labour legislation, eliminating security of tenure, might make it possible to solve the problem of finding foremen and training skilled labour in the future.

(e) Administrative deficiencies

As business consultants we had occasion to note, even in firms considered to be well organized, administrative deficiencies which result in a sizable reduction in the utilization of installed capacity.

Deficiencies in production programming and stock control are serious, as they can lead to hold-ups in production for want of raw materials or semi-finished parts.

Faulty programming can lead to late deliveries, even at times when the enterprise is not working at full capacity. Late deliveries, in the case of industries producing raw materials, can diminish utilization of capacity in industries using this raw material.

This situation arises because knowledge of the production programming and control techniques needed for the management of more complex industrial enterprises is not very widespread.

3.5 Causes of unused capacity: Summary of conclusions

We believe that the various causes mentioned above for the existence of excess capacity can be traced back to a few basic causes, which can be listed under the following headings:

(a) Irregularities in price mechanisms, leading to an inadequate allocation of resources. This heading covers negative interest rates, and preferential exchange and tariff rates, which led enterprises to over-capitalize.

(b) Faulty synchronization of industrial development with development of the infrastructure and institutions. Industrial development, based on the import of foreign technology, took place at a far more rapid rate than development of the infrastructure. This heading covers deficiencies in the educational system as regards the training of skilled labour, foremen and management personnel, the inability of the financial system to provide working capital, high transport costs, etc.

(c) Inadequate dimensions of the markets compared with the dimensions necessary for enterprises to apply economies of scale in production. The Government's efforts to promote competition, so as to avoid monopolies, aggravate the problem still further. The entry into operation of a new factory considerably increases supply, and a certain amount of time is needed before demand can meet installed capacity.

(d) The very process on which Brazil's industrialization is based, namely the replacement of imports by local production, by means of a high degree of tariff protection. Although, on the one hand, this mechanism enabled a share of the local market to be reserved for national industry, on the other hand it restricted trade with other countries. In present-day Brazil we have periods in which a scarcity of certain products, such as agricultural produce in bad harvest years, exists parallel with excess capacity in the industrial sector.

The ideal solution would be to export manufactured products and import agricultural products, but this is not possible because the cost of the former would be higher than international costs.

4.1 Recommendations on measures to increase capacity utilization

(a) Introduction

Measures to increase capacity utilization differ substantially, depending on whether under-utilization is general or confined to certain sectors.

We can list at least three different cases:

(a) General idle capacity;

(b) Idle capacity in most sectors;

(c) Idle capacity confined to a few sectors.

In the first case the problem is due to a lack of effective demand, which can be remedied by the adoption of a particular fiscal and monetary policy.

In the second case, too, an increase in effective demand can eliminate a large degree of idle capacity, although accompanied by inflation. Investments in sectors where full capacity has been achieved, can eliminate inflationary pressure upon maturation.

In the third case, where idle capacity is confined to a few sectors, the solutions would have to be totally different.

(b) Idle capacity in most sectors

The situation existing in Brazil, at least since 1966, comes under the second heading, as there is idle capacity in most of the industrial sector and full utilization of capacity mainly in the agricultural sector.

The year 1967 saw the beginning of a policy designed to increase effective demand, generated by Government deficits and by a more liberal monetary policy.

This policy has certain interesting aspects that call for comment, since it was the indirect cause of a growth in capacity utilisation, greater than that which would have resulted from a mere increase in effective demand.

For example, to prevent the increase in the means of payment from causing an increase in prices, the Government tightened price control. This helped to increase the degree of utilisation of installed capacity as it meant that enterprises were no longer able to make larger profits, by reducing the supply and increasing the price. Since the prices allowed by the Government were low, enterprises tried to make better use of their production capacity, achieving through the increase in sales what, in the past, they had tried to achieve by higher prices. Consequently, the Government's action helped the market towards conditions of almost perfect competition.

On the other hand, the Government intervened in the matter of wage policy, bringing about a forcible reduction in real wages under subsequent agreements. While the cost of the labour factor was reduced, the reverse happened with the capital factor as the reduction in the inflationary rate was far greater than the reduction in nominal interest rates.

With a combination of these two elements - a reduction in the cost of labour and a rise in the cost of capital, plus the curb on profits caused by price control, which meant that enterprises could no longer invest - we find that, in contrast to what happened in the past, expanded production was due far more to the use of more labour than to the acquisition of new equipment.

As already mentioned, we have no data on recent trends in the degree of capacity utilisation. However, between April 1967 and August 1968 we noted a 14 per cent increase in industrial employment, which is quite a high figure when compared with the average growth rate of 3 per cent a year, reported since 1950.

Evidently it is possible to reduce idle capacity by increasing effective demand only when most sectors fall short of their full capacity. When this is the case, increased demand will cause the inflationary rate to rise to unacceptable levels.

In the case of Brasil, the sector with the least elastic supply is agriculture. Consequently in years with a good harvest, due to favourable climatic conditions, effective demand can increase without a corresponding increase in existing inflationary pressures. In bad harvest years the opposite happens, as any increase in the means of payment is reflected merely in price rises.

According to these criteria, the best way of eliminating much of Brazil's excess capacity would be to increase the capacity of agricultural production by increasing the productivity of the agricultural worker, which would create a fairly large additional market for industrial products.

However, a discussion of this problem would lie outside the scope of this paper.

(c) Excess capacity confined to certain sectors

Where excess capacity is confined to only a few sectors, these cases must be classified in two groups:

1) Temporary excess capacity due to smallness of the market compared with factories of minimum dimensions from the economic point of view. The growth in potential supply proceeds by jumps, creating excess capacity just after the investments have matured; this capacity will be fully used up in the dynamics of the development process.

2) Continuing excess capacity, caused by over-planning in the sector, beyond the country's needs for the present or the near future.

We need not deal with the first group, which includes most of the Brazilian chemical industry, since the existing situation is capable of righting itself.

We shall therefore turn to the second group.

(d) Continuing excess capacity

The problem of sectors with continuing excess capacity must be considered from two viewpoints. The first relates to measures for the reduction of investments in the sector, which can solve the problem over the long term. The second has to do with measures that can raise the degree of capacity utilisation over the short term.

To promote investments there are various devices in Brazil, designed to reduce the cost of capital, increasing the rate of returns. Import tariffs for equipment - lower than those applicable to finished products - and financing at interest rates lower even than the inflationary rate, are examples of such facilities.

These subsidies should not apply in the case of investment in sectors with excess capacity. Nor should the entry of foreign capital for investment in such sectors be allowed either.

The problem becomes more complicated, and presents interesting theoretical aspects, when there is a large amount of obsolete equipment in the sector.

To what extent can one recommend incentives for re-equipment, even with an increase in excess capacity?

We would recommend a study in depth of the problem, as it could be very helpful as a guide to Government planning.

As for the second aspect of the problem - increasing the degree of capacity utilization over the short term - in the case of Brazil we must discuss means of increasing demand, since the lack of a market is the main cause of excess capacity.

We shall deal with the problem of increasing internal and external demand under two separate headings.

(e) Problem of increasing internal demand

As is rightly pointed out in the paper prepared by UNIDO[22/] the problem of excess capacity is far more difficult to solve when it results from a shortage of demand than when it results from technical, economic, general or social difficulties.

It would be possible to think of measures to reduce production costs and diminish prices. However, the effectiveness of these measures would depend on price elasticity, on global demand in the sector and on the possibilities for cost reduction.

In the case of the tractor industry, for example, which as already mentioned earlier has one of the highest rates of excess capacity, both of the above-mentioned conditions for raising internal demand are to be found.

22/ UNIDO - IPPD/1 - Industrial Excess Capacity and its Utilization - 1967- p.26.

Should the present requirements regarding the degree of nationalization of tractors be dropped, so as to permit the import of more components at low tariff rates, the price of tractors could be reduced, and they could be used on a far greater scale in agriculture. This measure should be supplemented by the granting of facilities for investment in industries producing parts, which would then be imported so that these industries can turn to other lines of production.

In the case of consumer goods, the price elasticity of global demand in the sector may be slight, so that there are limited possibilities for a growth in demand and increase in the degree of capacity utilization by way of a reduction in costs.

Another possibility that has been discussed in Brazil, for increasing the domestic market for durable consumer goods, is the introduction of less sophisticated products, at lower prices, for sections of the population with lower purchasing power.

In this respect, the assistance of an international organization such as UNIDO could be valuable, in providing information on similar attempts which have met with success in other developing countries, so that national manufacturers can acquire patents and know-how.

However it must be emphasized that this type of solution will meet with sociological difficulties which have not yet been fully identified. For example, the comparative use of motor cycles versus cars as a means of transport is far lower in Brazil than in less developed countries. Apparently, the possession of consumer durables, within Brazilian society, has a "status" element which surpasses the purely utilitarian advantages of having goods.

A comparative analysis of this phenomenon in various developing countries could also yield interesting information, and it might be possible to find ways of changing social behaviour in this respect.

(f) Increasing external demand: Exports

In the last two years the Brazilian Government has applied a number of measures to promote the export of manufactures, namely:

(a) Reduction of export formalities.

(b) Provision of loans, at an interest rate far lower than the inflation rate, to exporters.

(c) Exemption from all taxes, including income tax, on exported products. Draw-back of tariffs for imported raw materials used in the production of exports.

(d) Bonuses to exporters, in the form of a reduction in taxes on products intended for the domestic market, proportionate to the number of exports.

(e) Introduction of a flexible exchange rate, accompanying the internal monetary devaluation rate, allowing the proceeds from exports to develop parallel with manufacturing costs.

Since these measures were completed only during the last few months, they have not yet had time to produce their full effects. The problem is to accelerate these effects.

Since measures to promote exports with a view to eliminating excess capacity are no different from those designed to promote the export of manufactures in general, it is hard for us to make any novel recommendations on the subject. Besides the question, as it affects Brazil, was recently discussed at the Seventh Brazilian Foreign Trade Conference, held at Rio de Janeiro in August 1968.

The principal measures under consideration have to do with improving the operation of the Latin American Free Trade Area, with providing incentives for the export marketing network - by financing the establishment of branches and encouraging the creation of export companies - and with the need to ensure that foreign firms in Brazil start to export more of their production.

It is also generally acknowledged that Brazilian industrial technology needs to be perfected and that new techniques, better suited to the improved use of cheaper resources in Brazil, should be investigated.

In sectors which now have a great deal of excess capacity, such as the heavy engineering equipment industry, the main need is financing for long-term sales, that would allow greater possibilities for exporting to the Latin American Free Trade Area.

Despite the high degree of know-how required in this sector, which places Brazilian industry at a disadvantage compared with highly developed countries, the very successful results in exporting lathes outside the Latin American Free Trade Area show that there are products in respect of which Brazil is not at such a disadvantage.

As one recommendation, we would suggest developing and designing products which Brazil could export, in sectors with excess capacity.

This type of activity should be carried out with ample Government assistance, in research institutes subsidized by the Government, since the amount of expense involved in activities of this kind places them beyond the reach of enterprises acting alone.

Obviously product designs, acquired from developed countries through the direct use of patents, will reflect the relative prices of the factors prevailing in those countries.

The ideal would be to investigate processes and products better suited to Brazilian conditions. However, a study of processes would not solve the problem of excess capacity since it would necessitate the acquisition of new equipment.

Another measure that could facilitate any action that UNIDO or other United Nations agencies might wish to take in the promotion of exports, would be incentives for the establishment of export consortiums.

The dimensions of the typical Brazilian enterprise are small for international trade. In the case of enterprises with excess capacity, for example, exports must cover the marginal cost of production, leaving a margin to cover the increase in fixed expenditure entailed by the installation of

services to handle exports, which is difficult if the volume of exports is small. In the case of consumer goods, exports by isolated enterprises are usually insufficient in volume for them to be able to afford the publicity necessary for promoting sales in the importing country.

The size of the consignments sold on the international market is too large for most Brazilian enterprises. Consequently concortiums would introduce an economy of scale into the marketing of exports that would enable smaller enterprises to enter the international market.

Such consortiums would also afford a means of facilitating technical assistance for the promotion of exports (problems connected with adaptation of the product, quality control, packaging, etc.), and also for programming to reduce costs and utilise more capacity.

4.2 Recommendations concerning measures to increase capacity utilisation. Role of UNIDO and other United Nations organisations

As a suggestion, we are listing various possible fields of action for UNIDO:

(a) Measurement of the degree of capacity utilisation

Up to the present time there has been some dissatisfaction in Brasil concerning the usual methods for measuring capacity, especially in the case of sectors with many products and with a tendency to have bottlenecks in production, as, for example, in the engineering equipment industry.

The method applied by the Wharton School, or methods based on product-capital ratios, require that all enterprises in a given sector should have worked at full capacity in the recent past, a situation that is not found in many sectors of Brasilian industry.

The McGraw-Hill method, which has been employed in past capacity studies, has not produced reliable results. We have already mentioned the attempt made by the Faculty of Economic Sciences at the University of Sao Paulo, to measure the degree of capacity utilisation on the basis of "work sampling", estimating the machinery utilization time. This method is very expensive to apply on a wide scale.

We would recommend that UNIDO should investigate a simple and reliable method that could be applied at least once a year in connexion with industrial surveys.

(b) Greater economic integration in the international field

In the event of the adoption, internationally, of a uniform definition of capacity and methods for measuring its utilization, United Nations organizations could recommend to Governments that there should be bilateral agreements between countries having excess capacity in various sectors. In some cases such agreements could present sufficient advantages for participating countries not to include in their plans investment programmes designed to increase capacity in sectors for which they import products.

(c) Cost profiles

A comparative analysis of the cost profile for a single product, in sectors with differing degrees of capacity utilization in the various countries of the world, could provide useful information in solving the problem of excess capacity. Some such analyses were made by the Ministry of Planning. However, since the existing data were not presented within the framework of a uniform and detailed classification, the resulting conclusions merely revealed what was already general knowledge (the high cost in Brazil of basic input items - transport, fuel, power, salt, etc.).

If UNIDO were, as an experiment, to devise, for certain products, cost classifications that made for more accurate comparison on the basis of surveys, such a study might indicate new fields of action in Government planning.

The comparison of input costs could also indicate relative advantages in various countries, as a basis for industrialization policies aimed at exporting.

(d) Assistance to the export industry

United Nations organisations could play an important role in providing technical assistance to enterprises wishing to enter the export field. Consortiums of the kind already mentioned could, acting either alone or in association, be effective instruments for preparing business circles psychologically for entering international trade.

Technical assistance by United Nations organs should cover a number of fields.

Comparative analysis of the standard of education and of the kind of knowledge possessed by skilled workers, supervisors and managers in various countries of the world, could be important aids to improving the educational system, as well as for the institution of courses to remedy - at least partially - existing deficiencies.

The cost profiles mentioned earlier could indicate fields in which technical assistance would be most beneficial in reducing costs.

The technical assistance would also be very useful in setting up programmes to create quality consciousness among Brazilian industrialists. The experiment carried out in India[23/] could be used as a model in certain respects in Brazil. Some Brazilian industries, such as the footwear industry, find poor-quality raw materials the main problem regarding exports. The fear of being unable to meet international requirements regarding deliveries and quality is a discouraging factor for many industrialists wishing to export.

Lastly, UNIDO could provide assistance to research institutes in the development and designing of products better suited to conditions prevailing in national industry, as mentioned earlier.

(e) Technical assistance for Government planning

The existence of excess capacity on a fairly wide scale in Brazil in recent years, has meant that Government planners have not been concerned with the difference in degree of capacity utilization in the various sectors.

When full capacity is utilized in a number of sectors, as a result of an increase in effective demand, special plans will have to be made for those sectors which still have excess capacity. Assistance by United Nations organizations during this new phase of planning could be very helpful.

23/ Modaual CN - Measures for creating quality consciousness among Indian exporters - Foreign Trade Review - Vol. II, No. 3, Oct. - Dec. 1967.

Estimates of the price elasticity of global demand in each sector could, for example, indicate where a reduction in tax rates could offset excess capacity caused by lack of demand. International data could remedy deficiencies as regards the accuracy of the knowledge concerning records of income and expenditure necessary to foresee the impact of demand growth in one sector on the degree of capacity utilization in the others.

UNIDO could also undertake useful action in studying the number of work-shifts (to be discussed in the appendix below).

4.3 Appendix

Number of work-shifts

The problem of the number of work-shifts should be given special attention when considering the problem of excess capacity.

For this reason we decided to deal with this problem in the questionnaires distributed through our students, asking each enterprise to supply a breakdown of its sections by number of shifts, the time-table of the shifts and the reasons for not increasing the number of shifts.

Classifying the replies we find the following characteristic patterns:

(a) All sections working a single shift: 11 enterprises (27 per cent of the total); sectors: clothing, automobile parts, wood, furniture, equipment industry, railway stock, electrical household equipment and electronic goods.

(b) Enterprises with one shift in sections with little equipment (assembly, painting, cleaning) or in sections with a small workload; two shifts in the majority of sections; three shifts in thermal treatment sections, furnaces, sections where work has to be continuous and, exceptionally, in sections where work need not be continuous but where there are production bottlenecks: 18 enterprises (45 per cent of the total); sectors: automobile parts, railway stock, motor vehicles, rubber, plastics, food products, lamps, casting, electronics.

(c) Enterprises with three shifts in most or all sections; with only one shift in sections with little equipment: 7 enterprises (18 per cent of the total); sectors: paper, rubber, spinning and weaving, plastics, non-ferrous minerals.

(d) Other patterns in which the number of shifts varies with the sections, there being no common denominator for sections with the same number of shifts: 4 enterprises (10 per cent of the total).

Patterns "b" and "c", which are found in 25 onterprises (63 per cent of the total) are fairly reasonable. There are many arguments in favour of two shifts instead of three - for example, the need for equipment maintenance, the need to allow spare time for unforeseen oontingencies, higher cost of night labour (with two shifts the usual time-table is from 6 a.m. to 2 p.m. and from 2 p.m. to 8 p.m.), legal obstacles to the employment of women for night work, etc.

It is also reasonable to have a single shift in sections using very little equipment - such as assembly, paintwork, cleaning - so that the time-table of that section coincides with the working hours of the administrative sections.

The same cannot be said of the eleven enterprises working only one shift. This question is important since a number of the enterprises consulted regard this situation as normal and say that they are working at full capacity.

Only in exceptional cases is there any economic justification for a single work-shift. Consequently, the inclination to regard this situation as normal shows that surveys such as those undertaken by the Getúlio Vargas Foundation underestimate excess capacity in Brazil. It should also be pointed out that the percentage of enterprises found to be working a single shift (27 per cent) falls considerably short of the real figure, since the sample is not representative of Brazilian industry as a whole, in that normally only the larger and better organized enterprises accept student trainees.

We shall therefore now analyse the reasons given by enterprises for working only one shift.

In the first place, the replies do not indicate that much thought has been given to the problem. No figures were given to show that it was more economic to work a single shift.

It is interesting to note that, although automobile sales rose by 20 per cent between 1967 and 1968, some enterprises manufacturing automobile parts state that the lack of a market was the reason for not adopting two shifts. They complained of the competition. It remains to be determined whether the absence of two shifts is not one of the causes of the high costs and loss of market, even in a period favourable for the sector.

Deterioration in quality, as we mentioned under the heading "Difficulty of obtaining labour and supervision", is one of the reasons given for not increasing the number of shifts. One of the aspects cited by two enterprises in two different sectors (equipment and clothing industries) is the length of time needed to execute production orders, which can amount to several dozen hours. The adoption of more than one shift would mean that different workmen would be working on the same order, so that ultimately it would be difficult to determine responsibility either for quality or for efficiency.

Of the eleven enterprises with only one work-shift, only two had more than 500 workmen, the average number being 300. Even among the twenty-five enterprises employing a reasonable number of work-shifts, only three had less than 300 workmen, the average being 1,200.

Somewhat similar findings resulted from the survey conducted by the Economic Commission for Latin America[24/], in the spinning and weaving industry, as is shown by the following table:

24/ Economic Commission for Latin America - The textile industry in Brazil - Survey on operating conditions in the spinning and weaving branch (E/CN 121623, 26 April 1962).

Size of establishment	No. of shifts		Size of establishment
No. of spindles	spinning	weaving	No. of looms
less than 1,000	1.52	1.2[illegible]	less than 50
1,000 to 4,999	1.91	1.21	50 to 99
5,000 to 9,999	2.01	1.50	100 to 199
10,000 to 19,999	2.05	1.53	200 to 499
20,000 to 49,999	1.77	1.66	500 to 999
50,000 and over	1.71	1.43	1,000 and over

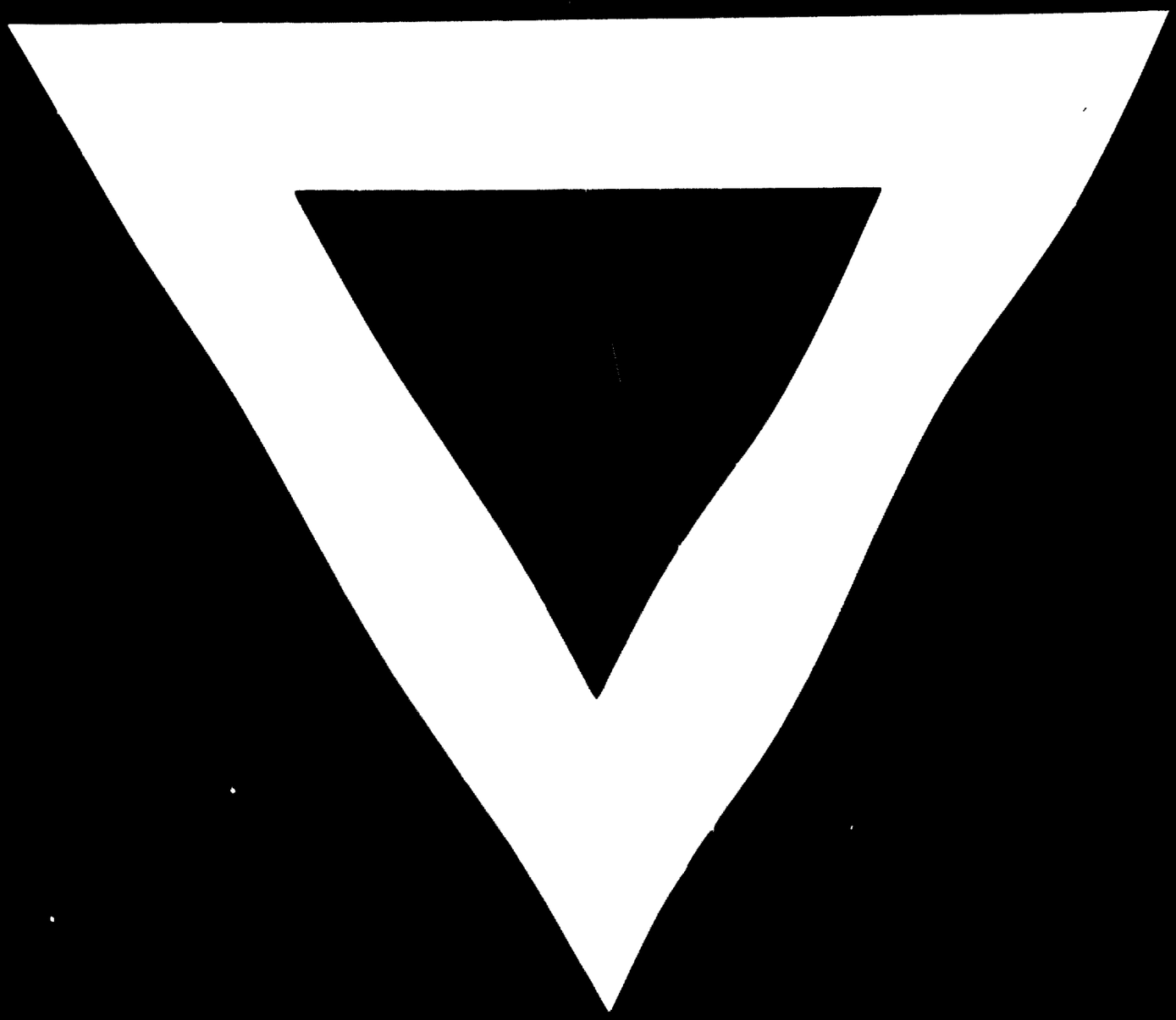
In view of this finding, we must acknowledge that small-scale enterprises are reluctant to adopt more than one work-shift. This reluctance is apparently due to the fact that in the smaller enterprises there is little delegation of authority, the entire organization being subject to direct supervision by the owner.

Some of the enterprises consulted said that they were prevented from increasing the number of shifts by the fact that their work contracts provided for a five-day week, with Saturdays off and 48 hours of work on the other days. They would have to dismiss their entire staff and recruit new personnel working an eight-hour day in order to adopt a work schedule with a first shift running from 6 a.m. to 2 p.m. and a second from 2 p.m. to 10 p.m. This situation must be quite widespread since the practice of having a five-day working week is quite common.

One question that UNIDO might investigate is the most economic number of work-shifts for each type of industry. Some studies could be made in enterprises with the same type of production, working on different shift systems. It might be possible to ascertain how the problems listed by some enterprises, as reasons for not increasing the number of shifts, were overcome in other enterprises. A comparison of the labour legislation in force in different countries regarding night work might also yield useful results.

Co-operation from UNIDO would be particularly valuable in sectors where the system of work-shifts differs greatly between countries, if an attempt were made to find the causes for such differences and ways of eliminating them.

We hardly think it necessary to emphasise the value of the findings of such studies as a means of improving Government planning.



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