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Development and environment: the Brazilian case

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The general relationship existing between development and the environment may be approached at various analytical levels and from different angles. In this article it is explored in the specific case of modern-day Brazil and in the framework of its style of development, which the author describes as one of 'associated dependence'. Having thus defined his object of study, he focuses his attention upon the consequences of the development style on the energy issue, the spatial distribution of the population and the development of the Amazon basin.

After sketching the broad lines of the 'associated dependence' style of development, he goes on to the problems raised by the energy issue, as well as the different possible solutions to them, which hinge on the petroleum economy, its replacement by other energy sources and the reformulation of the crucial questions of who consumes energy and why.

There then follows a critical interpretation of the urbanization process in Brazil, in which the central argument is that the process has shattered the equilibrium between city and countryside without having managed at the same time to create cities with a truly modern urban environment.

The final section is devoted to a discussion of the strategy followed in developing the Amazon basin, the close link between that strategy and the prevailing style of development and the concomitant negative consequences for the conservation of natural resources. The author also stresses, however, the importance which the abundant renewable resources of the Amazon region might have for a strategy which could develop the area without destroying its wealth; but he is aware that a new strategy of that kind would call for the transformation of the prevailing style of development.

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Introduction

Brazil's economic development over the past years is often pointed to as a successful case of industrialization and social change occurring on the periphery of the international capitalist system. At all events, it is not the only such case since, to varying degrees and with differing patterns of integration in the world economy, Mexico, Argentina, South Africa, Singapore, Korea, India, etc., are other examples. It is clear, however, that there are many ambiguities in this matter. Even though in all of these cases the manufacturing sector was integrated with the world economy, and consequently they represent different forms of the internationalization of capitalist production, there are great differences in the significance of industrialization based on a manufacturing-export platform and industrialization which creates a local consumer market.

Brazilian industrialization is a 'successful' example of the second type of economic integration. This aspect was often neglected in analyses, because at the height of Brazil's internationalizing type of economic expansion, there was an intense process of export growth and wage compression, especially between 1964 and 1968, although without major change until 1975. Some hasty analysts saw this as proof of the existence of a manufacturing-export development strategy.

Today, it is easy to see that both the compression of wages and the export strategy were central guidelines of the development policy implemented by the military governments. The first of these, however, did not mean that it was impossible to create domestic markets, nor was the second the result of such an impossibility.

Certainly, wages declined and the labour force was increasingly exploited, which allowed the enterprises to reconstitute their financial capital and had the additional effect of attracting multinational corporations (which were also motivated by the need to compete with the emerging local industry and to survive protectionism, and by the strong incentives and direct and indirect subsidies which they received from the State). But despite this fact, the consumption of "wage goods" continued to grow (which is easily understandable in view

of the incorporation of new contingents of workers: around 1 million new jobs created annually in and outside of industry) and there was an enormous expansion of the stratum of durable goods consumers due to the growth of the middle- and high-income sectors and the concentration of income among the latter. Furthermore, inter-firm consumption increased greatly, and public spending grew substantially.

All of this ensured the expansion of the domestic market, which grew at rates even higher than the already high rates of export growth.

Why, then, the emphasis on the export strategy?

Firstly, it must be stressed that although the expansion of international trade from 1947/1948 to 1973 was generalized and part of the internationalization of the production system, from the point of view of the Brazilian economy's need for growth exports were necessarily a priority. This was because industrialization took place within the framework of a process called 'associated dependence': What did this process consist of?

It was land-reform style of development which, by structurally linking the local economy to international production, *reversed* the previous course of industrialization: up to the mid-1950s, the strategy of the industrializing process sought to avoid 'external dependence' and to generate a transformation which would affect society as a whole. Although no concrete land reform measures had been taken, the political pressure for them existed. The State developed the so-called 'basic' sectors of the economy. Perceptible symptoms of a change in this strategy were visible during the government of Juscelino Kubitschek (1956-1960), when the *target plan* envisaged, together with 'basic' industrialization, the rapid installation of consumer durable industries, especially the automobile industry. In addition, new foreign investment began to enter the country as a result of the new international division of production adopted by multinational corporations. This took place initially in response to official incentives and to secure markets, and subsequently, because the expansion of the markets encouraged them to plough back their profits. After military coups (1964 and 1968) ensured some political stability through repression, and policies for wage control and industrialization subsidies were adopted, it became possible both for financial capital to guarantee the loans necessary for industrialization, and for the production capital of European and Japanese multinational corporations to compete with that of the United States corporations in Brazilian industrialization.

During this process, the basic industrialization plans were not discarded, but the rates were reversed, with final consumption products growing more rapidly than 'basic' products. In order to obtain quick results, a mechanism leading to ever-increasing structural dependence was built into the development strategy; the growth rates of the product required increased imports of equipment and basic industrial inputs which the country lacked, petroleum being first among them.[1]

How was the cost of this process to be covered? By exporting both primary products and semi-manufactured and finished goods in pace with the growth of the international market.

Exports were a fundamental goal in this

[1]This statement may not be considered categorical, as in fact the relative growth of capital goods and consumer durables varied according to the cycle and the policies applied by the various governments from 1964 to the present; but it applies more to the period until 1970. From 1970 to 1973, although the expansion of the consumer durables sector continued to be extremely vigorous, the rising trend in the growth rate of the capital goods sector was already apparent, and from 1974 onwards it was double that of the consumer durables sector. Ministry of Planning of the State of São Paulo (SEPLAN), *O examen das políticas economicas sectoriais*, Sao Paulo, 1979.

It should be noted, however, that despite the growth of the capital and intermediate goods sector, if the consumer goods sector expanded rapidly then the domestic supply of the former would be inadequate and inputs and equipment would have to be imported, as was in fact the case.

The increase in the import coefficient for capital goods is related to the growth in the rate of investment in industry, which climbed from 25.2% in 1965 to 41% in 1971/1972, subsequently returning to the previous levels (SEPLAN, *op. cit.*, p. 90). In this connexion, see F. Mazzucchelli, *A expansão inconclusa: considerações sobre o sector de bens de capital no Brasil*, UNICAMP (mimeographed document), 1977. Thus, it may be noted that the import coefficient for capital goods increased in real terms up to 1975, despite the fact that the relative prices of domestic capital goods were lower than the prices of those that were imported.

growth model, and this goal could be achieved because the international market was expanding rapidly. The need to import was also inherent in the model, in view of the priority given to the substitution of imports of finished consumer products and the creation of new consumer needs, for which the country lacked both the technology and the necessary equipment and inputs. It was imperative to export in order to pay for a development model which started where the advanced economies ended, acting in *reverse* fashion.

The State played an essential role in the formation of new strata of consumers, concentrating revenues through policies which worked not only by controlling wages but also by making financing easier so as to create the market required for the type of industrialization which was being imposed. Major funds were diverted from social objectives to finance enterprises as well as directly to underwrite consumption by higher-income groups. Moreover, the very expansion of some bureaucratic sectors broadened this type of market.

In this way, the industrialization model that was adopted not only tied the local economy to multinational corporations, but also shaped the 'development style': income concentration, technological dependence, the need for growing imports and consequently for growing exports, and a role which was not just active but decisive for action by the State, which co-ordinated the entire process.

With regard to the latter aspect, the characteristics of Brazilian economic expansion must be clearly understood. After 1955, and especially from 1964 to 1967, the direction of the process of accumulation (in the sense that such investment 'drives' the economy) took place through the transnational corporations, but the process and its integration were both underpinned by the expansion of the State sector of the economy, with both the State sector and the private national sector becoming integrated in the multinationalized economy through association and complementarity. The three pillars of development are the State, national and multinational corporations, under the 'command' of the latter.

What do we mean by 'command' here? First, that transnational corporations make investments in the sectors which expand most rapidly and yield the greatest profits. Second, that even when the regulation of the economy and the production of basic inputs depend on the State, and State enterprises are in partnership with the private national and foreign sector through joint ventures, what is produced is still determined by the pattern of civilization created by the capitalism of the multinational corporations, and production methods depend on the technology pertaining to them. Moreover, the financial capacity to sustain investment is determined by the world system, and as for the financing of consumption, either it comes indirectly from the international sector, or it involves the diversion of social funds.

In this way, the 'associated dependence' model of industrialization not only generates structural ties between the domestic and external sectors, but also shapes the way in which local and State enterprises must function, even though it leaves the latter important roles in accumulation. It transforms State enterprises from 'public service' enterprises to 'private-style' organizations: they are associated with multinational corporations, operate within the market as private companies, pursue profit and incorporate the operating methods of the large corporations. In very general terms, this is the style of development wich the Brazilian case successfully exemplifies.

This 'model' worked reasonably well up to 1974, when the decline in international trade and the rise in petroleum prices became serious obstacles. The Brazilian economy needed to continue to import in order to continue to grow. When the rate or value of exports decreased, the external debt rose rapidly, today totalling US$ 55 billion. Around US$ 7 billion per year, equivalent to a very high proportion of exports, are needed in order to pay for debt servicing alone. The interest rate on new loans rose, and the domestic rate reflected this.

Moreover, domestic financial speculation increased greatly, and the domestic debt also grew more rapidly. This, together with the government's non-reproductive projects, the need to reimburse international financial capital at growing interest rates and world inflation which affected the price of imports, produced sharp inflationary pressure.

It is in this context that the functioning of the 'Brazilian model' must be evaluated with respect to the matters which decisively affect the 'environment', it being understood that the latter is determined not only by a physical base which sustains economic development and is affected by it, but also by a life style which affects human beings.

In this article, in addition to discussing the problem of alternatives, we shall illustrate merely a few of the major problems which the development style that was adopted has generated. We will not discuss other crucial problems, such as the manner in which the process of rapid, unregulated growth has affected the various social classes and led to unequal opportunities for enjoying both manufactured and natural goods. All of the available data demonstrate that social inequality and class exploitation are intensifying and creating serious problems in the country. At all events, we shall limit ourselves to discussing the effects that this style of development has on the energy problem, the spatial distribution of the population and the manner in which new areas are incorporated into the country's economic space.

It is not difficult to justify the choice of these issues: the petroleum shortage and the definition of a growth strategy based on that resource place a very serious obstacle before development prospects; accelerated urbanization and migration from the country to the city, intimately linked both to the strategy of poles of wealth for development and to the absence of effective policies for the provision of social infrastructure in rural areas, are another outstanding aspect of the 'Brazilian' (and Latin American) style of development; finally, with respect to the development of new regions, it is extremely important to point out that Brazil is one of the countries which is growing industrially, yet which simultaneously retains an 'agricultural frontier'. This is another great problem for the future of developmental continuity. For this reason, we have selected the case of the Amazon basin to illustrate how new areas are developed, and the environmental, social and economic consequences.

I

The economic model and the energy problem

It is unnecessary to stress unduly the fact that the current demand for energy was determined by the development style described in the preceding pages, which radically modified the profile of energy generation and use:

BRAZIL: PRIMARY ENERGY SOURCES
(Percentages)

	1952	1977	1978 (National energy balance)
Firewood	49.9	20.2	21.5
Petroleum	28.8	41.7	43.7
Water	11.2	26.1	23.8
Coal	6.1	4.0	3.5
Charcoal	2.7	2.4	3.2
Bagasse	2.1	-	4.2
Natural gas	-	0.5	-
Alcohol	-	0.5	0.1
	100.0	100.0	100.0

In 1940, 80% of Brazil's energy consumption came from the 'biomass' (energy derived from organic matter), 5% from coal and the rest from hydroelectricity. Today, electricity represents nearly one-fourth of the total, the use of coal has remained stable and the biomass has been replaced by petroleum.[2]

Even superficial observation shows that a 'modernization' of the country's energy sector took place. But what does it consist of? Basically, the replacement of energy sources derived from the biomass (renewable) by non-renewable fossil fuels (coal and petroleum) which, moreover, the country does not produce in sufficient amounts. Moreover, the answer to the question of who consumes this energy is

[2]Lecture given by José Goldemberg in Porto Alegre, 17 April 1979; quoted from the mimeographed version.

implicit in the characteristics of the 'Brazilian development model'.[3]

1. The transport system has come to depend directly on automobiles and trucks, which has necessitated the construction of an enormous and costly roadway infrastructure and an increase in the proportion of liquid fuel within total energy consumption. It has been calculated that in 1978, 96% of passengers and 70% of freight were transported by road.[4] It is worthwhile noting that "transport" accounts for 98% of the consumption of gasoline and 73% of that of diesel fuel.

2. In manufacturing, the principal consumers of petroleum-based fuels and of electricity were the following, by order of size of consumption:

Petroleum-products fuels	*Electricity*
Non-metallic minerals	Metallurgy
Chemicals, rubber, leather	Chemicals, rubber, leather
Metallurgy (including steel and iron production)	Food, beverages and tobacco
Food, beverages and tobacco	Textiles, clothing and footwear
Textiles, clothing and footwear	Non-metallic minerals

[3]The evaluations differ: for example, in "Energía no Brasil", José Goldemberg calculates consumption as follows: industrial use, 29%; domestic and commercial use, 53%; and transport, 18%.

With respect to energy consumption by the transport sector, it is worth giving other significant data:

Inland transport of goods in various countries (1960)

	France	Italy	USRR	USA	W. Germany	Brazil
Railway	58	29	86	38	50	19
River	11	1	6	44	27	9
Road	31	70	6	18	23	72
Coastal transportation			2			

Source: Reproced from J. Goldemberg (in consultation with Robert H. Williams), *Energy Strategies for Developed and Less Developed Countries*, Center for Environmental Studies, Princeton University Press, 1978, Table XV.

[4]Data from "A Política Energética de Oposicao", mimeographed publication, 1979.

It may be noted that with the exception of 'food, beverages and tobacco' and 'textiles, clothing and footwear', the share of these sectors in the total value of national manufacturing output is relatively low:

PERCENTAGE SHARE OF PROCESSING INDUSTRIES IN THE TOTAL VALUE OF OUTPUT

	1959	1970	1974
Non-metallic minerals	4.5	4.1	3.4
Chemicals, rubber, leather	12.5	13.2	2.2
Metallurgy	10.5	12.5	14.1

Source: Statistical Yearbook, IBGE, 1975.

3. Energy consumption in the various regions of the country was extremely uneven:

BRAZIL: POPULATION AND ENERGY CONSUMPTION, BY REGION, 1975

		Electrical energy		*Petroleum*	
Region	Population %	%	MWh/year per capita	%	Litres/year per capita
North	3.8	1.5	0.242	3.1	304
Northeast	29.9	11.2	0.241	11.3	139
West	5.7	2.2	0.253	3.6	229
South	15.0	11.5	0.417	17.5	359
Southeast	42.5	73.6	1.120	64.5	559

Source: José Goldemberg (in consultation with Robert H. Williams), *Energy Strategies for Developed and Less Developed Countries, op. cit.*

I feel it is necessary to introduce more data so as to illustrate the extent to which the economic development model based on the rapid diffusion of consumer durables, the concentration of income and regional inequality relies upon the distribution of energy consumption, which has increased as rapidly as economic growth itself:

BRAZIL: PRIMARY ENERGY CONSUMPTION

(In thousands of ETPs: equivalent tons of petroleum)

Year	Petroleum	Hydro-electricity	Coal	Firewood	Miscellaneous	Total
1967	17 371	8 465	2 048	19 291	4 300	51 475
1972	28 740	14 918	2 491	17 661	6 306	70 116
1975	39 300	21 412	2 850	19 328	7 434	90 324
1977	43 063	26 953	4 106	20 885	8 245	103 252

Source: Ministry of Mining and Energy, *Balanço energético nacional*, 1978.

With respect to production, the biomass was replaced by petroleum as a source of energy, coal has not increased significantly as an input, and hydroelectricity is expanding at a reasonable rate: in fact, its growth has been notable. In 1967, thermal electricity represented 20% of the entire installed electrical capacity, whereas in 1977 in represented barely 15.8%. Total energy consumption in 1976 was 77 631 gWh (705 kWh per capita, whereas the projection for average Brazilian per capita consumption for the year 2000 may be calculated at around 1 678 kWh/inhabitant, equivalent to the current consumption pattern in Western Germany).

The country's hydroelectricity potential is considered more than adequate to cover foreseeable consumption, if the energy consumption profile determined by the current 'style of development' is maintained.

However, potential energy sources are not interchangeable. Liquid hydrocarbons, derived from petroleum and coal, are only partially replaceable by electricity, and only for industrial consumption. The critical problem of their production therefore arises.

The data indicate another significant factor supporting the view that the energy balance reflects the style of development. The National Energy Balance for 1978 indicates that 83% of the petroleum consumed is imported, and 40% of total energy consumed is imported, wherein 37% corresponds to petroleum and 3% to coal. Brazil spends US$ 5 billion per year on petroleum imports alone.

BRAZILIAN HYDROELECTRICITY POTENTIAL (MW)

Region	Installable energy[a]	Estimate[b]	Total
Southwest and centre-west	40 900	12 220	53 120
South	27 100	13 540	40 640
Northeast	13 440	480	13 920
Amazon basin	21 200	59 650	80 800
Binational	10 700	1 200	11 900
Total	*113 340*	*87 040*	*200 380*

Source: ELETROBRAS (Antonio Coló, Depto. Etudos Energéticos; Antonio Carlos Tatit Holtz, Depto. Geracao and Joao Carlos R. de Albuquerque, Depto. Etudos Energéticos; a work submitted to the Brazilian Energy Conference in Rio de Janeiro, December 1978).

[a]Inventory based on topographical surveys in the areas and minimum ratios in 40 years.
[b]Estimates based on aerial photographic surveys and minimum flows in 40 years.
[c]Half of the potential was calculated in the case of binational usage.

In sum, the development options have led to a dangerous external dependency in energy, all so as to create a style of development which, according to the physicist José Goldemberg (as well as the experience of the man in the street) asphyxiates the urban population with pollution, while annoying it with the problem of private transport, and catches us all up in the infernal merry-go-round which leads us to consume more and more liquid fuel that we do not produce.

If until 1973 one could still believe that, for good or for ill, there were no limits to the development of the pattern of civilization which 'modernity' symbolizes, since then the situation has changed. The 'partial exhaustion' of petroleum reserves has come to be recognized as an irreversible trend in the contemporary world. It is irrelevant for our purposes whether this exhaustion is *physical*, or a political problem; the fact is that a 'growing deficit' is expected after 1982.

Faced with this situation, the Government has had to propose alternative solutions to the energy problem. The matter was postponed and delayed for many years, finally surfacing with force in 1979. The problem was brought up in the following terms in a presidential statement in early July: together with combating inflation and the stimulation of agriculture, the energy problem wich affected the balance of payments was becoming a priority; measures both to restrict consumption and to replace petroleum and its products with local products were called for.

From the proposal of the 'new energy policy', it became evident that from the point of view of hydroelectricity there were no constraints on future development, and although the nuclear programme would complement that type of energy, its weight would be relatively reduced on the whole.[5] Therefore, the crucial matter is that of *petroleum substitution*.

Indeed, local petroleum output in relation to consumption is estimated as follows:

BRAZIL: PETROLEUM OUTPUT AND CONSUMPTION[a]

Year	Petroleum output (bbl/day)	Petroleum output including shale in the PETROBRAS fields and alcohol-added (bbl/day)	Petroleum consumption (bbl/day)
1976	171 950	171 950	845 075
1977	166 400	166 400	832 000
1978	167 160	193 833	898 560
1979	164 035	218 865	970 445
1980	366 822	485 732	1 048 000
1985	410 319	612 862	1 539 973

Source: A. Almeida Rocha *et al.*, "Petróleo e carvão mineral na política energética brasileira", 1977 (mimeographed).

[a]These data were taken from the above source, which is a careful study. For the projections from 1978 onwards, account was taken of the future decline of current producers at an annual rate of 3% as well as the contribution of new wells, approximately 210 000 bbl/day as from 1980, with an annual growth of 10% between 1980 and 1985.

Under these conditions, the Government must, in the final analysis face three non-exclusive alternatives: to promote petroleum substitution, to promote petroleum saving (through rationing and appropriate pricing policies), or to change the style of development itself. For the moment, in view of the rigidity of the associated dependence model, it must be expected that the policies proposed will relate to the first two.

If we begin with the problem of greater economy in petroleum use and of pricing policies, we must point out that in general, *waste* is an essential element of the current style of development. Of course, there is general waste in all energy production and its consumption, for

[5]Since it is beyond the purpose of this work, we will not discuss the complex problem of nuclear energy, which has so many uncertain and negative effects on the environment and on the determinants of the country's policy. In energy terms it is necessary to note that nuclear production does not replace liquid hydrocarbons and that, as a supplement for hydroelectricity, it would at best cover 10% of the total by the year 2000.

technological reasons relating to energy generation and transmission. A semi-official document admits that "56% of the country's raw energy is lost when it is transformed into usable energy, a quantity sufficiently large to warrant measures to improve the efficiency of transformation".[6] In addition to this loss, both electricity and petroleum are over-used due to architecture that is inappropriate for individual transport, irrational urban plans deriving from real estate speculation, etc.; in short, the incidental costs of the capitalist model of development —incidental to the model, but integral parts of the system.

Nothing significant has been done or proposed in this respect. The Government expects to impose petroleum saving and relative control of waste through the pricing policy which, so far, has been *subsidizing* consumption. It may seem senseless (and it is, from many points of view) but, for example, 'modernization', the expansion of the automobile industry, leads to the following contradiction: in a poor country lacking in petroleum, prices are subsidized. The following table provides insights for evaluating the relative scope of the price subsidizing policy:

SUBSIDIES AND INVESTMENTS IN THE ENERGY SECTOR

	Billions of Cr$
Approximate value of the subsidy for LPG diesel fuel, fuel oils and gasoline in 1978	24.0
1978 investments in Itaipú Binational	15.0
1978 investments in Furnas Electricity Power Staions	9.9
"Pro-alcohol" programme up to February 1979	6.9

Source: M. F. Thompson Motta, "Problemática Energética de Atualidade Brasileira", in *O Estado de São Paulo*, 8 April 1979. Subsidies were calculated for an annual demand of 15 billion litres at the rate of Cr$ 1.6 per litre set by the National Petroleum Council.

This year, 'relative austerity' measures are being taken: prices are rising significantly and service stations are closed in the evenings, on Sundays and on holidays. This is all part of an attempt to limit the level of imports to 960 000 barrels per day, which is extremely high and burdensome.

With respect to replacement of naphta by other hydrocarbons, the policies which are currently being discussed provide the following options: firstly, the decision has already been reached to mix naphta with 20% alcohol, the latter being produced through sugar-cane fermentation (ethanol); gradually replacing petroleum with coal and charcoal; mixing 20% gasoline into diesel fuel, to the extent that there is a surplus of the latter because of the use of alcohol; and mixing 7% anhydrous alcohol with diesel fuel (statement by the Ministry of Mining and Energy, *O Estado de São Paulo*, 12 July 1979).

An extremely interesting possibility arises from this group of measures. In practice, Brazil must decide, in the next five years, how to harmonize its external dependence in the field of energy and its own style of development since, as we have seen, both of these aspects are interrelated. There is a possibility of replacing naphta with alcohol, which is technically feasible but implies additional options: it is necessary to reconsider the production engineering of combustion engines and to cope with serious problems connected with both alcohol supply and distribution (since it is more corrosive than gasoline) and with the technology for its extraction.

These problems are being debated intensively; there is a desire to create or develop a technology (that of sugar-cane alcohol which is currently in use was imported 30 or 40 years ago, and has already been totally absorbed by local producers) and to opt for new directions. In this sense, the biomass may be revalued as an energy source through the use of sugar cane and eucalyptus or pine for alcohol extraction

[6] Ministry of Industry and Commerce, Department of Industrial Technology, 1979 (mimeographed document), p. 6.

(methanol). According to José Goldemberg, this had made it possible to "take the indisputable lead in a field of vanguard technology" (*op. cit.*, p. 9). Since in the production of alcohol, whether from sugar cane (ethanol) or from eucalyptus or pine forests, energy is also consumed, it is necessary to investigate the relative advantages more thoroughly. On a preliminary assessment based on reasonable hypotheses, methanol has obvious advantages:

ENERGY EFFICIENCY

Crop	A Energy produced (Mcal/inhab./year)	B Energy consumed (Mcal/inhab./year)	Efficiency A/B
Sugar cane (ethanol)	18 020	5 801	3.66
Eucalyptus (methanol)	18 407	1 613	11.4
Pine (methanol)	21 362	1 729	12.4

Source: Lecture by José Goldemberg, *op. cit.*

Thus, the development of a plan for using the biomass requires new technological decisions, the adaptation to the local production technology of methanol alcohol distilleries (if this is the solution) and the discussion of agricultural problems involved in each alternative (sugar cane requires very fertile land, and in order to meet energy needs the crop would have to occupy nearly one-third of the land currently cultivated as well as one-third of the labour force).

To some extent, the bottleneck caused by the petroleum crisis raises the problem of the future of the Brazilian economy. The crisis may be solved using the alternatives suggested, based on the country's material resources; but this would imply revising the style of development, since it calls for the creation or development of new kinds of production technology and in the final analysis leads to a change in an essential component of the existing framework of structural dependence.

Obviously, the solution of the energy crisis through a more intensive utilization of the biomass using new technology does not solve the global problem of the style of development nor that of its relationship with the environment. At best, it must be recalled that the production of sugar-cane alcohol generates an extremely polluting by-product which is currently responsible for the 'death' of many rivers. Studies have been made on ways to transform this residue into fertilizer, but the subject must be researched more thoroughly and the plans must be economically viable. Strictly speaking, the problem remains that an energy plan based on the use of alcohol would require financial efforts over a long period, during which external dependence in energy matters would continue to be considerable. And there is still the crucial problem that attempts are being made to replace naphta by alcohol so as to sustain the *same* style of development. Finally, the alcohol plan cannot replace the fundamental option with regard to energy dependence, which relates to the industrial consumption of fuels and not gasoline.

Consequently, the basic choices must not be restricted to the analysis of technological substitutes: they must take fully into account the pattern of civilization which answers the questions of *who* consumes energy and *for what purpose*.

II

The Urban Problem

Another stricking characteristic of Brazilian development is rapid urbanization. This trait is common throughout Latin America, although there are differences in this case: instead of occurring according to the model of the *primate city*, urbanization leads to a distribution of cities according to the *'rank size'* pattern.[7] In other words, whereas in most Latin American countries there is an enormous urban concentration in a single city (the capital city), in the Brazilian case the distribution among the cities in the various regions is more balanced. In relative terms, the urban concentration in Rio de Janeiro and São Paulo, the two largest cities in Brazil, is *declining* as a proportion of urban concentrations of 20 000 inhabitants or more, sinking from 52.8% in 1920 to 28.1% in 1970.

In the recent urbanization process, the creation of many cities and the proliferation of populations of more than 20 000 inhabitants are noticeable. There were 74 of these in 1920; by 1950 they had increased only to 85, in 1960 jumping to 155 and in 1970, to 270. In 1950 there were only three cities with more than 500 000 inhabitants, and in 1970 there were 11.

Consideration of the growth rates provides a dynamic view of this process, as shown in the following table.

BRAZIL: POPULATION DISTRIBUTION AND GROWTH IN LARGE CITIES OF 100 000 OR MORE INHABITANTS IN 1970, BY TYPE OF CITY, 1960-1970

Type of city	No.	Percentage of the group within total urban population in cities of 100 000 or more inhabitants		Growth rates
		1960	1970	
1. Municipalities of Rio de Janeiro and Sao Paulo	2	39.9	38.7	4.7
2. Municipalities of other metropolitan regions (MR)	7	24.6	23.1	4.3
3. Non-metropolitan cities of 250 000 inhabitants or more	6	6.4	7.6	6.8
4. Cities of 100 000 or more inhabitants in metropolitan regions	13	10.1	11.7	6.6
5. Cities of 100 000-250 000 inhabitants outside the MR:				
(a) Northeast	8	5.8	5.6	4.8
(b) São Paulo	8	4.3	4.5	5.3
(c) Miscellaneous	16	8.8	8.7	4.8
6. Total	60	100.0	100.0	5.0

[7]In this respect see Vilmar Faria, "O Sistema Urbano Brasilero: um resumo das características e tendencias recentes", in *Estudos CEBRAP No. 18*, São Paulo, 1976. The data used later are taken from this article.

This *rapid* and *widespread* urbanization process naturally reflects the nature of the process of Brazil's economic growth, which traditionally took place through agricultural

export cycles which traversed the country's territory from north to south, according to the weight of various tropical products (sugar cane, cocoa, coffee, rubber, etc.) and of mining activity in the export booms. But what is particularly noteworthy is that recently urbanization was linked both to industrialization (which was *not* entirely concentrated from the spatial point of view) and to agriculture and services. Vilmar Faria has pointed this out, and especially the fact that the urban population expanded faster than industrial employment in the north, central-west and northeast, whereas the opposite was true in the southeast and the south.

At any rate, it would be wrong not to stress the relatively less spatially concentrated pattern of Brazilian urbanization and the fact that it is not only accelerated industrialization which leads to urbanization. The division of labour between city and country and the concentration of urban population also took place in Brazil as a function of the *capitalization of agriculture*. This is what happened with coffee in São Paulo and is currently taking place with soya, and in a more general manner with the expulsion of the share croppers from the ranches and the formation of a rural proletariat (the *boias-frias*) inhabiting small- and middle-sized urban agglomerations. The formation of urban nuclei may even be observed in pioneering activities.

Clearly, the high growth rates of the urban population do not reflect solely the natural growth of the population. Migrations continue to characterize the spatial distribution of the population.

METROPOLITAN REGIONS:
TOTAL AND MIGRANT POPULATIONS, 1970

Metropolitan regions	Total population	Migrant population	%
Greater São Paulo	8 139 730	4 306 625	52.9
Greater Rio de Janeiro	6 891 521	3 156 358	45.8
Recife	1 729 127	583 534	33.7
Belo Horizonte	1 645 519	817 122	49.7
Porto Alegre	1 548 140	754 730	48.7
Salvador	1 194 578	348 072	29.7
Brasilia	537 492	417 300	77.6

Source: IBGE, *Censo Demográfico de 1970.*

BRAZIL: GROWTH OF THE METROPOLITAN REGIONS, 1960-1970

Regions	Urban population 1960 (1 000 inhabitants)	Urban population 1970 (1 000 inhabitants)	Average annual geometric rate 1960-1970	(%)
Greater Belén	383	606	4.7	5.3
Greater Fortaleza	496	846	5.7	4.6
Greater Recife	1 050	1 598	4.3	4.6
Greater Salvador	656	1 047	4.8	4.7
Greater Belo Horizonte	791	1 505	6.6	4.7
Greater Rio de Janeiro	4 551	6 847	4.2	4.2
Greater São Paulo	4 370	7 437	6.0	5.9
Greater Curitiba	378	647	5.5	6.7
Greater Porto Alegre	886	1 402	4.7	4.5
Total	*13 561*	*22 360*	*5.1*	

Source: R. Vas da Costa, "A explosao demográfica no mundo e no Brazil", BNH, Río de Janeiro, 1973, p. 41.

METROPOLITAN AREAS (1970): ORIGIN AND CURRENT DOMICILE OF THE MIGRANT POPULATION

Areas	Total migrant population		
	Total (100%)	Urban origin (%)	Rural origin (%)
Greater São Paulo	4 306 625	77.1	22.9
Greater Rio de Janeiro	3 156 758	76.6	23.4
Recife	583 534	77.6	22.4
Belo Horizonte	817 122	83.4	16.6
Porto Alegre	754 730	79.3	20.7
Salvador	348 072	83.8	16.2
Brasilia	417 300	86.4	13.6

Source: IBCE, Censo Demográfico de 1970, *apud.* C. Spindel, *Metropolização e Recursos Humanos*, Cuadernos CEBRAP, No. 25.

It may be noted that the population is intensively redistributing itself *among cities*, although certain provinces continue to *lose population* and new zones are *emptying* (particularly in the northeast, Minas Gerais and Espíritu Santo), which is caused not only by economic stagnation but also particularly, and especially in the areas of São Paulo and Rio Grande do Sul (which are also losing their population), by the manner in which capitalism in agriculture is progressing.

The purpose of this brief frame of reference is to analyze the distribution of the population and to highlight and debunk certain aspects of the current economic development process. In reality, much has been said regarding the accelerated urbanization of Latin America; few regions in the world have such a drastic separation between the rural and urban style of life. In Europe and the United States there is a certain continuity between the two styles, and it is only in the large cities that a global opposition arises, facilitating the creation of an 'unnatural space' which serves as the basis for the typical life of industrial societies.

In Latin America, in contrast, even the small- and medium-sized cities rapidly break their continuity with the natural environment. They become 'dehumanized', although strictly speaking they are an exclusively human product: there are practically no trees to be seen, the 'green belt' becomes an abstraction referred to by administrators but invisible to the inhabitants of these cities; and finally, reinforced concrete conceals the transformed natural environment.

In this sense, urbanization in Brazil, although 'well distributed', is also incapable of preventing the environmental problems derived from the process.

On the other hand, it should be noted that figures often hide the facts. A Brazilian city of 100 000 inhabitants may indeed fall in love with skyscrapers and concrete, and will always be distinguished by some architectural insult directed at the sky. But beneath the 'created support' there does not pulse an 'urban culture' in the European sense: no theatre life, no talks and lectures, no film-making, nothing of what usually characterizes 'modern life', with a single enormous, overwhelming exception: the forest of television antenna revealing the emergence of a 'mass culture'.

It is this extraordinary situation of a vital base (which breaks with the rural environment without having previously passed through the stages peculiar to 'urban-capitalist civilization' and bursts into the 'mass civilization') which sociologically distinguishes the country's 'urbanization'. Strictly speaking, 'mass civilization' exists only in some metropolitan areas, but it appears symbolically, as an aspiration and in caricaturized form, in the network of little-big cities with their skyscrapers and televisions, sometimes without industrialization and near-

ly always without a social environment capable of genuinely sustaining a mass civilization.

In the caustic pages of *Tristes tropiques* Levi-Strauss, referring to American urbanization in general (with his European-capitalist sensibilities, naturally) lamented the fact that the cities of the continent were becoming decadent without first having known civilization. In a less allegorical manner, we would say that Brazilian urbanization is the product of an energetic invasion by *oligopolitical capitalism*, which destroys the existing precarious balance in the country/city relationship (that is to say, it renews the social division of labour); and indeed, rather than tending towards the formation of an urban base compatible with the 'new society' it puts everyone in the same drawer and locks it through speculation in urban land, combining rich areas with poverty-stricken ones, both of which often lacking the basic infrastructure for water, light, drainage, telephones, etc., characteristic of 'modernity'. The rich areas are better able to look after themselves: when public services are lacking, private means replace them at a very high cost so as to achieve 'urban' living conditions. The poor areas are shanty towns, *favelas*, where malnutrition and infant mortality run rampant.

At all events, and again recognizing that the form of the Brazilian urbanization process derives both from the structural characteristics of its agricultural exporting past and from the current capitalist integration of society into international forms of production (which are now penetrating the countryside with greater force), attention must be drawn to the opportunities and alternatives involved in Brazil's urban growth.

Firstly, we feel that any judgement based on 'backwards-looking utopias' must be avoided. The rural past was always precarious for the poor; even today, the greater supply of education, health and wages to be found in the cities remains decisive in stimulating migration. This precariousness and instability means that they cannot be viewed as a genuine basis for an 'industrial mass civilization'; and this should be emphasized not in order to idealize the rural past, but rather to force the urban alternatives for the future to be improved.

Second, it should be stated that the 'modern' underdeveloped city (although it may be overpopulated) is the *locus par excellence* of the mass form of capitalist pillage. Here it is that the mass of wage-earners (minus the sector of wage-earners who in fact pocket the return on capital — 'executives' and the like) suffer *in the same conditions* the effects of the capitalist-oligopolitical civilization. In practice, it is in the city, and especially in the large city, that bad collective transport systems, environmental pollution, lack of green areas and lack of drainage suddenly become rife; in short, that the diseases of a society which 'grew' economically more rapidly than it 'developed' socially are manifested.

This melting-pot, wherein the mass of salaried workers is dissolved in the harshness of life, unites persons and groups from different structural situations: the factory worker and the bank employee, the company lawyer and the industrial labourer. Hence the enormous importance of both wage demands and urban protests: they unite aspirations and struggles which were separated during the period of the competitive capitalism of the 'integrated cities'.

In the Brazilian case, movements to transform life through urban demands are just beginning. But just as energy alternatives were vigorously proposed in recent years, it must be expected that the future of Brazilian development will be largely linked to the direction of urban options. The existence as mentioned earlier of a reasonable urban network makes it possible to take decentralizing measures in urban policy, which will depend not so much on industrial localization, a problem of which the policy makers are currently aware, as on an understanding of two types of interrelated phenomenon: that there will be substantial improvements in the living conditions of urban populations only if they organize to express themselves through urban movements and protests, and if the 'social policies' are decentralizing in nature.

So far, little has been done in this connexion. Public budgets are increasingly concentrated in the hands of the central government (as was to be expected in military-authori-

tarian régimes), at the expense of the provinces and municipalities. Health and education plans, in addition to being 'private-oriented', do not actively extend these services to the country or to small cities. Housing plans, as has already been mentioned, tend to strengthen large-scale capitalist accumulation and when channelled to the construction of housing they give preference to the middle- and high-income strata. We could continue enumerating problems of this type.

In conclusion, it may be said that the urban base has expanded, an with it, the services which it entails; however, this entire process has reflected the general pattern of concentrating development. There has been an accentuation of the old trend toward a nearly total break between the city and the country, and its effects have not been reduced as in the United States and Europe, by the creation of a technological base pertaining to the 'supercity' of industrial civilization. The latter has consisted more of the 'external' aspects of the mass culture that reach the small cities than of material resources actually made available to the inhabitants.

III

The Settlement of New Areas: the Amazon Basin

We have already noted a relative advantage of the Brazilian development process: the existence of plentiful virgin land which can be developed. In terms of alternative policies, however, this relative advantage is being reduced as a result of the style of development which concentrates wealth and depoils both men and nature.

The history of the incorporation of virgin land into Brazil's capitalist economy is long and repetitious, stretching from the individual act of daring of the old settler who penetrated the jungle to the expulsion of this same *posseiro* (homesteader) of his descendants by the large landowners — or, as happens today, by the capitalist enterprises. Nothing in all this is peculiar to the Amazon region.

What is unique is the gigantic scale of the areas involved, the violence of the working methods used, the 'advanced capitalist' nature of the initiatives, and the decisive role of the State (and the military régime) in shaping the 'new conquest'. Furthermore, all of this takes place within the framework of a debatable ecological policy (if one exists) which purely and simply leads to the depredation of the country's natural heritage.

In the past, the process of settling the Amazon basin has followed the course of the rivers and concentrated fairly large settlements on the river banks. Belén and Manaos, for example, are important cities and even at the start of the century provided a reasonable basis for urban life. In that period, rubber could be exploited by employing abundant migrant labour from the northeast: the region's population increased from 400 000 in 1872 to 1 400 000 in 1920. The rubber-producing economy decreased in importance after the First World War, but the activity did not disappear, and with it there was always Brazil nut harvesting. These forms of economic activity which exploit the workers, although based on the large plantation and the domination of the economic system by traders and importers, did not affect the natural base which served to sustain the economy. The same was true of mining, basically of gold and precious stones, and stock-raising. Such a precarious economic base did not even come to constitute a solid local bourgeoisie, although it was able to attract hundreds of thousands of migrant workers who underwent the bitter experience of the northeast's deprivation in the poverty of the Amazon. The owners of the large tracts of land and the rubber producers (known as *'seringalistas'*) lived in constant debt to the local traders who, for their part, turned for resources and liquidity to the representatives of the major export-import

firms (generally foreigners), who lent money at high interest rates.

Under the State's initiative, an end was recently put to this situation. The advance of large-scale capitalism in the central-southern area of the country made possible the transfer of financial resources to the Amazon; the advance both of enterprises and of the modern capitalist State, which managed the common interests of the propertied class. In Brazil's case, the latter is based both on local enterprise and on multinational corporations; and indeed, to undertake the conquest of the Amazon, foreign capital was called in from the start (currently, around sixty large foreign enterprises operate in the area).

It would be wrong, however, to suppose that a process on such a scale could get underway without involving extra-economic interests. On the contrary, in the case of the Amazon, ever since interest in the region was revived with the government of Castello Branco and especially from 1967 to 1973, geopolitical motives were constantly invoked to justify State activity in the region. The problem of the 'population vacuum' in the area, despite the future risks of 'foreign greed', and the fascination with a mythical Eldorado which was imagined as (if not paved with gold), at least overflowing with other mineral and natural resources, were among the motives and projects which led to the current policy of populating and profiting from the Amazon.

Among the development options for tackling the Amazon problem there was an enormous range of possibilities. The area had been penetrated centuries ago under a strategy which consisted of settling the areas next to the rivers and using them to penetrate the jungle, while establishing military settlements in the frontiers. The land largely belonged to the local states, or its ownership was in doubt.

At first, nothing seemed better than to establish rational plans for the distribution of the land among those who worked it so that, based on populated nuclei, the jungle could be penetrated without being destroyed. But this was not the strategy that was followed. Preference was given to the proposal for a daring plan: the construction of a trans-Amazonian highway to transfer settlers from the northeast and distribute them in nuclei scattered throughout that vast area. Simultaneously, it was decided to concentrate vast financial resources in the hands of major private investors,[8] who would undertake on a large scale the penetration of the jungle so as subsequently to begin stock-breeding and crop-raising activities. Especially in the period 1970 to 1974, this was masked under the ideology of 'national greatness', together with mining which, naturally, was undertaken through large enterprises, nearly always multinational, or through joint ventures with them. A by-product of this process has been enormous land speculation, including the sale of large areas to foreigners and all sorts of frauds with respect to property deeds, leading to violence when attempts are made to dislodge the old settlers.

The results of this impressive policy to benefit the major enterprises were not long in appearing: after 1974 (the Geisel government), the rate of colonization began to decrease, as did the interest in constructing roads such as the trans-Amazon which, after running from east to west (consequently, paralleling the Amazon river some hundreds of kilometers to the south), links areas with small capacity to generate intensive road traffic. But the strategy

[8]The best-known case of foreign investment is that of Jari Florestal e Agropecuaria, which owns 1,5 millions hectares, covering around 12 000 km^2 and potentially 36 000 km^2. The owner has already invested around US$ 200 million in it, and the total investment (agricultural project) is around US$ 300 million. The industrial project (including electricity power stations and pulp mills) amounts to US$ 400 million. The project is administered in close contact with the Government by retired military officers, whom the enterprise recruits.

In the case of enterprises operating in the south of the country, it may be noted that these investments are made with significant fiscal support through financing and the transfer of income taxes to capital formation destined for the Amazon region. Furthermore, in some cases there are customs exemptions for equipment imports.

The present government is prepared to transfer, on the basis of 'risk agreements', 12 areas totalling 40 million hectares for siting the first productive forests. If we are to believe official statements, this will all take place while respecting the ecological requirements necessary to preserve the jungle. There are official suggestions for increasing the obligatory forested area (currently at 50%) for agricultural enterprises. It must be noted, however, that whatever the criteria adopted, their application and control are extremely uncertain in such an extensive area which is so poorly controlled administratively.

of settling the Amazon through large enterprises was not only maintained, but *accentuated*. Policies were not formulated that could unite the scattered population, which made colonization difficult, nor was as attempt made to distribute the land so that it could be worked; rather, policies which concentrated ownership and exploited the workers were implemented.

Furthermore, despite the protests of ecologists and anthropologists, the forests were not protected, nor did the indigenous populations receive any benefit. It should be pointed out that there are still indigenous groups in the Amazon which have no contacts with other peoples, a situation unparalleled anywhere else on the planet, and of enormous cultural significance. But none of this is given due consideration. The argument in favour of conquest is simple and vulgar: it is noted that 'not even 4% of its 5 million km² has so far been exploited', and that consequently there is no reason to worry (in this connexion, see the statements of the Minister of the Interior, in the newspaper *O Estado de São Paulo*, 7 April 1979). It is difficult to determine how many of the 260 million hectares of the Amazon jungle were affected; perhaps, in fact, not even 10%. But the problem is not size but the trend which this indicates.

After severe criticism was directed at the policy of conquest and colonization in the period up to 1974, the Government decided to 'exploit the jungle rationally'. What does this strategy, reaffirmed by the current Government, consist of? Basically, it means stimulating only the major agricultural projects (a criterion already adopted by the previous administration and applied south of Pará and north of the Matto Grosso) and colonization projects, handing over the latter activity to the private sector, and especially large-scale wood exploitation.

Generally, ecologists have protested this strategy, which consists of treating the heterogeneous tropical jungle as a homogeneous whole and, as in the already famous Yari Project case, of adapting imported vegetable species which have varying yields, as wood or as a raw material, for pulp, for example. There is thus a confrontation between an attitude favouring economic calculation and exploitation, which even though it pretends to be 'rational' is potentially destructive, and one which seeks to preserve the ecosystem. Since 'the Amazon is large', the jungle is being destroyed while the ecological and social consequences of the 'major proyects', which often use semi-forced labour[9] and always, due to the very nature of the task of penetrating the jungle, apply extraordinary roughness in the use of human labour, are being discussed.

The pace at which the jungle is penetrated may be very rapid. The world market for 'non-coniferous' wood, such as the wood from tropical jungle trees, is growing extremely rapidly, whereas the supply is decreasing. It is calculated that the jungles of Southeast Asia will last more or less 27 to 30 years and the African jungles, between 13 and 30 years; these are the major suppliers. Consequently, there is an ample market for Amazonian wood.

For this reason, in Brazilian forest resources the opposite of what happens with petroleum takes place: we have a renewable and abundant resource available to us. Based on this criterion, if a high degree of ecological awareness could be maintained it would actually be possible to incorporate the Amazon into the international economy without destroying the natural heritage. And if the régime would orient itself to benefit the population, it would have to do so without recourse to over-exploitation of the labour force, as currently takes place.

But to what extent is this feasible?

Again, as in the case of energy and the urban problem, it is not a matter of the *physical limits* to development (because abundance is involved here) but of the limits of the economic system and the current socio-political order. Despite official statements and reports and the technological resources available, it is clear that the *form of incorporation* of the Amazon derives from an internationalized oligopolistic economy which finds in the State (with all its contradictions and conflicts) a basic supporter for rapid accumulation.

[9]For a more detailed analysis of this process and of the settlement of the Amazon, see F. H. Cardoso and G. Muller, *Amazônia: expansão do capitalismo*, São Paulo, Ed. Brasiliense, CEBRAP, 1977.

IV

Final Remarks

In the light of the above, in what terms should the problem of the alternatives and prospects of Brazilian development and the State's role in it be considered? Few underdeveloped countries have as broad a natural resource base and a population volume similar to Brazil's for undertaking a development strategy whose touchstone is *self-reliance*. The very cultural base which is available and the 'sophistication' of the technical decision-making parties theoretically would ensure this opportunity. The case of energy which is briefly outlined here actually exemplifies the manner in which the alternative technology challenge is within the reach of the country's resources. The size of the domestic market and the economy's dynamism do not weaken this hypothesis.

However, it is not a question merely of changing the 'style of development' so as to give the new style the will to be independent, nor may it be imagined that the State apparatus, so sophisticated in terms of organization and techniques, will direct its policies to attend to basic social needs. The Amazon case, although discussed briefly, indicates that the State acts as a lever to promote the growth of the large private enterprise, and that in the latter it sees an engine capable of promoting colonization, the penetration of the jungle and the exploitation of minerals and wood. It is true that in the Brazilian case the State has also become an entrepreneur. But its principal investment agencies (like the BNDE), and even its policy regarding prices, purchases and the expansion through joint ventures of State enterprises, constitute a basic component of the capitalist system of accumulation.

In other words, and expressed more directly, let us say that the prospects for Brazilian economic growth are many; the opportunities which will open up in connexion with the preservation of cultural autonomy, the natural heritage and the satisfaction of the population's social needs will depend upon political changes sufficiently profound so as to counteract, if not radically change, the trend towards an economy based on oligopoly and internationalization. If this should take place, the problem then arises of the possibility of socialism in a country which is industrializing on the periphery of the world economy; but this subject is obviously beyond the scope of this work.