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SCIENCE AND TECHNOLOGY POLICY INSTRUMENTS PROJECT \*

Analysis of the technological content of the Three Year  
Development Plan.

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Explicit scientific and technological policies and implicit technological contents of the Three-Year Plan

Theoretical Framework

All policy instruments, and planning instruments in particular, contain a series of postulates which make specific reference to objectives, goals and measures to be attained in the sector of science and technology, since the product of this sector is considered of primary importance in the achievement of global aims.

There are, on the other hand, ST needs which can be inferred from a reading of the general and sectorial objectives, as well as from projects and programs planned to achieve these aims. The implicit contents arise from the very existence of proposals for the quantitative and qualitative modification of the country in question. In the case of proposals for quantitative modification, the normal development of knowledge (and the incorporation of new knowledge into the elements of production) shows that new technological structures are implicit in any growth attempt. Thus, the technological factor intervenes in a planning design in two forms:

- a) by conditioning the attainment of fixed goals;
- b) by conditioning the coherence of the global model, i.e. the possibility of attaining simultaneously:
  - 1. all quantitative goals
  - 2. the goals and the objectives.

This becomes more important when the country in question is governed by a system in which the direct "quantitative" extrapolation of the existing situation hampers the achievement of far-reaching structural reforms.

An example of case a) would be a situation in which the attainment of the planned rate of growth depended in a large measure on a substantial increase in global productivity. In such case, failure to incorporate modern

technology would seriously limit the possibility of achieving the desired ratio of product increase.

Case b) would occur in situations where the full employment of manpower at high salary levels were a policy aim and had to be reconciled with the increase in productivity referred to above, while lacking the suitable technologies needed to achieve both these objectives simultaneously.

Another example, often found in dependent countries, and which shows the important role of the technological factor in planning designs, is that of attempts made to modify the structure of production by modernizing it with a proportionate increase in "autonomy", when the capacity to generate knowledge is lacking. Generally this results in an increased dependence on foreign technological and financial assistance. The problem of the "tempos" of economic, scientific and technological development shows even more clearly the importance of studying the scientific and technological contents of a Development Plan.

The need to achieve rapid growth within a short period, primarily in response to political restrictions, is one of the principal conditioning factors that must be dealt with by all those who wish to effect structural changes in less developed countries. Moreover, there are often lingering problems of scarcity of supply in vital sectors, financial strangulation, chronic lack of external balance, etc., considered primarily as short-term problems whose solution demands an all out effort. And it is here that the stereotype prescriptions are used again and again, recommending the need for an accelerated process of accumulation of capital supplemented by foreign contributions, and counting on imported technology in order to invest in sectors presumed to have a great multiplying power within the economy. Thus, as a result of the attempts to achieve rapid growth, the reform of structures which forms a part of the general objectives, becomes deferred through the ratification of undesirable structures.

The situation is even more serious in respect to the attempts made to overcome technological dependence and initiate a sustained process of own scientific creation and the absorption of this knowledge into local sectors of production. The process of installation of scientific creative capacity (and even its adaptation) if it is to have quality and durability, is slow and costly.

It is not only essential that knowledge generated by the system has sound quality (scientifically speaking), but that it meets the characteristics desirable of the demand. This is linked to the need to design instruments to foster the relationship between the scientific and the production systems, ensuring that the results obtained by the former shall be accepted by the latter.

Doubtlessly, all these objectives transcend the temporal dimension that a short-term development plan may provide for (and even more so, if it is a 3/4 year plan).

All the above reasons show that the most important part of the analysis of the technological content of the Three-Year Plan is the attempt to establish what extent does the plan propose the implementation of measures that will, in the long run, allow proposals of structural reform to change into concrete technological demands that can be fulfilled by a national system of scientific and technological creation.

Principal features of the 74-77 Three-Year Plan

The primary objectives of the Three-Year Plan are to attain a high ratio of general and sectorial growth, and to modify some structural features present in the social structure in Argentina. It does not, in fact, propose to modify production relations, but attempts to optimize specific variables related to the elaboration and distribution of the product within a capitalistic system.

The principal objective of the Plan is "to establish the bases of a long-term process that, while reaffirming the authority of the State's decision over economic activity, will facilitate increasing production of goods and services and the full employment of productive factors within a framework of an equal distribution of income and wealth and a balanced regional development".

The Plan is defined as a "Plan of change", as contrary to a "continuity" Plan which would be concerned only with the mere multiplication of quantitative variables. This is expressed to some extent in the general objectives, that include:

- a marked expansion of economic activity (the rate of growth of the previous decade doubled) and an increasing independence on all fronts.
- a high-quality of life... with idiosyncratic patterns of consumption, without ecological problems.
- national unity and the full development of regional potential.
- economic independence, especially the end of financial, technological and commercial dependence..

A marginal role to be reserved for foreign capital. Renationalization of industry.

Specifically, these general definitions become transformed into the following postulates:

- a restructuring of demand, implying, among others, that... "in the choice of providing individual equipment for the higher income groups, or collective equipment for the community, the latter option will obviously prevail"
- the need to transfer the dynamism of economy from foreign monopolies... to the national production sector, especially fostering the activity of a large group of small and medium size firms.
- opportunities provided for productive employment in the whole country.
- restructuring of the Government, so that it may carry out efficiently its role as promoter and regulator.

The above gives a general notion of the "qualitative" features of the Plan which attempts, through these definitions, to transcend the purely evolutionary designs in which changes of structure would be the long-term outcome of economic growth. In the terms of this Plan, on the other hand, the quantitative variations are significant, while they aid to attain the desired general objectives.

Bases of the development model

Three elements constitute the bases for achieving the goals of the Plan:

- a high rate of growth of investments (average of 12% per annum)
- increased productivity of the installed capital
- doubling the volume of exports.

This important increase in public and private investment should generate the desirable rate of growth (7.5% per annum, cumulative), doubling that obtained during the previous decade, since a high percentage of investments could be intended for installation and expansion projects in sectors producing intermediate and capital goods, as well as for the economic infrastructure.

Therefore, in order to ensure that the increase in investment would terminate in a more than proportional increase of product, a substantial decrease in the marginal relation capital/product is necessary which, together with increased labour productivity, would double traditional volumes. This not only depends on a more complete and effective use of existing productive installations, but also on the nature of the capital stock incorporated from the time when the Plan enters into force.

Export goals constitute a principal element in the growth dynamics provided for in the Plan, since it needs to ensure that "the import capacity will not hamper the attainment of the aims of growth programmed by the Plan for different sectors, nor the level of foreign debt jeopardize the country's capacity to take autonomous decisions". (Three-Year Plan, p. 22).

To achieve the general aims of the Plan, these growth designs must be cons-

istent with a sustained process of redistribution of income, where not only the average real wage increases (to an average of 7%), but the participation of wage earners in the total income rises as regards higher salary levels as well as the elimination of unemployment.

On this respect, the Plan considers that a substantial expansion of economic activity, particularly in the traditionally vegetating sectors which have a high employment capacity, will lead to the achievement of full employment, this being one of the primary general objectives of the Plan.

A study of what the plan refers to as the "principal actors" in the proposed model: the State and the local enterprise, is of special importance. With regard to the State, the Plan affirms (p. 61) "... the action of the State aims to fulfil the aspirations of the majority... The State's function as regulator of the behaviour of economic agents and of the community as a whole, is considered essential to the needs of a development policy". Moreover: "... the direct production of goods and services by the State holds an important place in Government Policy. Apart from the traditional activities which are necessary to fulfil the needs of the population, and the formation of an economic infrastructure compatible with global and sectorial development objectives, the function of the State is to carry out large scale projects which constitute together with certain basic measures of economic policy, the supporting pillars of Argentine development". For this purpose: "a high administrative efficiency is needed, as well as a concentration of resources and a reform of the administrative structure, leading to the creation of optimal conditions for the coordination of effort".

As far as local firms are concerned: "... it is necessary to foster the activity of a vast sector of small and medium size firms which act as agents of change and promotion in many sectors and in specific areas", also pro-



noting "... the development and reconversion of some industries manufacturing durable and non-durable consumer products, which employ a large number of manpower. This would be the case of the textile industry, ready-made ware, leather, furniture, branches of the "food and beverages" sector, "home appliances" and "printing and publications".

Technological implications of the general objectives of the Three-Year Plan.

As mentioned before, the Plan proposes a qualitative-quantitative change of the socio-economic structure in Argentina. Perhaps the most relevant components of the proposed qualitative change are: a) the modification of the nature of fulfillment of needs; b) the proposal to revitalize the small and medium-size local enterprise; c) the proposal that local capital play the principal role in the economic structure, removing foreign capital from the important position it has always held; d) the controlling participation of the State as producer and as regulator of economic activity.

In order to clearly understand the technological implications of items a; b and c, a prior understanding is needed of the reasons for a specific structure of production in a dependent country, such as Argentina.

The predominance of foreign capital, the marginal role of the local firm -the small and medium-size firm in particular- and the existence of an unsuitable structure of consumption, form part of the same process initiated with the incorporation of Argentina into the development designs of world capitalism.

The structure of demand, imitating the consumption patterns which prevail in central States, starts with the same process of cultural, economic and political dependence which has become a symptom of life in our country during the last decades of the previous, and the first half of this century. The process of substitution of imports is merely an attempt to produce locally the goods previously imported to satisfy the demand. Suc-

cessive development projects implemented by liberal governments have, by different means, opened the door to foreign capital, which imitated on the local level, the principal development characteristics of its countries of origin. The process of concentration of income and the expectation of fast social rise constituted a fertile ground for large foreign capital which used mass media, in order to consolidate a structure of demand which would fulfil their own accumulation needs. Demand and supply cannot be considered independent from one another (though theory has always maintained this to be true), and be able, by a process of interaction, to lead to the attainment of a "social optimum" ensuring, among others, the best use of the factors and a coincidence with the private optimum. They are, however, two aspects of the same process, determined by the evolution of world capitalism.

What role does the technological factor play in this process? Two elements must be taken into account: a) the rational governing the choice of technologies, and b) the possibilities of a choice of technology on a world scale.

With respect to the first item, it must be understood that the choice of technologies is determined by the capacity thereof to generate profits, whether through lower costs, diversification of product, use of a raw material, etc. These are the elements that, depending on the particular structure of the market, the businessman must confront and decide upon. The differential possibility of access to "modern" or "exclusive" technologies, or whatever they may be called, thus becomes a factor generating monopolistic advantage and explains in a large measure the predominance of foreign capital in dependent countries, such as ours.

On the other hand, it is necessary to consider the nature of technological evolution on a world scale. The creation of useful knowledge in productive sector is due much less to the inspiration of a few scientists, than to the definite demand arising from specific expansion needs of capital. The means of fulfilling the needs in central States, the average size of the market for leading enterprises (degree of concentration), and the general nature of competition in such countries, provide specific guidelines for technological evolution (the "state of art") resulting in: a) the type of goods being produced; b) the nature of the capital goods used (their sophistication, degree of automatization, etc.); c) the nature, and especially the scale of the production process; d) the type of raw materials and intermediate products, etc.

All these developments restrict rather than expand, the range of effective technologies (of those technologies, at least, that minimize the relation capital/product of fundamental importance in our countries).

If we admit the truth of these observations, then it is also necessary to admit that all policies which only attempt to "modernize" the production system must lead to the use of such technologies.

An attempt should now be made to apply the foregoing study to the proposals for structural changes contained in the Three-Year Plan, particularly those referred to in the beginning: the restructuring of consumption patterns; preferential treatment given to local capital and revitalization of the small and medium-size industry.

The modification of the qualitative characteristics of demand implies:

- 1) a review of the scale of needs, attempting, in particular, to fulfil some needs that receive scant attention at present in view of the prevailing nature of distribution of income.
- 2) a search for new methods to satisfy such needs.

Beyond the political implication of this type of proposals, there is the redoubtable technological challenge that acquires its true dimension when considering our previous remarks regarding the patterns of technological progress on a world scale. The first question we must ask in this respect is: are there any technological alternatives that allow to fulfil existing needs to the greater benefit of society?

On the basis of experience, the immediate answer, would appear to be negative and, in any event, if such technologies do exist, they are either obsolete or lacking the recent addition of new, significant knowledge which would ensure a high level of usability of the factors. Nourishment, clothing, transportation, pastime, communications, use of leisure, are primary needs, the fulfilment of which has traced, to all intents and purposes, and more or less precisely, the guiding pattern of the United States.

Thus, unless such proposals are supported by plans or research programs aimed to find solutions that will make them technically feasible, they will remain as mere proposals, impossible to implement. In this respect we may refer to what may be perhaps the most significant proposal concerning the reform of the nature of need fulfilment, provided for in the Three-Year Plan: "in the choice of providing individual equipment for the higher income groups, or collective equipment for the community, the latter option will obviously" (p. 17). If this proposal were to be implemented, it would require a total

modification of the structure of public services and the discouragement of the production and consumption of durable services and goods which are a symbol of a consumption structure oriented toward the fulfillment of individual needs. The first to be affected would be the transportation and communication, health, education and housing system, but such complex variables as the whole design of urban structures would also be directly affected. Together with the problem of creating the knowledge necessary to implement the proposed reform of the structure of fulfillment of needs, is that of the measures necessary to achieve the adoption by the productive units of the technologies involved (if the "rules of the game of the free enterprise system" are to be maintained) and their adoption by some of the consumer units.

As stated before, the structure of production is not based on mere chance, but is the result of a process in which the nature of the distribution of income, the expectations of social rise, the type of goods consumed, are determined in accordance with the accumulation needs. A "break" in one of the terms of this "equation" would require the appropriate changes in other terms, in order to maintain the balance. And this balance is due, precisely, to the benefit derived by the units producing the type of goods consumed; a benefit, in the calculation of which are included, among others, the cost of the technology, its nature, and the relationships that such technologies may establish abroad. Therefore, the nature of the new technologies must be, economically speaking, "acceptable" to the production sector, if it were to be adopted without the use of coercive measures.

Technological development is also of the greatest importance in fostering

the sector of small and medium-size firms. Although many of these firms' problems are of a financial nature, it is obvious that in all cases, their technological characteristics limit the possibilities of an increase in productivity compared to that of the large local firms with which they compete, to say nothing of international firms; and thus condemn them to perpetual marginality. The problem transcends national frontiers and becomes a question of technological development on a world scale, since its characteristics -as we have said before- are clearly defined, one of them being the tendency to increase the level of production. In other words, technologies which lead to high levels of productivity or to the production of different goods, able to generate monopolistic benefits on local or international markets, are developed for large-scale activity, far beyond the market possibilities of the small or medium-size local firms that needs fostering.

The Corporation of the small and medium-size, a body created by the Government for these firms, should envisage research programmes aimed to develop/ local vanguard technologies for small scale production and to adapt to a local scale those outside generated technologies which are considered to be desirable for a market that small and medium-size local firms production may satisfy.

Finally, some comments should be made with regard to the scientific and technological implications of the proposals concerning the role of the State in the economy. The State, in order to be able to regulate production activities, and in order that its own firms might act as leaders in the sectors where they and their subsidiaries function, must reconsider the question of the existence of technological factors on all levels of its structure of decision.

Every decision concerning the allocation of resources, whether for common purchases or large investments, has a great potential bearing on the nature of the affected production units.

The volume of resources handled by the State in Argentine is so important that the State should be able to effect profound changes in the structure of production, without the use of coercive measures. But this would require: a) a clear definition of the characteristics of the desired technological structure, both on a global and sectorial level; b) a full understanding by the State, of the instruments necessary to modify the production characteristics of the economic units linked thereto; c) a well mounted internal structure of technological decision-making, with highly qualified personnel and such position in the organigram as to have bearing on high level decisions.

In other words, just as the suitable management of technology in private firms is of primary importance for obtaining profit so should the technological factor be properly handled by the State sector to achieve high political goals.

The reform of the internal structure of technological decision must be initiated immediately, if visible results are hoped for within less than 5 years. Delay in implementing these principles will lead to a loss of opportunities to foster the development of national technology afforded by every investment the State makes in great projects, while in many cases technological structures become consolidated, that are contrary to those contained in the general objectives of the Plan; in particularly the ending of technological dependence.



The goals of the Plan and their technological implications

As we have seen before, the goals which constitute the basis of the dynamics of the Three-Year Plan for Argentine economy in the coming years, are as follows:

- a high ratio of investment growth
- increase in the productivity rate of installed capital
- doubling the volume of exports.

A large percentage of the proposed high rate of investment shall be applied to important projects in the industrial sectors and projects of economic infrastructure that would complete the vertical integration of industry and put an end to some of the bottlenecks that restrict the possibility of general expansion and regional integration.

The great industrial projects will be developed in the iron and steel areas (1,140 mill. US\$); petrochemistry (581 mill. US\$); cellulose, paper and wood (500 mill. US\$), while 3.764 mill. dollars will be invested in the establishment of an infrastructure for generating the power required for the projected needs.

These investment shall be made, taking into account two elements: a) the evident need to prevent a high rate of growth from weighing too heavily on the balance of payments for the defective vertical integration of the industrial sector; b) because such investments in the chosen sectors shall be the principal factors in the dynamization of the structure of production, ensuring the attainment of the desired rate of growth.

Although from the technological point of view the Plan specifically establishes that the greatest possible flow of purchases should pour into the country, it is also certain that the medular technology of the projects, whether incorporated or not, will have to be imported, due to a) the nature of the chosen

projects; b) the limitations of existing installations; c) the presently limited local creative ability in priority areas.

All the above leads to assume that the large investments referred to in the Plan will, in a first instance, increase the degree of dependence on foreign technology in the sectors which serve as a basis in the dynamics of the Plan

We find ourselves, therefore, in the presence of a case such as the one referred to in the theoretical framework, prepared for this analysis: political limitations make it necessary to place the immediate potential of technological development on a secondary plane, although we must admit that it would be unreal to expect a short term alternative, more so, if we take into account the chosen pattern of growth.

From now on, therefore, the technological policy coincident with the global objectives of the Plan -especially the desire to end technological dependence should be to create the appropriate mechanisms and instruments to achieve progressive decrease of the inevitable dependence to which we have referred, as well as to fulfil the needs created by the existing, or by a more expanded structure. The large investments planned would facilitate such action and provide an important financial basis for initiating technological development activities, even if only a small percentage thereof were allotted for this purpose.

An additional comment should be made regarding the nature of the chosen basic sectors and the proposals for changes in the structure of demand made in the Plan. If a definite structure of demand, different from the existing, were really created, which would "find expression in a new country model, freed from consumption patterns imitating foreign models" (p. 16) it would be necessary to make provision for the modifications resulting from such change in the production structure of intermediate (or "basic") products.

If we fail to make such provisions, we would be proposing a different structure of final demand, while extrapolating the existing structure in order to

determine its downward requirements.

In this respect, the Plan adopts the latter criterion, and this appears a contradiction or rather a situation in which the future characteristics of the society would be tied with the immediate needs of growth.

Similar comments regarding the relationship between objectives and goals can be made with respect to the need, expained in the Plan, of achieving substantial increase in labor employment together with a decrease in the growth of capital/product relation.

All these objectives require a careful evaluation of the technologies that would make them feasible. As stated in another section of this study, the creation of vanguard technologies acquires a certain slant in the world market defined by the predominating features of the markets of central States which do not necessarily coincide with those contained in the structural changes proposed in the Plan, specially those which refer to the consolidation of the employment capacity of industry.

We might state, in view of these theoretical considerations that include the experience of the country during the process of rapid capitalization that took place between 1958 and 1962, that the possibility that the industrial sector may significantly increase its capacity to employ labour, against its traditional tendency, and is able to decrease the extent of its technological dependence, would depend on the proper control of the technology incorporated in the new investments, taking special account of the sectorial strategy of the Plan, which places upon the "traditionally employing" industries a great responsibility to generate employment for the duration of the Plan.

Some final comments on the proposals made in the Plan to double the volume of exports. The goals pursued may be diverse: to obtain on the short term, an influx of foreign currency of such magnitude that the import capacity will not hamper the plan of general expansion; to attempt the achievement of a

significant change in the industrial structure, enabling it to generate at least as much foreign currency as may be necessary for its own expansion.

The first aim may be achieved by strong financial or credit incentives (reimbursements, draw-back, credit promotion, preferential exchange rates etc.).

These instruments do not, in principle, modify the structure of the industries that benefit therefrom, to such an extent that they are forced to abandon the foreign market as soon as the Government ceases to provide such incentives. They only provide the means for a greater efficiency through a higher level of production. But, on the other hand, these instruments involve a redistribution of the resources of the whole economic system toward the export sectors, and this may involve considerable sums, such as in the case of the Three-Year Plan.

It is obvious that Argentina needs a consolidated and dynamic structure for the export of manufactured products, that will make it possible to overcome the cyclic limitations of supply of primary products, and this can only be achieved through the production of goods able to hold and affirm their position on the international market, either by lower cost or diversification. Therefore, policy instruments should contemplate the selective support of those products able to achieve such position, and also attempt to change their structure of production through intensive technological activity, granting of loans and the action of specialized State agencies (Corporation of State Enterprises, Corporation of the Small and Medium-Size Enterprise, INTI

Explicit technological policy of the Three Year Plan

At this point, two aspects must be considered: the enouncements explicitly formed in the Plan regarding the technological question in general, and the concrete measures proposed for the achievement of its objectives in this area.

Perhaps the most complete enouncement can be found on page 18, where it is stated: "Scientific and Technological development shall constitute one of the pillars of the efforts toward reconstruction and liberation... It is fundamentally a question of placing the talent and creative ability of the Argentine people in the service of the highest objectives of the Plan. In particular, the end of technological dependence... This involves the development of a capacity to solve our technological problems, resorting to foreign cooperation only when it is indispensable. This, of course, does not mean that we must reject new international advances in the scientific and technical fields; only to strengthen our ability to choose, from these advances, what is most useful to our future progress. It is essentially a question of relating functionally technical development and the nature of the destinataries of production...; This means that preference should be given to some lines of technological development more than to others, and in particular:

- the creation or adaptation of technologies leading to the full employment of our labour and a growing scale of productivity and remuneration; decreasing per unit costs and improving the quality of goods and services that will strengthen the economic integration of the industry through the development of the production of capital goods.
- Improving the ability to adapt technological advances to our own structure of consumption and production.

Briefly, this is the position with regard to the nature of the desirable technological structure, according to the general objectives of the Plan.

The policies proposed in the Plan to achieve these objectives, include:  
(p. 19);

- intensifying basic and applied research, using selective standards that will direct it to serve national aims and not to supplement the scientific and technological progress of great international industrial centers.
- possession of a solid scientific and technological infrastructure
- strengthening the role of the State through its agencies and firms, as the promoter of technological development and as the inductor for the absorption there of into the country's production and distribution machinery.

These policy lines shall be supplemented by the action of the institutional instruments created by the Plan, particularly the Corporation of State firms and the Corporation of Small and Medium-Size Firm.

The above clearly shows that the Plan establishes the characteristics needed to achieve an "optimal" scientific and technological system, acting in perfect harmony with the global objectives of the proposed model of development. In other words, the global objectives appear to have been "interpreted", thus arriving at the scientific and technological structure that should be useful to these objectives.

Two comments can be made with regard to the technological policy as it appears in the Plan. The first refers to the lack of instruments which would clearly define the lines of action that, in a general way, would lead to the attainment of the objectives established for the area. Just as the Plan establishes in detail the nature of the instruments which will serve to implement sectorial policies, similar observations should be made regarding the most important aspects of the scientific and technological policy and, especially: the

form of financing; necessary reforms of the institutional structure for planning and performance of science; mechanisms and instruments to ensure the innovation and absorption of national technology by the production sectors, etc.

The failure to provide such definitions within the context of the Plan may lead to the conclusion that it contains only a series of pronouncements impossible to implement, or that implementation has not been planned.

The second comment refers to the failure of the Plan to enumerate the important sectorial problems which could be solved by research, and this may lead to the conclusion of failure to carry out the sectorial studies required for the implementation of the Plan.

These vacuums are not even filled by a Science and Technology Plan. The serious problem that arises is that the country has initiated large investments in sectors and infrastructure, without taking into account the technological implications to which we have referred.

It would therefore appear that in view of the lack of well-defined lines of action, the implementation of the "great objectives" shall be directed and interpreted by officialdom according to their own ideas. Thus, a Plan which, by its very nature, should be obligatory for the public sector, will become merely a series of directive enouncements as regards the technological problems, while, as far as the private sector is concerned, it will lack even this characteristic.

### Conclusions

If a general conclusion may be reached concerning the technological content of the Three-Year Plan, it would be that the implicit technological content arising from the desired aims, and even more from the objectives, is much more fertile and consummate than that to which we have referred as the explicit technological content (policies and measures proposed for this area).

The mere proposal to obtain a high rate of growth and to modify patterns of consumption, without changing the basic features of the capitalistic system, implies the need for a creative effort of hitherto unknown proportions. As we have attempted to explain in this report, this proposal requires the modification of one of the central variables of a capitalistic system in such form that the balance thereof remains steady.

It is also considered doubtful if the goals of redistribution of income, full employment, regional balance, the fostering of national capital and the re-conversion of the small and medium-size firm can be made compatible with the chosen pattern of growth based on a large flow of investments in sectors referred to as "basic", and the doubling of the volume of exports, together with a substantial increase in the productivity of factors.

Experience obtained in this field, even by our country between the years 1956 and 1962, shows that efforts to achieve speedy capitalization as a means to attain a high rate of growth in a short period of time are apt to condition the structure of production for many years. But if economic growth is a short term economic necessity, in order that proposals of structural changes may be fulfilled, it is necessary to provide the mechanisms for progressive change at the same time that speedy capitalization is attempted. And one of the basic mechanisms in this sense, is the scientific and technological creative ability (and therefore the ability to decide) that, while it allows to



reduce progressively the greater dependence arising from the process of capitalization, ensures that future capital "stocks" will progressively include national technology.

Paradoxically, processes such as are proposed in the Plan may provide the financial and institutional bases for the attainment of this ability, since the large flow of investments allows the inclusion of provisions concerning scientific and technological creation without greatly affecting the total sums. Furthermore, political aspiration to attain this goal does exist.

At this point we must state that the concrete proposals contained in the Plan concerning the implementation of a scientific and technological policy leading to the attainment of the global objectives are frankly insufficient.

The most notable lack is that of precise sectorial definitions concerning the scientific and technological needs to be fulfilled in the course of the Plan, both the existing ones and those which may arise from the investment process. The Plan also fails to propose specific changes in the nature of the generation of scientific knowledge: guidelines for the organisation of institutions, standards for the allocation of resources, relationships with potential users, etc. These will, apparently, not be taken into account in view of the lack of a specific Science and Technology Plan.

Perhaps one of the principal reasons of the really marginal role of the scientific and technological factor in the development model proposed in the Plan lies in the planning process itself. To quote an apt figure of speech by Sabato, we might say that in the Three-Year Plan, technology is introduced "from outside toward the inside", from "above to below", almost as if it were a "patch" inserted in the process.

In practice this shows that the technological implications of global aims are ignored, precisely because of the failure to carry out the necessary basic studies. Briefly, the planning process consist in defining the "way to a balanced growth" based on a pre-existent input-output matrix and starting from determined general restrictions of a political nature (desirable external debt, level of employment, distribution of income, etc.) which do not include the technological needs that may be implicit in global

The Three-Year Plan which we have studied does not escape this general rule, although in this case ambitious proposals are included concerning science and technology.

We shall therefore proceed, in the following stages of the Project, to study how far the instruments to which the Plan itself refers as pillars of its policy: the Corporation of State Firms, Corporation of Small and Medium-Size Firms and System of Regional Promotion, are able by concrete action to reverse the negative technological structure apparent in the foregoing study

On the sectorial level, the Petrochemical Plan controls one of the sectors in which we are interested. Therefore we should study the correlation between its concrete implementation and the global objectives enounced in the Three-Year Plan. Special emphasis must be placed on the study of the origin of "modular" technology of the principal projects, as well as the development of activities that affirm the national decision capacity in this sector, i.e. the short-term/long-term relationship upon which we base our study of the technological content of the Plan.