The present study has analysed, with reference to the role played by the Government, the way in which electronics industry has grown in this country; and has tried to identify the principal factors that have retarded the growth of the industry in the past. The investigation led us to explore -

I. the various linkages at the micro level which serve as the sine qua non in the process of long term growth of an industry,

II. the deficiencies and the extent of non-existence of these linkages in case of electronics industry in India, and

III. the interaction of the electronics industry with other industrial sectors, and particularly, with the macro-economic environment.

The detailed analysis and also the summary of the conclusions have already been presented earlier in the various chapters. It would, however, be useful to recall here a few of the major points developed as a prelude to drawing implications for policies to be pursued in future:

1. the growth of electronics industry in India, till 1970, was far from being satisfactory. This remains true regardless of which of the following criteria is applied for measuring the performance of the industry?

I. electronics industry's relative contribution to the total pool of industrial employment in India;
II. India's relative share over time in the total world production of electronic items; or

III. the country's relative dependence on imports.

2. From the viewpoint of growth of electronics industry, the post-independence period in India could be broken down into two phases. The first phase spanning up to the end of the First Five Year Plan was one when the industry centred around the assembling of radio receiver sets by the subsidiaries and local collaborators of a few foreign firms. During this phase, all the required components were used to be imported. The second phase began with the launching of the Second Five Year Plan when, following the worsening of foreign exchange situation and general tightening of import-control, the relatively simple types of components began to be produced within the country. Though the entry of public sector and the small scale sector helped to widen the production base of electronics industry in India in the sixties and seventies, till 1976 the one single product line, viz., the radio receivers, continued to account for a substantial part of the industry. Even during 1971-79, when the electronics industry experienced significant 'apparent' growth rates, major part of the overall growth came from a very limited range of items which were based on relatively simple manufacturing technology and/or had high import contents. Growth rates of production were not only in the entertainment electronics sector and also for a variety of general-purpose items belonging to the industrial electronics sector that were primarily assembly-oriented. However, the same could not be said about other sectors which were technology-intensive and where the manufacturing technology was relatively fast-changing in nature. Growth rates of production were in particular in case of equipments for communication, a group of and defence, and for most items in the professional-grade components sector.
3. Analysis of the past pattern of growth shows that electronics industry, since its inception, has grown in India primarily in response to the growth in domestic demand and particularly as a result of the import substitution oriented policies and programmes. In spite of noticeable shift in the premises of India's industrialisation strategy, throughout the period under consideration, the urge to substitute imports continued to remain the guiding force behind industrial activities in the field of electronics.

4. Of late, there has been an increasing tendency among several quarters to ascribe the phenomenon of slow growth of electronics industry to the general climate of import substitution orientation. Criticism against the policies of import substitution in electronics, so far, have stemmed from two sets of inter related issues:

I. the size and growth of the domestic market;
   and

II. the inefficiencies and the high-cost structure resulting from absence of economy of scale and constraints placed by various forms of administrative control.

However, the analysis in the present study has pointed to the fact that the question relating to the size or growth of the home market is irrelevant, as even the existing demand for electronic items remained largely unfulfilled. Nor, in the overall atmosphere of successive liberalisations and leniency prevailing, can the administrative controls be regarded in electronics industry as serious constraints on the process of growth.

5. The strategy of import substitution oriented industrialisation as embodied in Indian Plan models was based upon the
implicit premise that there were different sectors and subsectors within the economy and the simultaneous launching of investment projects in all the major sectors would raise the rates of overall and sectoral growth. However, the operation of the needed "multiplier effects" was dependent on the strength of interconnections existing among the different sectors and sub-sectors. Characteristically, electronics industry has strong forward and backward linkages with other sectors of the economy. The actualisation and the strength of these linkages have a vital bearing on the pattern and pace of the industry's growth. But there are also other potential linkages at the micro levels which are even more indicative. These concern the network of interconnections between the equipments sector and the components sector, between the electronics industry and capital equipments manufacturers, and finally, between the R & D institutions and producing firms. The actualisation of these linkages were a sine qua non for the long-term growth of electronics industry. In other words, bringing effective integration among the growth of different sectors within and around electronics industry was an essential pre-requisite for overall growth of the industry in India. This, in turn, called for the existence of long-term sectoral plans, and also for the required administrative apparatus to direct activities in the field along that plan. Further, the technology involved in production had a vital role to play in the process of integration; this was because, in electronics, not only the technology was a fast-developing one, but the global market for technology was highly imperfect, making it often difficult for a country like India to obtain the requisite know-how for production. The creation of an appropriate institutional and policy framework, that would have fostered building up of indigenous technological capabilities, was of crucial importance to growth.
6. Evidences, however, suggest that electronics industry had grown in India in a haphazard and uncoordinated manner prior to 1970, there was neither any government policy nor the needed institutional set-up to plan and steer the growth of electronics industry. Although some attempts were made in this direction in early 1970s through the launching of the electronics Commission and through the drawing up, in the wake of the formulation of India's Fifth Five Year Plan, a detailed blueprint for electronics industry's growth, in fact, these measures had been of very little practical significance. For one thing, there was the persistent resource constraint forcing the cancellation or postponement of many of the important investment programmes. Secondly, in a situation where the primacy of Planning itself was on the decline, the sectoral plans (even in their distorted and reduced shape) did not find proper implementation. In the situation featured by non-existence of long-term planning and by overall anarchism at the policy-making level, it was not possible for the Government to channelise the activities in public and private sectors along the desired directions. Activities in the public sector remained uncoordinated. At the same time, Government was unable to make available the requisite volume of resources for public sector's expansion. Launching of investment projects, that were of crucial importance and priority, often became difficult. The manner of Government's dealing with the private sector was even more disappointing. While as a result of the series of relaxations and liberalisation schemes carried out since the mid-sixties, the effectiveness of various instruments of control substantially declined over time, the manner of their application in electronics industry was far from being satisfactory. Not only that these instruments were often applied in a relaxed and permissive manner, but the application was often based upon discrete and short-term considerations; a long term perspective was, thus, clearly missing.
7. The failure within the country to fulfill the conditions for building up of technological capabilities was equally glaring. Electronics industry in India, since the beginning, had been associated with continued dependence on imported technology. Initially, the industry was characterised by a near-total dominance by subsidiaries of transnational corporations. Gradually, Indian firms - particularly, public sector enterprises - came to dominate the field; but failure to perceive (in the context of electronics industry's growth) the priority of building up indigenous technological competence was evident from the nature of formulation in execution of sectoral R & D Plans, and also from the inability of the government to create an environment favourable for the development of indigenous technology. However, the resultant continued dependence on imported technology - in its adverse effects on inter-sectoral linkages - clearly came in conflict with the basic premises of the import substitution strategy.

8. Thus, as is evident from the analysis carried out through the present study, it was not import-substitution in itself, rather were the non-existence of a clearly defined policy - frame with regard to electronics industry's growth, the anarchism prevailing at the policy making level, the failure to create the necessary environment or organisational frame-work to make possible the building up of adequate technological capabilities within the country, and the resultant continued dependence on imported technology - that explain why the electronics industry could not grow better during the period under consideration.

9. Finally, though the process of import substitution in electronics industry had remained largely incomplete, an
though the actual progress within the country with regard to technology-development and upgradation was far from being satisfactory, yet, during the 1970s, the idea of an export-led growth strategy for electronics industry was found to be gaining increasing acceptance at different sections within the policy-making level. The arguments in favour of export-led growth strategy for electronics industry seemed to have been based on certain important explicit as well as implicit assumptions. However, our review of the actual trends of growth of electronics exports from India, and particularly, of the experience with respect to Santacruz Electronics Export Processing Zone suggests that most of these assumptions were not valid.

The arguments in favour of export-led growth strategy in electronics industry have tended to ignore the direct and indirect costs of the proposed set of policies, and the distortions that these policies might introduce in the growth process. Secondly, these arguments also failed to explain why, despite the several liberalisation measures carried out during the 1970s, and despite the formulation and operation of different export incentive schemes, electronic export from India failed to grow as per expectations. In particular, the arguments in favour of export-led growth strategy in electronics industry did not take into account the various exogenous factors that had vital bearing on the growth of electronics exports.

**New Hints for the Future Growth Strategy of Electronics Industry**

1. First, the traditional arguments in favour of export-led growth strategy need be evaluated afresh. Arguments of "outward looking industrialisation", in case of electronics industry, should take into account the following factors:
(i) the pattern and pace of growth of world demand, the total absorptive capacity of world market for the given products, and the increasing protectionism in developed countries;

(ii) the direction of technological change in developed countries, and the declining labour-intensity of manufacturing in electronics industry; and

(iii) the trend towards automation in electronics industry and the changing strategy of transnational corporations with regard to international relocations.

Let alone the case of desirability of export-led growth, careful analysis of the above aspects would suggest that, even the viability of such a growth strategy is seriously questionable. The country's experience with regard to Santacruz Electronics Export Processing Zone serves as a testimony to this.

2. At any rate, the growth of the electronics industry in the long-run would depend upon the technological competence that could be built inside the country. It might not be possible to totally dispense with import of knowledge. It is sometimes a way to 'buy time'. However, technology import, per se, is unable to raise the technological level or accelerate the growth rate in productivity and output of a given industry. The essential question is related to absorption, adaptation, assimilation and diffusion of imported technology, and to its further improvement and innovation. To ensure such a process in electronics industry, there is a need to build up within the country adequate technological capabilities and to emphasize indigenous efforts. The attention should be given to the fulfillment of the following two conditions:
(i) the formulation and appropriate net working of the requisite policy instruments to create an environment that would both force or motivate producing firms to undertake adequate in-house R & D efforts;

(ii) the creation of an organisational net work that would foster close linkage among the R & D institutions and the producing firms.

In case of electronics industry, particular attention should be given to the following two aspects:

(i) The first one is regarding the selection or procurement of the particular technology that would be most helpful from the viewpoint of the country's socio-economic needs and factor endowments. A selective approach with regard to installation of computers and other forms of so-called high technologies is required. Building up of adequate competence within the country would help to search out the right technology, bargain effectively with the technology suppliers and to make the most out of the imported know-how.

(ii) As regards the new information technologies, 'software' is as important as the production of 'hardwares'. Particular attention should be given to the application aspects. To what extent, the advances in information technologies could be exploited by India in future, would depend upon the nature and spheres of application of these technologies.

3. Finally, the strategic indecisiveness that has prevailed so far at the policy-making and policy-execution levels need be replaced by a clearly defined policy-frame.
formulation and determined pursuance of long-term plans for sectoral growth, and exploitation of the potentialities of the public sectors, particularly, in the matter of technology development - are the basic pre requisites for the growth of the Indian Electronics Industry in future.

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