



WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT

FIFTH MEETING  
Ottawa, 28-30 May, 1986

WCED/86/7

## MEMORANDUM

TO: All Members of the World Commission on Environment  
and Development

FROM: Jim MacNeill, Secretary General

DATE: 7 May, 1986

RE: Report of the Advisory Panel on Industry and  
Sustainable Development

Enclosed is a copy of the final draft of the Report of the  
Advisory Panel on Industry and Sustainable Development,  
for your consideration and discussion in Ottawa.

The Chairman of the Advisory Panel, Prof. Umberto Colombo,  
has accepted our invitation to come to Ottawa and  
personally present the report to you. He will also join  
in your discussion under agenda Item 6.2 (WCED/86/7). As  
soon as feasible after the Ottawa Meeting, with your  
approval, I plan to have the report copy edited and  
published through commercial channels.

Action Required: For Discussion

WCED/86/7

INDUSTRY AND SUSTAINABLE DEVELOPMENT

A Report Submitted to

The World Commission on Environment and Development

by

The Advisory Panel on Industry

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PART A: PERSPECTIVES:

Industry, Environment and Development in a Global Context

1. Industry is central to the economy of world society and indispensable as a motor of growth. It is essential to the developing countries which must create and expand heavy and light industrial sectors, thereby widening their development base and moving gradually away from a situation of reduced self-sufficiency essentially based on agriculture. It is also essential for the advanced countries which are moving towards a post-industrial, information society. It must be clear in fact that the provision of sophisticated services to satisfy the needs of an increasingly affluent society will not be possible without a continuing generation of wealth from the industrial sector. The term 'industry' embraces entrepreneurs, management, organized labour: each have their own interests, their own priorities, as well as certain shared attitudes. Industrial behaviour, in developed as well as developing countries, is therefore a band of behaviour, and not a unique united response.

2. Economic growth will continue to be a primary objective of world development strategy for many decades to come. The patterns of industrialization adopted by developing countries will, however, reflect the priorities of developing countries, rather than those historically followed by present-day advanced economies. This factor will significantly affect resource use (especially the use of labour), product and process mix, and markets. The current geographical pattern of resource use, with 80% concentrated in the advanced industrial economies, is to be regarded as temporary, and a more equitable distribution of calls upon the world's reserves of natural resources to be regarded as the likely outcome of Third World development, be it achieved by industrialization or by other pathways to growth.

3. The stress on personal consumption which has been such a major factor in OECD industrialized societies, for example, is unlikely to be seen as a possible option for many developing countries facing very real difficulties in reaching more general development goals. Economic growth must therefore be sought in directions which do not overload markets with goods which, in today's Third World context, may often be considered superfluous. For those developing countries which decide to follow the well-trodden path to growth via industrialization, the husbanding of resources for the attainment of socio-economic goals receiving priority becomes imperative. Other developing countries may decide to follow a pattern of development which is not so directly linked to industrialization of the economic structure, .

The particular circumstances and conditioning factors of the specific society and economy must be taken into account, so as to avoid distortions in patterns of investment and consumption. The real needs of populations will therefore determine the product mix of industry, and the allocation of resources.

4. In Third World countries, population is still expanding at high rates, with dramatic effects on the comparative patterns of age distribution between these countries and those already industrialized. Most of the world's young people are already now to be found in developing countries. The problem of population growth and accompanying changes in the age distribution are not necessarily to be seen as a liability. They could, indeed, eventually become an asset, once the spectres of famine and disease have been laid to rest. It is, however, inconceivable that all this potential labour force could find adequate employment in the agricultural sector. The socio-economic needs and wants of these expanding societies must be met by products and services produced by industry - but by an industry adapted to local conditions and local markets, decentralized, disseminated and thus able to contribute to rural as well as to urban development.

5. On the other side, industry in advanced countries is expected to undergo comprehensive restructuring due to the shift of emphasis towards the emerging technologies and the relocation of some basic and traditional industrial sectors to developing countries. The current technological revolution, well under way particularly in advanced countries, leads to a "dematerialization" of economy and society - in the sense that, as a result, less and less resource-, energy- and environment-content will be required for each unit of GDP. Developing countries cannot ignore the implications of this revolution for their own advancement. They could industrialize without copying the models previously followed by advanced countries - that is, in a way mitigating the side effects on society and on the environment that industry used to bring in its train.

6. Yet it has to be acknowledged that many examples of negative impact on the environment throughout the world, and even, on occasion, of risk to the health of workers and the population at large, can be cited. Despite this, it must be remembered that industry also produces the instruments and equipment essential to monitor our environment and to prevent pollution - ranging from satellites and remote sensors to control devices and testing systems, and products to improve the quality of life and continuously increase public health and safety. In addition, the products of industry enable man to keep a watch on the dangers of natural events such as weather conditions, earthquakes, volcanic eruptions.

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7. In early stages of industrialization, environmental issues were not a primary consideration, and were often ignored when compared with the benefits to society of industrial development. But concern grew when the environment began to show signs of stress due to the intensity of the industrial process and the particular effects of certain industries - including energy, mineral extraction, chemicals, pulp and paper, iron and steel and non-ferrous metals.

8. Thus, industry was faced with the need to find therapies to reduce the environmental effects of industry. Curative approaches were shown to be costly, and anyway often proved palliative rather than capable of eradicating the sources of danger. Preventive strategies, relying on technologies and modes of production which, though at times more costly, could avoid environmental pollution, were required. For industrialized countries with a solid basis of fixed assets in place, the shift away from a "pollute-and-cure" to an "anticipate and prevent" approach depends largely on considerations of economic trade-offs; that is, for example, the question of replacing existing dirty plants before the end of their life cycle with new cleaner ones. For developing countries wishing to build up from scratch an industrial system, the preventive approach - not only as regards process choice, but also as regards patterns of industrialization - should in principle be supportable and make economic and socio-cultural sense as well.

9. Developing countries now have greater opportunities to profit from the technological improvements now achieved by developed countries, and so avoid the need for expensive clean-up of mistakes made during the process of industrialization. Best-available technology should be the goal of developing countries in making their development choices, even more so given that Third World countries do not have the time to industrialize now and clean-up later - the fore-shortening of time-scales brought about by the rapid pace of technological progress excludes this option.

10. In addition, as development gears up, it is vitally important that each country develop environmental regulations and environmental regulatory bodies appropriate to its particular situation and needs. While it may not be appropriate for each developing country to adopt the same regulations as found in developed countries, there are basic elements which must be shared in arriving at locally acceptable standards. The basic considerations involved in defining pollutant control levels protective of health or in determining appropriate environmental process technologies are similar in both developed and developing countries. It is possible, however, that product standards may differ (the example of the continuing validity of DDT in Third World contexts is a case in point), and also ambient standards can be left to be determined with reference to more local criteria.

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11. The process of global redistribution of industrial activity caused by transfer of productive capacity and by differential rates of industrial expansion which is currently under way has brought with it a phenomenon of market segmentation, tending in many instances to increase the price of refined or sophisticated products with a higher content of science and technology while reducing the importance of primary industrial products such as metals and other basic materials. Thus, developing countries may find themselves in a situation of small margins deriving from their primary industrialization. Under these circumstances, it is probable that environmental considerations receive second priority, and preference be given to "less expensive" (and thereby likely to be dirty, polluting and inefficient) processes having adverse impacts on the environment.

12. Other considerations can be made concerning the industrialization process and its impact on the environment in developing countries. Emerging technologies, in particular microelectronics and information technologies, process technologies and biotechnologies, make it possible to achieve competitiveness in the market with relatively small-scale, decentralized production units. No longer is economy of scale always a winning factor. This implies that new patterns of industrialization are possible, more broadly distributed within the country or region, between urban and rural areas. This is highly desirable if one wants to avoid excessive and disorderly urbanization as has taken place, and is still taking place, in many developing countries.

13. Thus, we can envisage agricultural-industrial systems integrated on a regional basis and altogether more respectful of environmental values. This does not mean that cities lose their importance. Often the city represents the only societal environment where one can bring together expertise in the whole cluster of emerging technologies that are essential to a sound industrialization process. In addition, there is considerable resistance from trades unions and workers in many parts of the Third World against dispersal of industries to shift polluting units for relocation elsewhere. This fact can act as a brake on technological renewal. A further element is that government urban land ceilings frequently operate to prevent industry from taking advantage of the increased value of land freed for other purposes by such relocation as a source of funds for new investment in cleaner technologies. This is but one aspect of the wider problem of land hunger which many developing countries governments are now attempting to resolve.

14. Traditional sectors of economies in developing countries are themselves the target of renewal. Rejuvenation of traditional activities can be achieved by the grafting onto them of suitable emerging technologies, for example the microprocessor, electronic control systems, new materials and so forth, and this is already happening in advanced economies. Industries candidate for imminent relocation to the developing world will therefore also now continue to operate in advanced countries following the rejuvenation process induced by application of new technologies. For developing countries to compete, they have to inject elements of new technologies during the process of relocation itself, avoiding the start up of an industry which could effectively be regarded as obsolescent.

15. All of these considerations must be present in the mind of planners in developing countries today. The blending of elements of emerging with traditional technologies may offer real opportunities for a more balanced approach to development, with centralized and decentralized initiatives co-existing side by side. Blending puts into a different light the debate on appropriate technologies that was a central topic of development thinking in the 1960's and early 1970's: one needs to look for appropriateness in the blend, rather than in the individual technologies which make it up.

16. Underlying and cross-cutting analysis of major trends, critical issues and needs, is the concept of sustainable development and equitable sharing of the benefits of industrial growth. It can be said that, at present, the concept is rather vague and that a better idea is possible of what sustainable development is not, than of what it is. This is even more true with reference to particular aspects of sustainable industrial development.

17. As the United Nations Environment Programme's 1984 report on the state of the environment said: "The central question today is not whether to choose between development/industrialization and environment. It is how to select patterns of development that not only minimize adverse impacts, but are actually designed to stabilize and improve environmental, and hence, economic, conditions." Though development and environmental protection can go hand in hand, and are self-supporting, the process is not automatic. Mutual reinforcement of the two requires careful attention to content and modalities of growth and environmental protection.

18. International bank lending, for example, has a profound impact on sustainable development, through loans to companies and government agencies involved in developing infrastructure, natural resource projects and

industry in developing countries. Very little is actually known about the extent to which commercial banks concern themselves with the environmental and natural resource consequences of their lending and their borrowers' activities. International institutional lending has not been exempt from the financing of schemes and projects subsequently demonstrated to have generated negative impacts on natural and human environments. If the role of environmental considerations in both public and private lending is still little known, the activity of government export credit and insurance agencies appears likewise so far largely unrelated to analysis of the environmental effects at various levels - local, regional, national, and indeed international - of the industrial plants, projects, goods covered. There are signs that the international financial community is belatedly waking up to these issues.

19. From the above reflections we shall try to analyse in the following chapters the individual issues of industry, environment and development, and derive from such analysis tentative conclusions and recommendations hopefully to be endorsed by the World Commission on Environment and Development.

PART B: ANALYSIS

Major Trends, Critical Issues and Needs

20. Within the framework of the long-term global perspectives for industrial development provided in Part A, and partly as a result of the growing interdependence of national economies in terms of trade and investment; research, development and transfer of technology; financial flows; access to raw materials, energy sources, markets, technology and labour, we can discern several major trends which will significantly affect or be affected by the future course of world industrial growth and its environmental implications.

21. These trends can be listed as follows: 1) the progress of industrialization of the Third World and the concomitant relocation of some basic and consumer industries from the developed to developing countries; 2) the emergence and expanded application of an entirely new generation of technologies and the consequent reduction of the resource and environmental content of growth (that is, the dematerialization of industry and economy) especially in the advanced industrial countries of the world, in parallel with the increasing shift from mining and manufacturing to service sectors; 3) the ever-accelerating pace of urbanization in developing countries, with important implications for food production, housing and city planning, transport, energy and water supplies, health and sanitation services, education, tourism, amenities and recreational facilities; 4) the emergence of a new model of agriculture with a greater convergence of industry and services; 5) the increasing role of multinational corporations (MNCs), and the rising number of relatively small companies engaged in multinational operations; 6) the increasing importance of small and medium size industries indigenous to the countries concerned; 7) greater societal awareness of environmental problems at a global, national and local level; 8) finally, and also in relation to point 7) above, the growing problem of various hazards associated with industry, such as pollution, chemical products, hazardous waste and industrial accidents.

22. Each of these major trends has complex effects on efforts to achieve a more sustainable pattern of world development than that currently prevailing. The international community must analyse their interaction and competing demands, in the overall context of growing concern and shared responsibility for the care and management of the Earth's finite resources.

1) Industrialization of the Third World

23. Industrialization is a legitimate aspiration and an imperative need for the development policies and programmes of any developing country. The frustrations felt by many would-be industrial countries at the slow progress of industrialization after decolonization led some schools of development thinking almost to turn their back on the goal of industrialization and instead advocate agricultural development and commodities production and trade. Today, there is renewed interest in striking a suitable balance between industrial and agricultural development. This contrasts with previous thinking centred on a dualism between industrial development based on urban poles and an old fashioned, traditional agricultural sector excluded from modern trends. The present view of industrial development is of a process which takes place around both centralized poles and decentralized initiatives, with small-scale industries utilizing blends of indigenous and emerging technologies together with locally available resources, integrated in a rural context which over time grows into an agro-industrial complex.

24. The last two decades have witnessed considerable growth in industrial production and trade by developing countries. Over the period 1963-83, world manufacturing output increased at almost treble the rate of agricultural output, and developing countries have played an increasingly important role in this industrial growth. In aggregate terms, developing country share of world manufacturing value added (MVA) has risen considerably and this has occurred across the whole range of industrial activities. It reached 10.3 per cent by 1980-81, although still far below the growth curve that is deemed necessary to achieve the "Lima target" of 25 per cent share of world manufacturing output by the year 2000. (See Appendix A. Box and Fig. 2.1). Some developing countries made spectacular progress in industrialization, earning the title of "newly industrialized countries" (NICs). Many of the countries in East and South-east Asia - such as South Korea, Hong Kong, Singapore - are examples. There is now a second wave of industrializing countries following on the heels of NICs, involving countries such as Malaysia, Thailand, Tunisia, and Turkey.

25. Industrial activity has thus assumed increased importance for a wide range of developing countries. In all but a handful of developing countries, the share of industry in GDP has risen over the last two decades. Even in the low-income countries (excluding China and India), industry's share of GDP rose from 12 to 19 per cent between 1960 and 1983. If India and China are included, the figure rises to 34 per cent. For the least developed countries, however, some fundamental constraints remain before viable industrial sectors can be established. There has also been a clear tendency for the pattern of developing country industrial production to move towards more capital-intensive activities, as projects became more

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ambitious and economies more sophisticated. There has been particularly striking growth in the share of metal products, machinery and equipment and in chemical products within total MVA in developing country production. These industries, it must be noted, have generally been pollution-intensive in the past. At the same time, shares for food products, and to a lesser extent for textiles and clothing, have fallen significantly. (See Appendix A for Tables and Figures illustrating these changes and trends.)

26. Development goals have also been furthered by the buying in of plant rendered uneconomic in advanced countries by rising labour costs. Such plant, while not being the most efficient from the point of view of a sophisticated industrial economy, can make a valid contribution to the process of industrialization of a developing country by taking advantage of that abundance of labour which still represents a major resource in the most parts of the Third World. Clearly, should such plant also possess negative environmental impact, a developing country would be less justified in considering its importation. As has been noted in Part A, reliance on older, cheaper technology - often dirtier technology - should not be seen as an acceptable option for development.

27. Independently of the endogenous process of industrialization in the developing countries, another aspect of this process is that which takes place by the intervention of MNCs: a relocation of industry to developing countries, primarily motivated by the desire to take advantage of cheap raw materials and energy (in the case of basic industries), cheap labour (in the case of mass produced, labour-intensive consumer products), or to serve local markets where transport costs, import restrictions or lack of hard currency make international shipment of goods impracticable. In addition, MNCs are frequently encouraged to enter a country by the home government, which may make local manufacture a condition of access to the market. This factor can have an important influence when analysing the possible environmental consequences of these facilities, as MNCs left to themselves would seem in general to prefer to retain their manufacturing base where effective technical control over processes can be maintained.

28. Relocation can also be brought about by a wish to conduct industrial activities in areas where the environment's natural ability to absorb and deal with polluting substances remains unimpaired. Where over-exploitation and hence saturation has occurred, and

the environment has lost its self-purifying capacity, such activities are faced with the choice of either adopting clean technologies or becoming candidates for relocation elsewhere. For relocation to be acceptable environmentally, regulation must ensure that saturation is not then approached at any new site of operations: the strictness of such regulation reflecting the degree of strain being placed on the environment at any one time.

29. So far, there is little evidence to suggest that environmental controls adopted in some developed countries are driving heavily polluting industries to the developing countries where environmental regulations are non-existent, lenient or ineffectively enforced and monitored. However, notable examples such as the asbestos industry, which after its effective closure in the United States migrated first across the frontier to Mexico and is now in phase of expansion in other developing countries, show that the problem is not trivial.

30. Changes in the geographical and geopolitical distribution of industry also take into account the general economic situation, and technological trends. The population of the Third World will continue to rise between now and the middle of the next century, and in addition the average per capita GNP across most of these countries hopefully will increase significantly. Combined effects are likely to lead to a five to ten fold increase in economic activity. This will set in motion an enormous expansion of those industries (steel, paper, chemicals, building materials, road vehicles, etc.) producing goods essential for the provision of infrastructures and parallel urban growth.

31. In an industrialization process based on concentrated, essentially urban, development, these are typically the activities which could bring about saturation of local environments through over-exploitation. They have, in fact, already created major pollution problems in megalopoli like Sao Paulo, Mexico City, and Bombay. These examples of rapid, highly-polarized industrialization reinforce the need to flank such development by decentralized initiatives to spread the burden of environmental impact, reduce the pull of a few vast cities by generating more balanced growth in more manageable smaller urban areas - and also in rural areas - thus avoiding black spots which demand costly but imperative remedial action.

32. Every effort must be made in developing countries to try to ensure that norms and regulations adequately reflect the degree of protection the local environment and population require, and that expanding basic industries use where possible modern, clean, efficient, resource and energy conserving technologies, the long term economic

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benefits of which at first sight frequently seem less than the price immediately to be paid in terms of increased capital cost. This is important to countries struggling with chronic lack of capital and indigenous expertise to get the very first stages of industrialization off the ground and put in place a rudimentary infrastructure.

33. In many developing countries, it is felt that the development imperative must override all else and that the environmental problems of the Third World are of a different kind to those besetting advanced industrialized economies, being problems reflecting poverty and lack of development. Pollution control may be seen in this view as using up productive resources which could be applied to greater social advantage in other ways.

34. Development can be seen as a cure for environmental problems, and not necessarily as the cause. Just as poverty exacerbates environmental problems, so there is considerable evidence that environmental protection measures yield significant economic and social benefits, which include improvements in mortality and morbidity rates, improvements in working conditions, increased amenities and technological innovation. In both industrialized and developing countries, environmental protection and economic development can be seen as being not only compatible but interdependent and mutually reinforcing.

## 2) New and emerging Technologies

35. As discussed in Part A, the world is now facing a new technological revolution generated by major innovation in widely different areas, with different impacts and characteristics. Information technology is of particular importance: it has the capacity to make a major contribution to decentralization of industrial operations and transform ways of working, living and producing. It is affecting international trade, often reducing the advantage of cheap labour in developing countries.

36. New materials are making a more flexible approach to production possible. They also contribute to energy and resource conservation, as in general they tend to require less energy to manufacture and be lighter than traditional materials. Increasingly they will substitute for them.

37. The third major area of technological revolution is represented by the biotechnologies. These technologies, more perhaps than the others, will have a major impact on the environment. Human and animal health could be dramatically improved. New strains, new climate- and pest-resistant species will revolutionize the most traditional sector of all - agriculture. Biotechnologies

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could also replace many wasteful and more polluting products and processes with cleaner and more efficient alternatives. Moreover, they offer great promise in the treatment of solid and liquid wastes. Research in the area of waste technologies could eventually provide a solution for one of the world's most pressing problems.

38. Biotechnologies, it must be stressed, are not all intrinsically benign. There could be the danger that the more risky research is carried out, and products tested, where safeguards and regulations are weakest, or ignorance of the real dangers greatest. The need for caution is reinforced by the experience of the "Green Revolution" itself which, in spite of its formidable achievements, has given rise to concern over mankind's dependence on relatively few crop strains. Crop diversity and the protection of species supplanted by new bio-technological products must be ensured. Furthermore, there exists the danger that bio-technological research be conducted by inadequately trained personnel without maximum - and necessarily costly - attention to safety aspects or, worse, be perverted for unethical ends.

39. Advances in space technology, now the almost exclusive domain of advanced countries, will also have an impact on developing countries. Remote sensing from space and satellite imagery to monitor and assess the state of the world environment by keeping track of long term trends in climatic changes, marine pollution, soil erosion rates and plant cover will permit us to optimize our use and access to the Earth's resources.

40. Emerging technologies are also increasing the interdependence of industry and the services sector. Complex trends are involved: the growth of a services society in advanced economies is not likely to be as straightforward a process as was previously predicted. The role of industry will remain vital for the foreseeable future, even though sophisticated services have already assumed leadership in such economies and are spreading to the developing countries. On the other hand, not even the poorest countries can afford, for example, not to adopt sophisticated telecommunications services, unless they accept the risk to their economies of being excluded from the international communications network.

### 3) Urbanization

41. The net impact on the environment of these multiple changes will be considerable. The basic tendency of some new technologies (for example, the information technologies and the biotechnologies) to bring about decentralization of industry, agriculture and services, as new opportunities accrue from a shift toward local, market-linked operations, may go some way to slow down the

growth of mega-cities and the Third World's ever-accelerating pace of urbanization. While the progress of urbanization per se is not to be regarded as an evil, by occurring too rapidly and in an extremely polarized way it can strain the capacity of populations, central governments and city and municipal authorities particularly in developing countries to cope with negative impacts on land use, city planning, transport systems, public services and housing.

#### 4) The Convergence of Industry and Agriculture

42. As science and technology play a greater role in agricultural production, agriculture itself becomes increasingly interdependent on the industrial and the services sectors. Until recently, agriculture has been a relatively backward activity, receiving as sophisticated input the products of industry in order to raise its productivity. Industry also contributes to raising the level of food production through the provision of agro-chemicals and the mechanization of agriculture. Though agricultural productivity has increased sharply, misuse of products and techniques has given rise to problems for the health of farmers and labourers, contamination of soils and crops, increased resistance of pests to pesticides (and consequently the increased incidence of crop damage by those pests), soil erosion and loss of soil fertility.

43. With the new technologies and the "Green Revolution", the age-long distinction between agriculture, industry and services is fading away. Agriculture is catching up and gradually becoming an advanced sector in advanced countries, with an optimization of the use of factors of production in the context of an agro-industrial economy. Agriculture-related services too are becoming ever more important, especially when provided on a regional scale such as weather forecasting, extension services, storage and transport. Dematerialization is part of the process. Genetic engineering, for example, could soon generate new strains of plants directly able to fix nitrogen at the root, with serious repercussions on the fertilizer market; biological methods of pest control will have equal impact on that for pesticides. Direct effects on the environment will be marked. In the past, across much of the world agriculture generated limited negative environmental impact. With new technologies, however, it could create fresh socio-cultural and pollution problems which will need to be addressed. At first sight, reducing the role of agro-chemicals may appear to be positive. But great care will be needed: even biological methods may reveal undesired side-effects.

44. The new technologies will radically affect agriculture and, as in industry, the Third World will not be exempt. Flexibility, small scale use, the customizing of products to meet very complex and specific circumstances and functions, trend toward bio-technological rather than chemical solutions; all these elements suggest that agriculture will benefit from progress in fields as far apart as materials science, space technologies, molecular biology. The aim will not only be to improve performance, invent new products and decrease impact on the environment. An entire new sector providing a matrix of products with high technology and knowledge content will come into being. A seed industry of major dimensions, with close links to industrial sectors including chemicals and energy, is developing, providing new seeds with very specific qualities, hybridized to meet strictly local or regional needs.

#### 5) Multinational Corporations

45. The dominant economic role played by multinational corporations is evident from international statistics. The world's 500 biggest industrial companies, measured by sales, had an aggregate income of US\$2,990 billion in 1982, roughly equivalent to the gross national product of the United States. Of these, 211 were American, 72 Japanese, 56 British, 36 German, 25 French and 21 Canadian. Flanking these enormous corporations, there exists a myriad of smaller companies whose activities are now multinational. This is a relatively new development, which has taken place across many sectors and not only in the advanced ones. Furthermore, the large domestic corporations with a leading, if not dominant, role in specific individual economies share certain of the same characteristics as the multinationals, and some of their problems.

46. MNCs are often active in high technology industries, including those with potentially hazardous technologies. A high level of complex technology requires special precautions in design, construction, operation and maintenance. Safe environmental management, for MNCs as for national companies, calls for a significant level of understanding regarding the technology involved, extensive practice in following procedural steps for safe operation, and a high level of maintenance of installed equipment. MNCs are also active in industries related to process-pollution problems, including chemicals, iron and steel, non-ferrous metals, oil, pulp and paper, and industries related to product-pollution problems, such as motor vehicles, tobacco and pesticides.

47. Over the last ten years, much attention has been paid to the environmental role of multinational corporations, particularly in developing countries. Though there have been examples of MNC misbehaviour, the impression gained from studies carried out so far is that the majority of multinational corporations seem to operate at a higher level of environmental awareness than local enterprises in developing countries. At the micro-level, however, the working of double standards in worker and environmental protection by some MNCs at home and abroad has been documented.

48. Some governments in developing countries have expressed concern that additional costs related to environmental protection and process safety might reduce the future flow of foreign direct investment and other forms of participation, including the transfer of technology to host countries. In the current approval process for foreign direct investment or technology acquisition by developing countries, safety and environmental considerations have not been given priority attention. A certain, often unvoiced, concern exists that foreign investment might shy away from countries imposing stricter environmental protection standards.

49. In fact, a very limited share of global foreign direct investment has been flowing to the lowest income developing nations where environmental awareness and regulation are most lax. Environmental policy has started to emerge in the group of newly industrializing countries that have been the largest recipients of foreign direct investment among developing countries, though it is in an early stage of development. Such specific cases of international site selection influenced by environmental policy as have occurred can be traced to blockage or exclusion of first choice sites in densely populated advanced countries, for example Japan, Denmark or the Netherlands.

50. Environmentally-related research and development efforts have become a part of activities of MNCs in their home countries, but apparently less so in host countries. There is little evidence that pollution control technologies developed and applied in operations in one country are promptly transferred to similar operations in others. Although exceptions can be found, the common pattern among MNCs is to leave the management of environmental, and other, issues to a large extent to local initiative - a reflection of the on-going decentralization of management of most large enterprises, even within single nations.

51. A number of MNCs have attempted to develop a consistent set of corporate environmental safety objectives and standards which are applicable to their worldwide operations. Manpower assigned to environment or safety-related staff positions has varied from one country to the next, within the same corporation, as well as the degree of co-operation with government agencies. Special consideration of ecological impacts in project planning has generally been present only in cases where it is an expressed concern of the host country. Moreover, there has been a tendency for many MNCs to do more intensive safety auditing for plants located in developed market economies, where regulation, potential liability and public concern are greatest.

52. Differences in the stringency of environmental policy between nations have been traced to differences in environmental assimilative capacity (that is, the ability of the physical environment to absorb potentially harmful materials), and differences in environmental quality preferences (the extent to which environmental protection is considered a priority in development planning). Assimilative capacity is, however, difficult to measure empirically and there is considerable controversy over whether such capacities actually do differ significantly among countries. Should it be established that variations in national environmental norms result from genuine differences, then attempts at uniformity in standards could act to frustrate efficient allocation of economic and environmental resources, reduce social welfare at the global level, and infringe upon national sovereignty.

53. Pressures in favour of some degree of standardization may nevertheless be mounting. Some major advances in pollution control have been achieved by MNCs, and by their agency these are on offer worldwide. In addition, environmental quality preferences have themselves been found to be related to per capita income. Thus, as strategies based on sustainable development - which must be seen in a global perspective involving a range of economic, social and ecological interdependencies - gain acceptance, the present hesitancy to allocate scarce resources to environmental protection may become less pronounced.

54. With the current climate of concern for Third World and environmental issues, however, and given the importance of their corporate image in their major markets in industrialized countries, MNCs may be induced to perform functions which go well beyond the actual requirements of government regulation and contractual agreements, and engage in active monitoring of local conditions for the mutual benefit of both corporation and host country. In the wider environmental field, as in many others, research is needed effectively to blend new

technologies with traditional ones; MNCs should dedicate more efforts in this direction, and attempt to ensure that research they undertake can be of benefit to the Third World as well. The mere transfer of technology without adaptation has been seen to be no longer enough - specific technological solutions suited to the circumstances of developing countries are called for if industrial development is to become self-sustaining in the wider meaning attributed to this term.

6) Small and Medium-size Industries

55. Having far more limited resources at their disposal than large firms, be they state-owned corporations or MNCs, small and medium-size industries often can less readily afford or understand the implications of the process adaptations and other technological innovations necessary to meet environmental regulations and product controls. Small-scale businesses like metal working, machine tools, printing, tanning and dying, are frequently among the worst offenders of environmental regulations in any country.

56. The advent of new technologies, especially micro-electronics, makes it already possible for small-scale industries in advanced countries effectively to control the entire production process at surprisingly low costs. As such applications diffuse, small firms in poorer countries will have access to them, and therefore will be able to integrate elements of new technologies at the basic level of their operations.

57. Since they make up the largest segment of industry in most countries, and especially in the developing countries (both in terms of the number of people employed and their contribution to the national economy), small and medium-scale companies need to be provided with information and both financial and technical assistance in this field. As regards the incorporation of clean technologies and environmental and resource planning into work patterns, the provision of management and worker training becomes essential. The enforcement of environmental measures against both larger and smaller companies, be they foreign or domestically owned and run, should, as a matter of principle, be homogeneous.

7) Increased Awareness of Environmental Issues

58. Growing economic interdependence, the subject of much public debate over the last twenty years, not only presents increased opportunities for working together toward the common goal of sustainable development, but also increases the vulnerability of our society to disruption, risks and crises inherent in an interlinked economic and ecological system.

59. Cleaner, more efficient technologies cannot be the preserve of industrialized countries, nor can rapidly growing demand in developing countries be left to be met by traditional, inefficient or obsolete, dirtier technologies. Scientific and technological breakthroughs are occurring in relatively few industrialized countries. The advanced industrialized economies, together with a restricted number of NICs, are spearheading the diffusion of new technologies and their incorporation in sophisticated products and processes. This differential rate of diffusion and fall out from scientific and technological advance could mean that countries with slower rates of take-up of technology be compelled to continue to rely on outdated, highly polluting processes and technologies into the foreseeable future.

60. This, however, provides no comfort for those economies fortunate enough not to be in this predicament. Such an imbalanced world economy is likely to suffer from inherent instability. Moreover, the risks, the hazards, the other ill effects of unwise industrial policies recognize no boundaries. Regional and indeed global pollution, such as acid rain, possible depletion of the ozone layer and the climatic changes which in the future may be induced by greenhouse gases; the depletion of natural resources; the disturbance to marine ecosystems, fishing grounds, water resources, all transcend national frontiers.

61. Divergences in income and standards of living will be further accentuated, should developing countries undermine their resource base by passive acceptance of extensive environmental degradation. Developing countries must be a priority area for international co-operation in environmental matters. The siting of projects should minimize negative environmental impact and involve sensible co-ordinated land use planning. Clean technologies should be demanded in new facilities and retro-fitted into older plant as needed and practicable.

62. Public opinion worldwide is becoming sensitized to environmental issues. The pressure for improvement in the quality of the environment can be seen in Western countries, with the rise of the Greens and other pressure groups; in the Soviet Union, and other centrally planned economies, with major government initiatives to reduce pollution; and in several regions of the Third World. This is a significant development. Especially in the Third World, mobilization of public opinion, in non-governmental organisations and groups of like-minded people united in a desire to protect environment and populations from over-use, is finding ways to influence policy-makers and industrial leaders often by dialogue and consultation. The

right of access to information, to a degree of government recognition, public assistance and even financial support, is increasingly being recognised. It is now a widely shared notion in all sectors of society that pollution is, in fact, both uneconomic and unnecessary.

63. The exportation of negative environmental impacts beyond national boundaries should be discouraged. A clean, unimpaired environment is also a national resource. This is a prescription which affects developed and developing countries alike. The economic costs of pollution should not be borne by those countries taking no part in its generation.

64. In the Third World, the development process can be seen as an opportunity to bring in where possible the most advanced technologies and blend them efficiently into the existing productive system in order to devote available resources to the achievement of development goals. While this process is taking place, richer nations have a responsibility to do everything in their power to avoid over-exploitation of global resources and consequent damage to the world's ecosystem.

65. Natural resources, especially non-renewable ones, should be regarded as the national endowment of each country, and terms of access to these resources should reflect this concept. Resource management policies in developing countries must be designed to prevent over-exploitation by the use of improved lease terms, codes of conduct and import restrictions, with an acceptance of an obligation by industry to ensure that renewable resources are given time to regenerate, in order to guarantee their survival over time, and to restore land damaged by resource extraction or use.

## 8) Growing Industrial Hazards

### 8.1) Environmentally-damaging and Hazardous Industrial Waste

66. Waste of resources is potentially a symptom of inefficiency, and blatant waste has been regarded as morally reprehensible in many cultures. The production of a certain amount of waste is, however, inherent in the fulfilment of any human productive activity. Earlier societies followed a practice of dispersion of the little waste material they produced across wide tracts of territory. From the first cut-and-burn cultivators to the village structure of pre-industrial England, waste was spread thinly over as wide an area as possible, to be broken down in time by natural forces. Cultivation or habitation returned when the process was deemed to be complete. This system is that which still rules in much of the developing world today.

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67. Now, however, waste is more often concentrated and dumped in specific sites, then abandoned for lengthy periods of time for nature to attack the more difficult task of rendering such concentrated waste harmless. The surveillance of such waste deposit sites presents major problems even in highly-organized industrialized countries. The time span required for the self-destruction of toxic wastes has not always been respected, giving rise on occasion to risk to human health.

68. It is the intention that some wastes be abandoned forever, isolated from any further contact with the natural environment. This latter course is not only going to be reserved for radioactive wastes, highly toxic wastes will also be placed in sealed containers, designed to act as barriers between it and nature. Alternative solutions - for example, the systematic elimination of accumulated waste and decomposition of toxic molecules - suffer from problems arising from technical complication and the enormous cost of their implementation.

69. Many of the goods which advanced societies take for granted are the outcome of an inefficient and polluting production chain. Some of the waste produced by modern industry are toxic and pose serious hazards to human health. Some are even virtually indestructible, and prone to accumulation in the natural environment, especially in soils and water basins. Not only production processes (including extraction and mining of raw materials) but also transport, handling, use and final disposal can cause difficult, and expensive, problems of waste management and control.

70. The question of the transport, storage and final disposal of wastes is of vital importance for developed and developing countries alike. There is a need better to understand how industry can handle these wastes and recycle them. Thought must be given to avoid the Third World becoming a receptacle for wastes generated elsewhere. The issue now presents itself as to whether, ethically, wastes generated in advanced economies should be consigned to the Third World for storage or disposal. It may be financially rewarding for developing countries to accept such wastes for storage at sites within their boundaries, and some developing countries are making known that they would be willing to put areas aside for use by advanced countries and multinationals for waste disposal.

71. All anxiety must be dispelled, however, that in coming to any decision the frequently imperfect norms governing such wastes in these countries is a factor, and that Third World governments may be trading off environmental quality for future generations in return for much needed hard currency. In fact, there is no lack of

geologically or environmentally suitable sites for waste storage in advanced countries. The problem of siting is essentially political, and is the result of increasingly vocal opposition from local communities. Export of waste to less sensitive areas in developing countries in order to placate such opposition cannot be considered, as a matter of principle, a responsible option for the advanced world.

#### 8.2) Industrial Process Pollution

72. As regards pollution resulting from industrial processes, many industries are involved. Chemicals are sometimes regarded as the chief culprit, but a major producer of air pollution worldwide is in fact the electricity generating industry. The transport industry is also a major contributor, essentially through exhaust gases from the internal combustion engine. The timber and paper industries have a universally bad record for environmental damage mainly through water pollution. Agricultural wastes, and fertilizer and pesticide run-off, are a threat to drinking water in developed and developing countries alike. The metal working industries produce a degree of heavy metal pollution of soils and aquifers which can reach alarming proportions.

73. Natural conditions represent "common resources" that cannot be reduced to private ownership. They can be seen as asset-like stocks which produce streams of varied services and utility - both tangible (flows of life-sustaining material resources such as air, water, soils, minerals), functional (waste assimilation, nutrient cycling, pest control and climate regulation), and intangible (scenic beauty, recreational amenities). Natural systems possess a capacity to assimilate, to some degree, most forms and types of pollutants through natural mechanisms. These natural mechanisms, for example, in the case of the air, are strongly influenced by the micro-climate. Human activities may impair this capacity, or the volume of pollutants generated may exceed it. The significance and acceptability of this environmental change depends heavily on its interaction with human conditions.

74. Environmental quality is a matter of social choice and societies differ in their views as to what constitutes "acceptable" levels of environmental quality. This clearly then may impact on the political process. But, as policy-making is itself subjected to widely differing variables from country to country, identical social awareness on the same environmental issue may then not translate into the same selection of policy alternatives. These latter become a joint function of environmental assimilative capacities available and environmental quality preferences expressed - both concepts extremely difficult to analyse quantitatively.

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75. Whether developing countries have a comparative advantage in polluting industries, for example, may depend on the degree to which their assimilative capacities are being exploited, not on the fact that it is necessarily large. Given the already existing level of industrial concentration around few development poles in many developing countries described above, pollutants entering air and water in such areas actually tend to be higher than in cities in industrialized countries. Such high levels of pollution may also have a proportionally greater adverse effect on local populations, given their generally lower standard of health and hygiene. "Unused capacity", in that it exists, will tend to be found in remoter rural locations, and even there the environment has very little assimilative capacity, if any, for certain pollutants - mercury and other heavy metals to take only one group of examples.

76. Strategies of redeployment of industry based on the assumption of unexploited capacity may therefore be illusory and perhaps even self-defeating in terms of efficiency and environmental impact. Not only redeployment is at issue: the expansion of traditional, but highly polluting, activities can generate problems. Growth in Third World market shares in tanning, an activity generally congregating around major sources of water, for example has rarely taken place through the adoption of technology recycling the toxic salts used for treating leather. This technology is compulsory in virtually all advanced countries. Though recycling may in the short term add considerably to costs, it not only permits the recovery and reuse of valuable raw materials but also, and above all, the conservation of usable water resources. Where the traditional activity is undertaken by many small units, the cost of pollution control systems or of recycling can sometimes more readily be borne by co-operative effort.

### 8.3) Chemical Products and the Chemical Industry

77. The increasing use of chemical products in all modern societies calls for a special note. The chemical industry is one of the greatest contributors to the welfare of mankind. Its products have greatly improved life expectancies, raised the quality of life, expanded economic opportunities. This industry, however, can have a particular impact on the environment. Major accidents have taken place, and the safety record of the industry, while good overall, has been challenged.

78. The chemical industry embraces many different sectors, each of which has become vital for man's well-being, including industrial chemicals, fertilizers, pesticides, pharmaceuticals, detergents, plastics and

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petrochemicals, dyes. The industry's products - be they for other industries or for the final consumer - can in certain circumstances be themselves causes of pollution unless handled and used with due care. Special restrictions in trade and use apply to certain chemical products found to be hazardous to health and to the environment, and this area of industrial activity is subject to international regulation.

79. It is true to say that most major corporations operate in conformity with safety norms and regulations, and have an excellent record worldwide. Experience indicates that smaller companies are unaware of, and find it more difficult to conform to rules and regulations, codes of conduct, and specific restrictions. Nevertheless, there have been cases of negligence and even of flouting of codes by larger chemical companies, which have used differential legislation between nations to export products deemed unsafe in one country to less regulated markets in another. Given the frequent inadequacy of Third World safety legislation, and sometimes even the lack of a structure responsible for vetting products introduced onto the local market, developing countries must guard against product pollution from all directions. Lack of information, product secrecy, and the practices of unscrupulous intermediaries can also magnify the task before developing country regulatory authorities.

#### 8.4) Industrial Incidents and Accidents

80. Environmental pollution resulting from accidents is not the unique responsibility of any one industry. Nor are accidents to be thought of only in terms of explosions or major incidents. The accidental spillage of liquids used in electro-plating, for example, can seriously pollute aquifers and cause considerable environmental damage. In a world more and more dependent on the products of the chemical industry, however, accidents involving highly toxic products and processes are likely to increase. There will be a greater need to perfect techniques for the management of industrial accidents and safety routines. In fact, while in most countries at least two major modern industries - aviation and the nuclear industry - grew up from the start with a paramount awareness of the need for compliance with stringent regulation in terms of safety and reliability, the chemical industry grew out of 19th Century beginnings. The significance of certain advances in products and processes for safety standards have not always been widely understood, nor has a systems approach to the new type of problems involved been adopted across the board. Such a systems approach would anyway prove difficult to practice for the smaller companies.

81. As a result of accidents such as the 1984 leak of methyl isocyanate, an intermediate chemical used in the manufacture of a pesticide, which brought about the most serious accident to date in Bhopal, India, at a facility operated by an affiliate of the Union Carbide Corporation causing the death of over 2000 people and injury to 200,000 more, new awareness has emerged as to the disaster potential of both products and processes. Ever more so, attention needs to be concentrated on smaller companies and on ways to strengthen the interactive relationship existing between chemical companies and the communities which host them.

82. Despite the concentration of most of the industry dealing with hazardous processes or products in advanced countries, many significant accidents occur in developing countries. As noted above, a constant danger for the developing world results from the inadequacy of environmental and health legislation, and the all-too-often poor safety record of both plants and waste dumps. Much of this can be ascribed to the serious institutional and technical weaknesses existing in the area of environmental, worker, and consumer protection.

83. Even where environmental agencies exist, they seldom carry the necessary weight in national and political life. Many such agencies lack financial resources and do not have enough trained personnel to carry out programmes and administer legislation. Most developing countries have neither the technical ability nor the institutional capacity (for example, laboratory facilities) to assess potential health and ecological problems, nor do they possess the monitoring capabilities to keep an effective surveillance over industrial activities. These weaknesses increase the possibility of accidents and place more responsibility on the individual manufacturer as being the best informed party.

84. Industrial accidents involving toxic chemicals are not limited to plants located in developing countries alone. Only months after the tragedy in India, another accident occurred at a plant in West Virginia operated by the same company, causing large-scale evacuation of population and risk to human health. Acceptance of responsibility on the part of Union Carbide on this occasion, however, was more prompt, and initial offers of compensation more generous, than at Bhopal. The accidental release in 1976 of the highly toxic and mutagenic compound dioxin into the air of heavily populated Northern Italy by a plant operated by ICMESA, a subsidiary of Hoffman La Roche, showed that in Western Europe too regulations can be evaded and otherwise respected companies behave with culpable indifference to accepted safety standards.

PART C. INTEGRATING ENVIRONMENT  
AND INDUSTRIAL DEVELOPMENT:

85. Many of the currently prevailing patterns of industrial development are not adequate and sustainable over the long term. Some threaten the capacity of industry to grow at profitable margins and hence militate against achievement of the goals they are intended to serve: the satisfaction of human needs and the generation of wealth and employment to improve the spiritual and material base of life.

86. The prospects for attaining adequate and more sustainable patterns of industrial development are good, however. The advent of a new generation of technologies coupled with a steadily growing awareness of the need to ensure that development enhances rather than undermines its own resource basis and environmental support systems, provides enormous opportunities for the future.

87. A number of far-sighted yet practical changes in current approaches will be required to seize these opportunities and ensure sustainable industrial growth and, in particular, to accelerate the development of industry appropriate to the wide range of preferences and situations in the Third World. The precise form of these changes will, of course, vary greatly between countries and industries but their overriding objective everywhere must be to integrate resource and environmental considerations fully and effectively into decision-processes within both government and industry.

88. Such integration will make possible a steady reduction in the environment and resource content of future growth through increasing the efficiency of resource use, reducing waste and encouraging resource recovery and recycling. It will enable the adaptation of new and emerging technologies to facilitate the development of human resources, and improve existing, traditional work patterns. In general, it will enable government and industry to shift to more cost effective anticipate-and-prevent approaches to sustaining the resource and environmental base of development, gradually reducing the current heavy reliance on economically and socially inefficient react-and-cure measures. Because of their cost, these latter measures have been and will remain out-of-reach of all but a few of the richer industrialized countries.

89. Such integration will not happen in practice, however, without significant changes in institutional arrangements at the national level, on the part of both government and industry, and without more effective means of international co-operation, especially between government and industry.

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- 89.1 Integrated industrial planning, for example, requires a coherent deployment of economic, fiscal and environmental measures such as taxes, emission charges, resource development leases and trade agreements, as well as the further extension of the Polluter Pays Principle. Current modes of decision-making do not normally facilitate this.
- 89.2 Within industry, comprehensive planning for cost-effective, sustainable development requires an integrated approach to the resource and environmental factors of production and the constant redesign of products and processes to blend elements of new and emerging with existing technologies, so as both to reduce the resource and environmental costs of production and to maintain an advanced and competitive range of products. This occurs systematically only in a few leading industries.
- 89.3 Environmental assessment of industrial policies and all major industrial investments must be built into corporate decision-making processes at a much earlier stage than is now generally the case, in order to promote a preventive approach, thus avoiding unnecessary and costly delays and ensuring that development takes place on a more sustainable basis. At present, environmental assessment is usually an "add-on", not a "built-in".
- 89.4 The same is true of measures to inform and involve local communities and segments of the public in industrial development, and particularly of measures to integrate community and industrial goals for growth, employment and welfare and reflect them in choice of technologies, siting of industry and plans for the safe management of hazards, emissions and wastes.

90. In government and in industry, integration of environment and industrial development is often hampered by fragmented and compartmentalized institutional structures and decision-processes. In industrialized countries, this adds an extra element to the costs. Within the context of social acceptability, industry can find itself required to wind a way through confusing bureaucratic systems to obtain multiple approvals sometimes calling for conflicting actions. Within industry, top management is often far removed from internal sources of advice and expertise on resource and environmental issues and hence unaware of opportunities to reduce resource and environmental costs.

91. In developing countries, the effective integration of environment and industrial development is even more remote. Indeed, it is doubtful whether most developing countries can establish their basic priorities in these areas, let alone devise and enforce the measures they need to undertake, without a significant strengthening of their

institutional framework. Although 110 developing countries have established environmental agencies of some sort (a ten-fold increase since 1972), most of them lack resources, staff and effective power. Some are one-person offices or inter-agency committees with no authority, real or imagined. This institutional incapacity is a major impediment to sound industrial development.

92. In addition, many developing countries face an acute need for information concerning the nature of industry-based resource and environmental problems, the hazards associated with certain materials, and the standards and other measures necessary to ensure and maintain human health and environmental sustainability. They face a corresponding need for trained people to receive such information and apply it to local circumstances and advise on policy. There is at the same time a need to heighten the awareness of industrial management, employees and members of the public at large to the risks and benefits of industrial activity, and the importance of sound environmental practice.

93. Throughout this report, there are repeated references to the provision of information. In this regard, the Panel wishes to assert its view that the fullest possible disclosure of information should always be contemplated and encouraged. Clearly, some types of information are of legitimate concern to industry, because they relate directly to trade secrets or to a company's competitive position. The Panel believes, however, that this concern should not be used as an excuse to withhold information essential to deal with health, safety and environmental problems.

PART D: RECOMMENDATIONS FOR ACTION

I. Strengthening Institutions for Environmentally-Conscious Industrial Development

1) In Industry

94. The Panel believes that industry should play a leading and constructive role in encouraging and supporting the institutional changes needed; beginning with its own mode of management. It therefore recommends that industry, whether large or small, in both developed and developing countries, but especially the larger multinational corporations and national enterprises should:

94.1 establish a company-wide policy concerning resource and environmental management within the company, including full and prompt compliance with all laws and regulations of the country or the community in which the company operates, and communicate this policy to all levels of management and the workforce;

94.2 assign responsibilities for the implementation of this policy, with procedures for the environmental assessment of products, processes and technologies as well as energy and resource audits; provide for the education and training of managers and workers in their respective responsibilities; and for a fair system of rewards for those management and staff who propose the most innovative and effective means to achieve the policy;

94.3 establish (or when it exists, upgrade) a group of top managers within the centre of the companies' senior decision-making body, to oversee the implementation of the policy.

2) In Governments of Industrialized Countries

95. The governments of industrialized countries may need to make changes in their modes of management. The Panel recommends that, if they have not already done so, they should:

95.1 review their existing institutional framework and identify changes that would reduce fragmentation while further decentralising regulation;

95.2 encourage industry-wide co-operation on environmental issues by establishing or, if they already exist, strengthening mechanisms for consultation with industry and for experience-sharing and technical assistance at the local, national and international levels;

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- 95.3 encourage initiatives by and co-operation between larger companies in possession of, and smaller firms in need of, expertise on environmental and resource problems arising from their inadequate capabilities in environmental management;
- 95.4 stimulate co-operative efforts among smaller firms, for example in joint research on environmental issues and collaboration in local pollution control.

3) In Developing Country Governments

96. The governments of developing countries need urgently to give a much higher real priority to, and reflect this in strengthened institutions for, effective management of their resources and environment, especially as regards industrial development. To this end, the Panel recommends that they too:

- 96.1 review their existing institutional framework and identify the changes needed to strengthen it;
- 96.2 encourage regional organizations such as ASEAN and SADCC, to establish means for effective co-operation on environmental and resource management questions related to industrial development, including joint research, exchange of information and experience, consultation with industry, and advice and technical assistance on industrial location, leases and agreements;
- 96.3 seek the co-operation and support of multilateral and bilateral assistance agencies and industrial organizations for financial and other assistance needed to strengthen the institutional framework, locally, nationally and regionally.

97. Industrialized countries, multilateral and bilateral assistance agencies and where appropriate, industrial associations, should be prepared to offer and respond to requests from developing countries for assistance in strengthening institutional, technological and financial capacity in these areas (as they have in many others such as education, agriculture and energy). The Panel recommends that:

- 97.1 governments should request bilateral co-operation and encourage multilateral assistance agencies to offer support for national programmes of institution-building aimed at bolstering the capacity of agencies and officers to manage industry-related environmental and resource questions;

97.2 industrial associations, local, national and international, should review means to extend existing programmes of voluntary industry-to-industry advice, co-operation and assistance in the transfer to developing countries of cleaner technologies, products and processes.

4) When Introducing New Technologies, Processes and Products

98. When introducing a new technology, plant, product or process, or setting up a joint venture in a developing country, the parties involved and MNCs in particular, must also recognize and accept certain special responsibilities. In this light, the Panel recommends that (while conforming to relevant treaties, guidelines and codes of conduct), they should:

98.1 adopt the highest safety and health protection standards practicable and acceptable to the host country, with due account being taken of specific local requirements and conditions, both economic and environmental;

98.2 as a matter of general principle assume responsibility for safe process design, staff training, supervision of commissioning, start-up assistance and information for safe operation and handling of products, unless otherwise specifically agreed in the terms of contract between the parties;

98.3 take whatever steps are necessary to ensure that the competent national and local authorities are fully informed about the properties and potentially harmful effects of the technology, process or product being transferred, including emissions and wastes generated, and any potential risks to the community;

98.4 take whatever further steps are necessary to ensure that such authorities are fully informed about the measures needed for the effective monitoring, regulation and management of the effects, wastes and risks. This would include disclosing all necessary information to the residents of the community in an easily understandable manner; and co-operating fully with local government authorities and community residents in contingency planning and in devising clearly understood mechanisms and procedures for relief and compensation to victims of industrial accidents.

99. Developing country governments, in turn, and the competent authorities nationally and locally, should

- 99.1 adopt and enforce the legal and other measures needed for the safe operation of plants, the secure handling of products and wastes, and the management of accidents and emergency situations, and
- 99.2 ensure that adequate provisions are written into the terms of the contract with industries concerning each party's responsibility, including any cost sharing, for the above.
100. In addition, where the technology, plant, or process involves the development and use of natural resources, governments should:
- 100.1 in respect of renewable resources like forests and fisheries, re-examine and, if necessary, negotiate modifications in lease terms to ensure (a) that the rate of exploitation stays within the limits of sustainable yield; and (b) that finances are available for resource regeneration and for dealing with all linked environmental effects.
- 100.2 in respect of non-renewable resources, re-examine and, if necessary, negotiate modification in lease terms to ensure (a) that the leaseholder undertakes an adequate degree of exploration effort aimed at adding to proven reserves at least the amounts extracted; (b) that the production to proven reserve ratio is kept below a pre-specified limit; (c) that the funds generated by royalties are employed so as to be able to compensate for the declining income when the resource deposit is exhausted; and (d) that the leaseholder is responsible for land restoration and other environmental control measures in the area affected by mining activity.
- 100.3 request relevant international organisations such as UNCTAD, UNIDO and UNEP, to develop model contracts and guidelines incorporating these principles, and to ensure that price stabilisation programmes for primary products should pay explicit regard to the requirements of resource conservation and environmental protection.

## II. Strengthening Citizen Groups and NGOs

101. A vital element in improving environmental and resource management is the existence of strong, well informed local and national citizen groups, including non-governmental organizations. Experience in industrialized and some developing countries shows that a broad constituency of such groups can serve to convince a government to seek to understand the environmental

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dimension of industrial development, to put good resource management higher on its scale of priorities, to create the institutional framework to put such programmes into action, and to dedicate enough money and attention to get the job done. In view of the critical important role of citizens groups and NGOs in generating awareness of environmental issues and promoting sustainable development, the Panel recommends that:

- 101.1 governments and multilateral and bilateral assistance organizations encourage the efforts of citizens groups and NGOs, providing access to decision-makers, sources of information, and where necessary independent funding, so as to enable them to build up their capacity to participate in planning and surveillance activities and broaden community knowledge about resource and environmental needs.
- 101.2 industry establish special links with such groups, locally and nationally, encouraging to adopt a constructive and responsible approach to the full range of issues involved consulting them about mutual concerns providing information and technical assistance, and, where appropriate, utilizing their services in the community.

### III. Strengthening Technological Capacities of Developing Countries

102. There is an urgent need to assist developing countries to strengthen their indigenous capacity for industrial development and technological innovation. A regional or sub-regional approach would appear to be the most effective means to promote international co-operation in this area and with this in mind, the Panel proposes that governments, industries and the academic community in developed countries and international organizations; including international finance and aid agencies;

- 102.1 utilise, to the maximum extent possible, the pool of human, financial and technical resources vested in regional institutions, non-governmental organizations, joint industry/government/community bodies, and industry associations;
- 102.2 promote R&D activities related to the development of environmentally sound technologies and their adaptation to local conditions, including environmental monitoring and assessment techniques, plant and process design, and policies governing the siting of industrial plants and projects;

102.3 encourage development of close working relationships between individual companies and regional institutions so as to provide training, technical assistance and, if necessary, finance to local industries.

#### IV. Developing Human Resources

103. As regards the development of human resources the Panel recommends that government and industry, should:

103.1 encourage and support special training, particularly of industrial managers and workers, local administrators, and community leaders, with a view to enabling more informed decisions on alternative development options;

103.2 target special educational activities at entire communities in order to engender a community-wide sense of environmental responsibility, and at industry so that it may assume greater initiative in environmental responsibility;

103.3 encourage "in-house" provision of training and education programmes by larger companies and MNCs with the assumption by the latter of part of the task of dissemination and instruction, offering facilities and staff to smaller local companies lacking training programmes and structures;

103.4 establish wherever possible easy channels of communication and a forum for dialogue between the various participants in the development process, reinforcing the contribution of bottom up initiatives and maximising the utility of attitudinal differences through encouragement of groupings to work together by pooling efforts, information and resources for the common good.

#### V. Improving the Management of Industrial Hazards

104. As regards chemicals (including pesticides and pharmaceuticals), the Panel recommends that governments and the international organizations concerned should

104.1 as a matter of priority extend adoption of the principle that no new chemicals will be placed on the market until their impact on man and the environment has been appropriately tested and assessed in accordance with internationally agreed guidelines, laboratory practices and assessment procedures;

- 104.2 as regards existing chemicals, reinforce efforts to obtain international agreement on criteria for selection for priority testing, on procedures for their assessment, and on a system for international sharing of the tasks involved in the work and the costs of doing it;
- 104.3 encourage extension of the international network of information and data banks on chemicals now evolving in the UN (eg IPCS and IRPTC) and OECD, and increase their accessibility to the general public;
- 104.4 adopt stricter measures based on international agreements to regulate the export of chemicals that are banned or severely restricted in the country of origin, including prior notification to the government(s) of the importing country of the intent to export, and provision of available information to the importing country concerning the health, environmental and other effects arising from the use of the chemicals together with recommendations for safe use;
- 104.5 adopt and enforce regulations to require the packaging and labelling of chemicals whose use may be potentially harmful, so as to ensure that in processing and marketing such products clear directions are provided in the most common local language(s);
- 104.6 provide assistance to develop and extend less pesticide-dependent techniques of crop protection, such as integrated pest management programmes based on a blend of conventional agricultural practices and advanced agro-biotechnologies;
105. As regards the international movement of hazardous industrial wastes, the Panel recommends that governments and the competent international bodies, including regional organizations, should
- 105.1 support and promote the development of up-to-date disposal techniques, including incineration of toxic chemicals and hazardous wastes in the country in which it is generated, and which has benefited from the economic activities concerned;
- 105.2 require the exporter of hazardous wastes to obtain the informed consent of competent authorities in both importing and exporting countries, as well as countries of transit, prior to their transfrontier shipment;

- 105.3 actively support negotiations underway to achieve an effective international regime to control the transfrontier movement of hazardous wastes, including mechanisms to monitor their flow and including legal principles to be applied in case of damages and claims for compensation arising from their inappropriate handling, management and disposal.

#### VI. Extending Guidelines and Codes of Conduct.

106. As regards guidelines and codes of conduct covering business activities, international trade, industrial relations, transfer of technology and international co-operation for industrial development of the Third World, the Panel recommends that industry and business should:

- 106.1 actively pursue their steady improvement and their extension (e.g. ICC's "Environmental Guidelines for World Industry") to other areas such as the trade in and export of drugs and medicines, packaging and labelling practices, local training and user education, technology transfer, etc;
- 106.2 encourage emulation by the whole of industry of initiatives undertaken in particular industrial sectors which have led to the adoption of voluntary industry-wide codes of practice, such as that of the Greek shipping industry association, HELMEPA, or of "the international oil tanker and terminal safety guide" prepared by the International Chamber of Shipping and the Oil Industry Marine Forum to prevent marine pollution;

#### IN CONCLUSION

107. Finally, the concept must be made plain to all involved in the development process that an unbalanced interpretation of the environment versus industrialization debate can only hinder development prospects. Neither must be allowed to over-ride the other. If environmental aspects are accorded too high and unreasonable a priority, then industry will almost inevitably be penalized even at an early stage of economic growth. If the attainment of short-term industrial goals regardless of environmental impact is made paramount, then not only will the quality of life be undermined but the possibility of maximising the benefits of the industrialization process will itself be jeopardised. For industry's contribution to development to be most effective, attention must be dedicated from the start to environmental issues, and to the overwhelming importance they have for mankind and his habitat.

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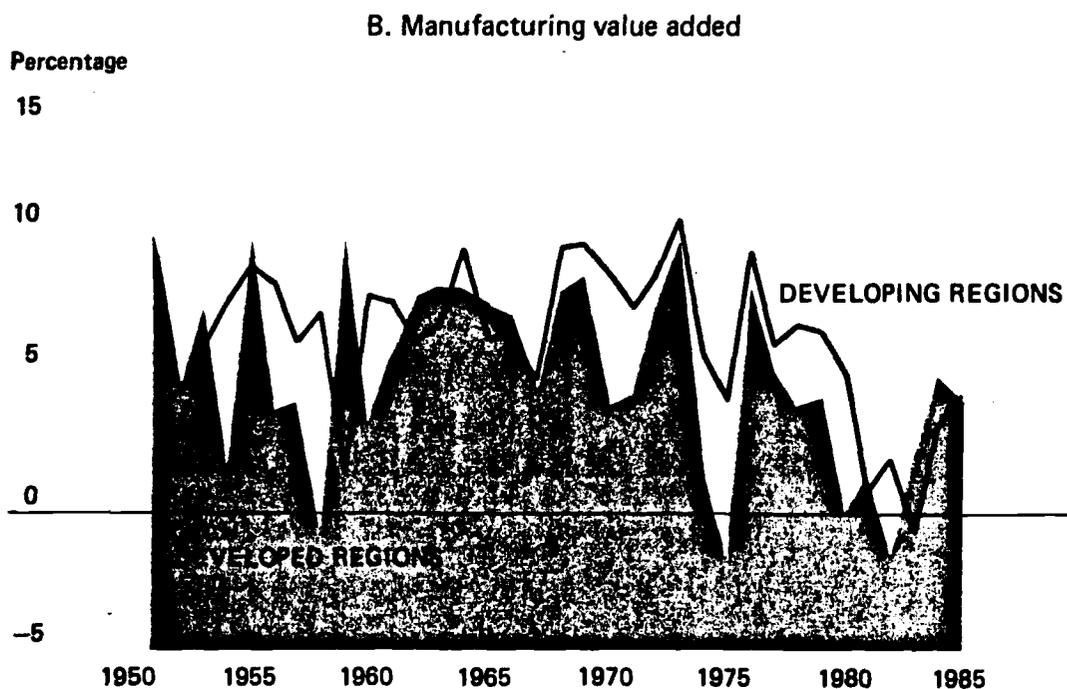
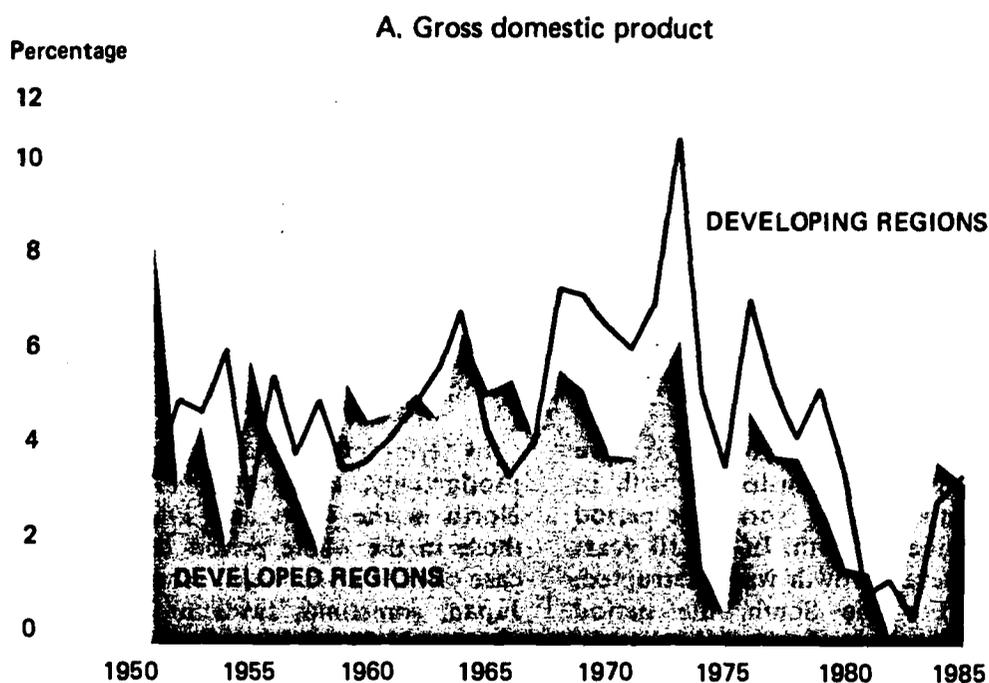
**APPENDIX**

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**A. Tables and Figures**

( Source: All Figures and Tables quoted herein are from UNIDO's Industry and Development: Global Report 1985, published by the United Nations in 1985, New York. )

**Figure 1. ) Growth rate of developed and developing regions**  
(Constant prices in 1975 dollars)



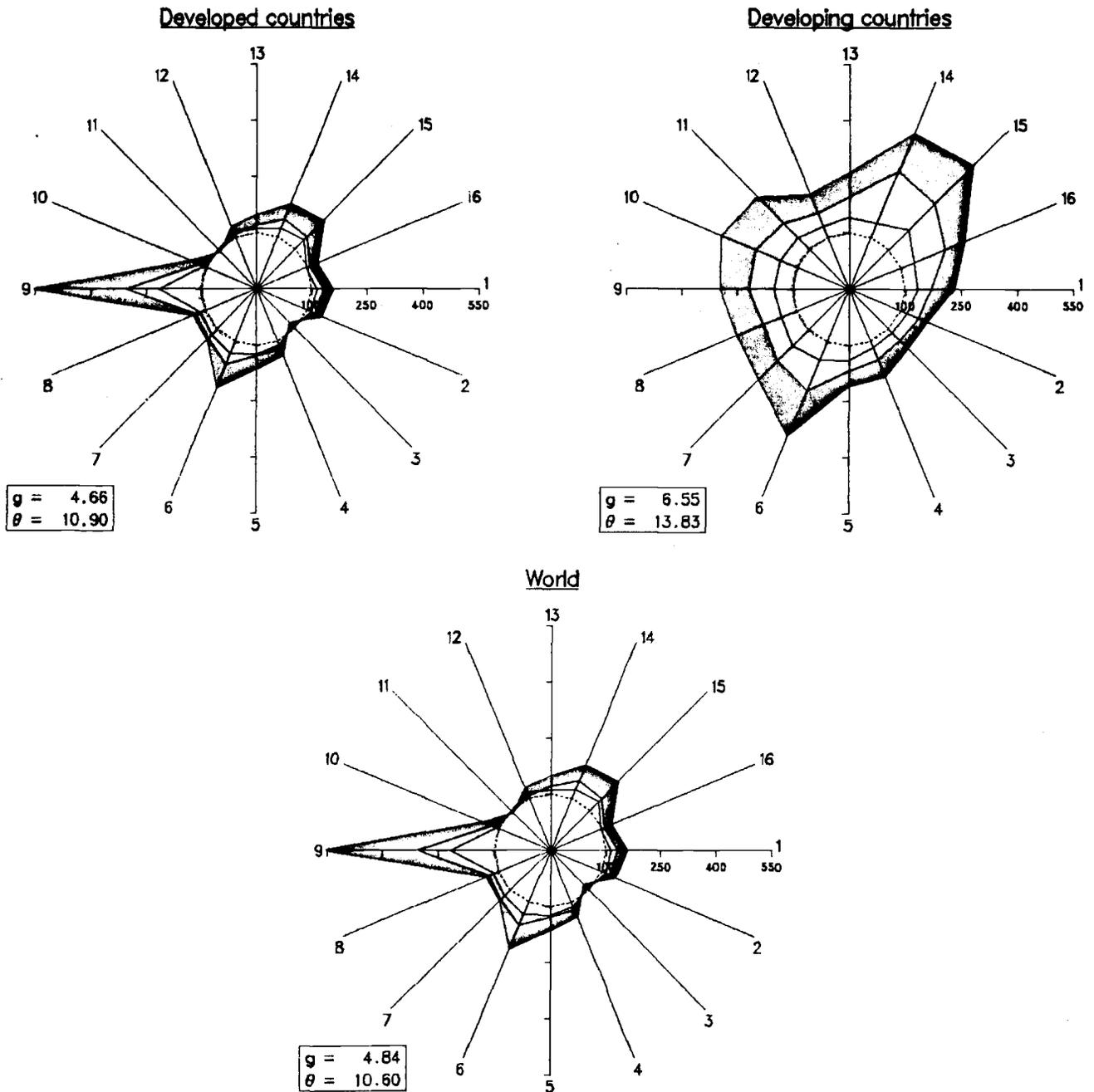
**Table 1. Growth rate of MVA; North and South compared by industrial branch, 1963-1981<sup>a</sup>**

(Percentage per annum)

ISIC	Branch	Growth rate of value added					
		1963-1979 <sup>b</sup>		1980 <sup>c</sup>		1981 <sup>c</sup>	
		North	South	North	South	North	South
	Total manufacturing	5.0	6.7	0.5	4.7	1.0	-0.1
311/2	Food products	3.7	5.1	1.4	5.7	0.5	4.1
313	Beverages	4.4	7.2	1.6	9.4	1.2	5.6
314	Tobacco	2.7	4.9	1.8	3.2	0.2	8.0
321	Textiles	3.4	3.9	-0.7	2.7	-2.1	0.4
322	Wearing apparel	3.8	5.1	-0.7	1.4	0.1	3.9
323	Leather and fur products	2.3	4.3	-5.0	3.1	1.5	6.5
324	Footwear	2.2	3.2	-1.1	3.7	-0.6	3.4
331	Wood and cork products	3.1	5.2	-4.4	5.1	-3.7	-1.7
332	Furniture and fixtures	4.9	4.6	-0.6	6.7	-2.2	-5.8
341	Paper and paper products	4.0	6.1	0.9	5.1	0.1	0.3
342	Printing and publishing	3.3	4.3	2.1	4.3	0.5	3.0
351	Industrial chemicals	7.4	10.4	-2.1	3.4	1.9	1.5
352	Other chemicals	5.7	8.7	1.7	8.8	2.9	-1.1
353	Petroleum refineries	5.9	7.6	-5.0	3.9	-4.3	2.0
354	Misc. petroleum and coal products	2.2	6.3	-2.6	8.0	-1.3	3.7
355	Rubber products	4.8	7.0	-3.0	7.3	-0.3	-3.3
356	Plastic products	10.7	7.9	-0.8	5.4	2.2	-2.2
361	Pottery, china and earthenware	4.6	6.4	4.1	5.1	-0.7	-6.9
362	Glass and glass products	5.7	8.5	2.4	4.2	-1.5	0.6
369	Other non-metal mineral products	4.7	8.2	-2.0	7.7	-1.9	2.6
371	Iron and steel	3.3	7.4	-5.1	3.7	-1.2	-1.0
372	Non-ferrous metals	5.1	6.3	1.1	-1.1	-1.4	-7.1
381	Metal products	5.2	7.0	0.0	3.8	0.6	-4.7
382	Non-electrical machinery	5.6	11.0	3.3	5.8	2.9	-7.1
383	Electrical machinery	7.2	10.3	4.7	4.8	3.8	-0.9
384	Transport equipment	5.2	8.2	-1.5	4.0	1.7	-6.0
385	Professional and scientific goods	7.9	9.5	5.5	-1.5	3.2	-6.6
390	Other manufactures	5.7	4.6	3.5	-0.4	1.2	-1.0

**Figure 2. Structural change: the world, developed countries and developing countries, 1965-1980**

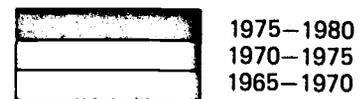
(Index of value added: 1965 = 100)



**Key:**

**Branches (ISIC code):**

- |                                   |   |
|-----------------------------------|---|
| 1 Food products (311/2, 313, 314) | 9 Plastic products (356)                      |
| 2 Textiles (321, 322)             | 10 Non-metal mineral products (361, 362, 369) |
| 3 Leather industries (323, 324)   | 11 Iron and steel (371)                       |
| 4 Wood and furniture (331, 332)   | 12 Non-ferrous metals (372)                   |
| 5 Paper and printing (341, 342)   | 13 Metal products, excl. machinery (381)      |
| 6 Chemicals (351, 352)            | 14 Non-electrical machinery (382)             |
| 7 Petroleum and coal (353, 354)   | 15 Electrical machinery (383)                 |
| 8 Rubber products (355)           | 16 Transport equipment (384)                  |



$g$  Average annual growth rate 1965-1980 (percentage)  
 $\theta$  Index of structural change, 1965-1980  
(constant prices in 1975 dollars)

Source: UNIDO data base.

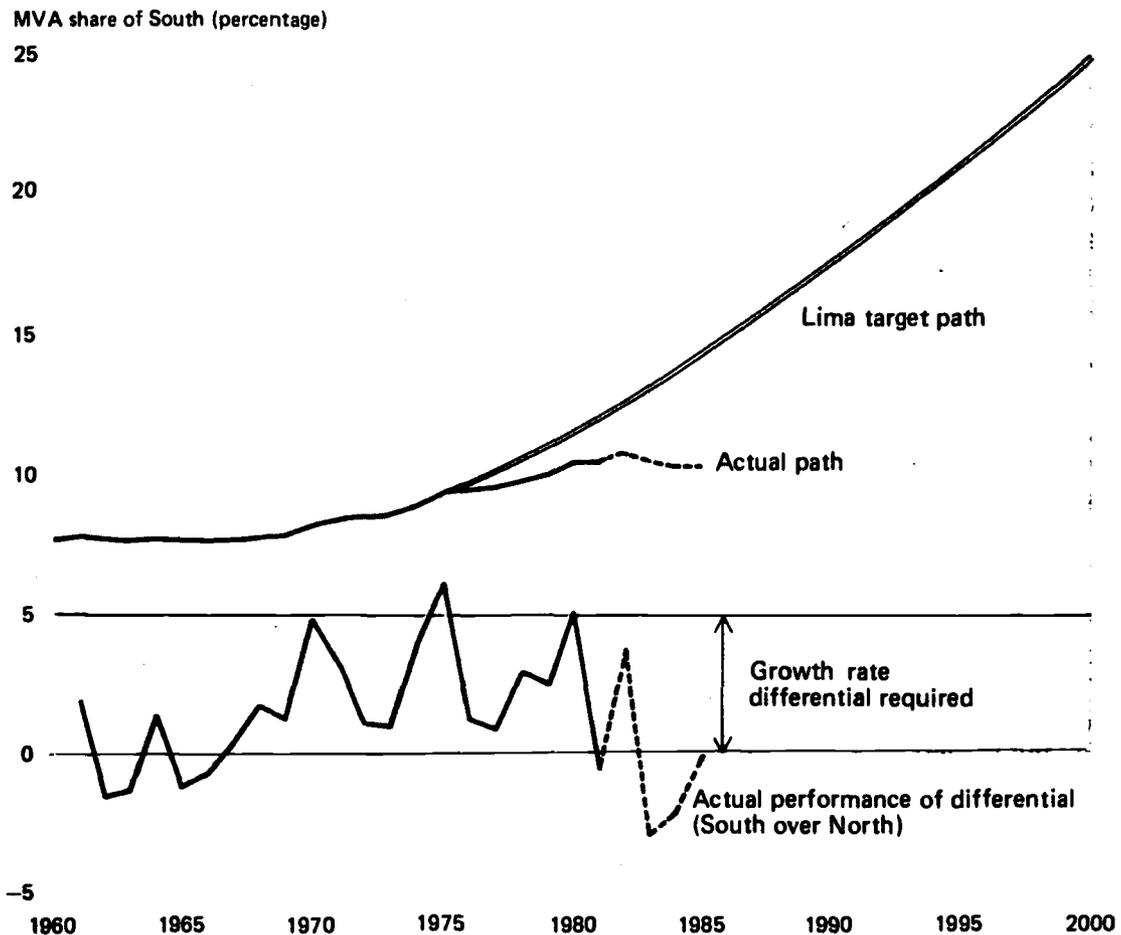
**Box: The Lima target**

The Second General Conference of UNIDO in 1975 adopted the now well-known Lima target by which the developing countries would have at least a 25 per cent share of world manufacturing output by the year 2000. Given the 25-year span of time stipulated, the target would have required the developing countries to out-perform the developed countries on average by 3.5 per cent per annum in GDP and 4.5 per cent in MVA. The developing countries started out-performing the developed countries in 1967 and the differential in MVA growth rate was actually 5.5 per cent in favour of the developing countries in 1975.

A continuation of MVA growth-rate differentials of 4 to 5 per cent for the period 1975-2000 would have placed the South inside the Lima target zone. However, once stagflation and subsequently the recession in the 1980s descended

upon the world economy, the MVA growth differential narrowed and even became negative. The Lima target slipped out of sight. This illustrates the importance of the North's economy on the growth performance of the South. (See figure 2.1.)

**Figure 2.1. Lima target and actual performance**



Source: UNIDO data base.

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