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INNOVATION, COMPETITIVENESS AND AGRO-INDUSTRIAL DEVELOPMENT

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1. INTRODUCTION

The last decade has been a period of profound changes in the political and economic thinking in Latin America and the Caribbean (LAC). The efforts to overcome the crisis of the 80's and the macroeconomic adjustment programs that emerged as the principal product of that effort set in motion a revision of traditional development strategy.

The hard phase of macroeconomic adjustments has been, for the most part, completed in much of LAC. The new gained stability and relative fiscal prosperity allows now for a bold effort in the direction of seeking long term sustainable economic growth and social development. Today, after decades of import substitution strategies that had significant negative distortions towards agro-industry, i.e., the primary production of plants and animals, their processing and the distribution of the obtained products, the sector is, in most countries of the region, a major contributor to national product and the major source of exports. Any new strategy for sustainable development, therefore, needs to give major attention to agro-industrial production and integrate the sector into an economy-wide strategy for attaining international competitiveness in the long term.

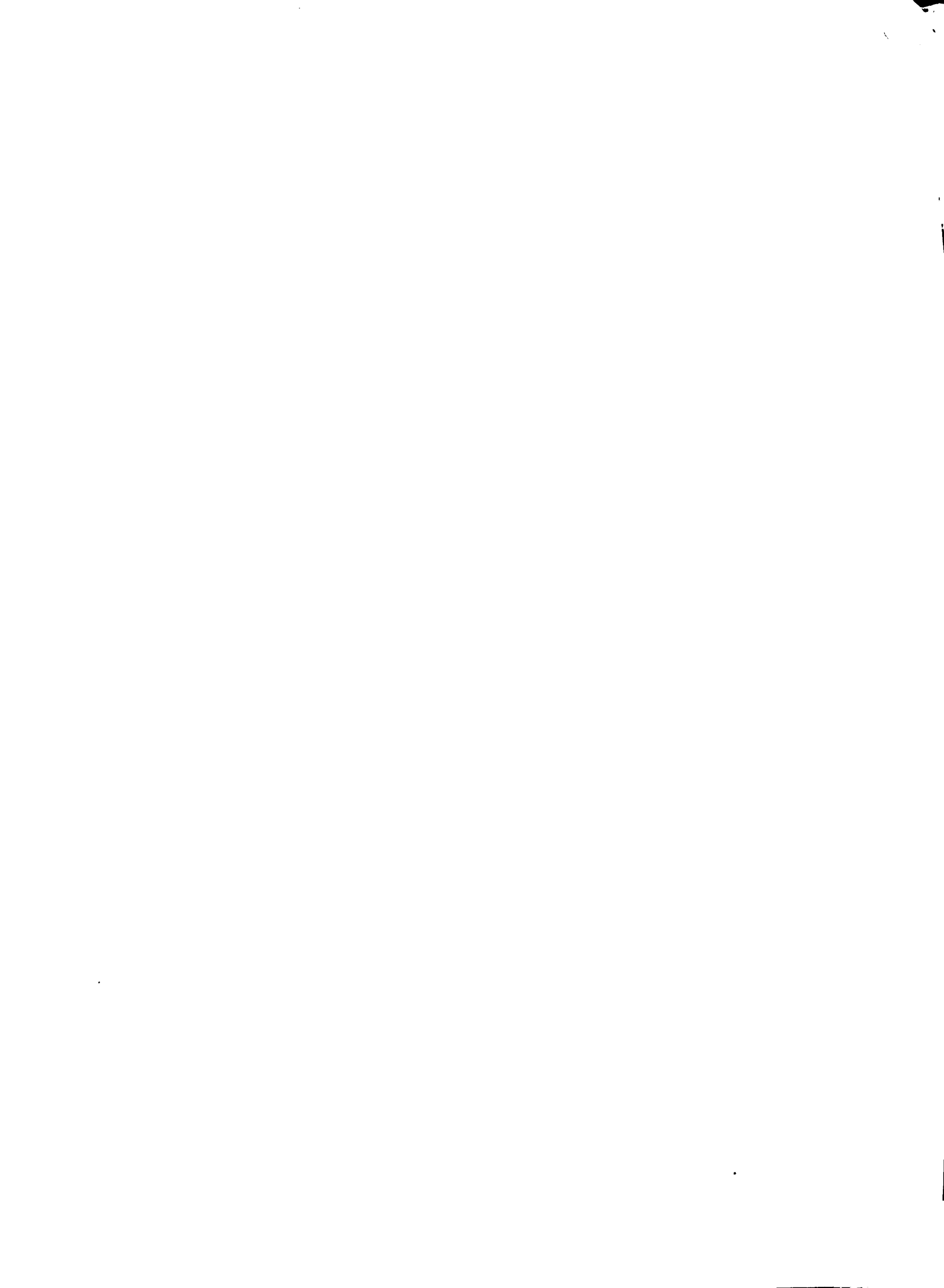
Recent trends in development in the region, characterized by trade liberalization and regional integration, have already set in motion rapid processes of economic restructuring and growing specialization in productive sectors more competitive in international markets. Agro-industry has fared well in this process based on its comparative advantages given by natural resources, and the considerable efforts made in the past in technological development. However, it is evident that globalization of the economy, the emergence of a new technological revolution, profound changes in consumer demand and new concerns about conservation of natural resources, deforestation and pesticide pollution among others, will impose new rules and conditions to agricultural development. The ability of Latin America to understand and master these new rules and requirements of international markets and to rapidly build appropriate policies to guide the development of the agroindustrial sector in the appropriate direction will be of utmost importance to its successful long-run economic development.

This paper explores some of these issues, with the objective of contributing towards a conceptual framework for the formulation of policies to enhance agroindustrial competitiveness of LAC. It is built around two major observations, one thesis and one overall policy proposal.

The first observation relates to the nature of agricultural development in LAC during the last four decades. During that period, agroindustrial growth was quite significant but concentrated on a limited number of commodities and countries. These situations were documented in the PROTAAL research project². The evidence strongly suggested that success stories were based on a) good natural resources conditions, b) the development and diffusion of important cost reducing/yield increasing technologies and c) a good economic framework. The studies showed that these conditions occurred when social articulation within the primary productive sector and between these social actors and the state was present. Under these conditions politically strong social actors would push the public sector into implementing appropriate sectoral policies and providing appropriate institutional and financial resources for technology development.

More recent studies of selected "case studies" developed by IICA (1990) indicate that during the 80's the basic explanatory variables of success do not relate exclusively to yield increasing/cost reducing technologies but rather to the appropriate linking of production with access to markets, in many cases relatively specialized expanding international markets. In these cases, market development and careful

² PROTAAL stands for Proyecto Cooperativo de Tecnología Agropecuaria en América Latina, a joint effort by IICA, IDRC, Ford Foundation, Rockefeller Foundation, Dutch Government and UNDP. A number of case studies and detailed reviews of research institutions were the basis of policy recommendations.



orientation of production to demand requirements were more important than cost competitiveness in the production of primary commodities.

The contrast between the driving forces in the 60's and 70's as opposed to the late 70's and 80's provide the basic perception for the main thesis of the paper: in the context of the international economic conditions that LAC will face in the future, agroindustrial competitiveness will be less related to price competitiveness in commodity markets and more to processing, product differentiation and quality control specially geared to carefully defined market niches and to negotiations.

The corollary to this proposal is far reaching from a policy point of view. A number of areas will require a special and different attention in the future.

First, new mechanisms, both political and institutional, will be required to help develop social articulation between primary production, agroindustrial and trade activities. It should be noted that these mechanism do not exist in the present government structures (Ministries of Agriculture) or the organizations of civil society.

Second, technology innovation priorities and technology support institutions will need major changes to satisfy a new agro-industrial productive sector with scientific and technological requirements quite different to those of traditional agricultural production.

Third, export promotion, environmental concerns and social and political imperatives have to be incorporated explicitly and fully in technology innovation priorities, regulatory mechanisms and trade negotiations.

In summary, agro-industrial production has been and will continue to be a major source of economic activity and employment and trade in LAC. To materialize this potential, a different, more complex, more industrialized sector needs to be built in the future. The success of this effort will have an important impact in achieving sustainable economic growth with social development.

2. AGRO-INDUSTRY AND COMPETITIVENESS

Competitiveness is a concept which can be applied to any economic activity. But the specificities of agro-industrial production requires special categories for the analysis of its competitiveness and the formulation of competitiveness strategies and policies.

Competitiveness: concepts, strategies, determinants

The concept of competitiveness has been used in the literature with widely varying degrees of extension. It goes from very specific and limited definitions, mostly based on international trade share indexes, to very broad, complex and general notions which start to be equivalent to concepts such as development and economic growth.

The operative definition of competitiveness will depend on the level of analysis (nation, sector, firm), the product analyzed (commodity or differentiated product) and the objective of the analysis. For example, a definition used at IICA states that competitiveness is the capacity of a socio-economic organization (e.g. a firm or enterprise) to maintain and expand market-shares in a profitable way and to grow (Müller 1993).

But more than selecting or constructing a definition of competitiveness, the implications of using a determined one have to be clear. Some of them are of normative character, which appear specially when policy proposals are formulated. So "spurious" competitiveness has been differentiated from "authentic" competitiveness, to set apart short term export success based on a declining wages/exchange rate relationship,



from the attainment of increased living standards, within equity and sustainability concerns, through a greater international economic exchange (Fajnzylber 1988).

The performance of a company or firm in international and national markets depends on the resources, capacities and conduct of this organization. Companies compete one against another to gain advantages in terms of market shares but, in the last instance, to increase the value of their capital and to expand the organization. The instrument for this competition is the added value of the product or service for the clients. It can be price, the most common form of competition, but also quality, new functions, opportunity of supply and other factors. The factors determining this competition are therefore of crucial importance for competitiveness.

Competition unfolds on the national and international level. Policies like trade protection, economic subsidies and incentives, anti-trust norms, environmental safeguards, among many others, will determine the level of competition in a country. Internationally, competition is influenced by the actions of many companies and countries as well as by the agreements between them. In this sense, competitiveness develops within a defined, but dynamic, context. Internationally, this context has little to do with the simple idea of market forces, or the relationships between supply and demand. It is, and always has been, the outcome of a complex set of actions, negotiations and impositions, some political others technological and economical. This highlights the need to include into the consideration of competitiveness the notions of power and negotiations, as proposed by Strange (1988).

Competitive success of a nation depends on four basic factors which can be seen as sources of competitive power (Strange, *ibid*). They are security (military power), knowledge, production (resources) and financial capability and represent different facets of a whole, which can be more or less important for different nations. Excluding security, these same sources of power are on the basis of the competitive capabilities of an economic organization like a firm.

Actions and events can modify a specific set of these power sources in a given moment, to the advantage of a nation or a firm. For example, new natural resources can be found, new knowledge created. The most important way of changing this set of power sources today will be innovation, that is, an original way of combining the different factors of competition to gain a competitive advantage. These innovations can be technological, as well as organizational and institutional-legal.

Competitiveness is then the result of a historic process of interactions of location specific, social and economic elements, both at the firm and regional or national level. The recognition of this "systemic" character of competitiveness (Porter 1990) has led to the concept of "structural competitiveness" (Chesnais 1986, OECD 1992) to denote the competitive capabilities and advantages of a nation or a region, as well as the capacity of firms for technological innovation and self-improvement.

The process of developing competitiveness starts and is set in motion by the initiative of some key actors (firms, farmers, government officials, etc.). Its success requires that these actions be coherent and consistent in time with the goals sought. They therefore have to be part of a strategy shared by firms, labor unions, government and scientific and technological organizations, to provide the framework needed to guarantee consistency and coherence. The decision to develop competitiveness can be taken for many particular or general reasons, but in general it will either be the response to a competitive challenge, like a threat to market positions or to profitability or the exploitation of some opportunity offered by markets.

Empirical studies of successful productive performance have led to the identification of the determinants or elements of competitiveness. The analysis at the firm level (micro-economy and management) quickly leads to the importance of "meso-level" (interactions between a group of related organizations) and regional or national factors (macro-economy). This suggests the necessity of working at these three levels of analysis, which on the other hand, correspond to different strategies, policies and



their instruments. At the firm level, competitiveness is mainly the result of management strategies. At the meso-level, it is the outcome of the combination of cooperation/competition strategies of a group of organizations and at the regional or national level, mainly the result of public policy and its response to policy initiatives of the economic or social actors.

Agro-industrial competitiveness

Agro-industry as a productive activity has many characteristics which differentiates it in crucial ways from industrial production. Primary production is subjected to high levels of uncertainty due to climatic and biological factors over which there is still relatively little control. This makes agriculture a relatively high risk activity in comparison with other productive sectors. The number of production units is high and the relationship between primary production and final consumers is complex. Products are still mostly commodities, that is, produced in bulk with little differentiation in regards to quality and functionality. International trade, in particular, is still mostly in commodity form, with relatively little being traded as consumption ready products.

Agricultural production, on the other hand, has an importance which goes way beyond the production of prime materials. The strategic importance of food for any country, the fact that agriculture occupies important proportions of the land, the deep cultural implications of rural life ways and the political influence of farmers gives it a special position in political and social terms, which has important economic consequences. The preservation of agricultural sectors in spite of economic realities leads to protection of markets and subsidies which determines and influences international trade and consequently the assignment and location of resources and productive capabilities.

Categories of agro-industrial production

Analysis of agro-industrial competitiveness is conditioned by the characteristics of different agricultural production and processing situations. One way of categorizing them is the taxonomy of "economies of agriculture", as proposed by Breimyer and adapted by Abbott and Bredahl (1992). It is based on the degree of potential substitution among traded and non-traded inputs, the linkage of production to end-use characteristics of final consumption goods, the relative importance of product versus process technology, and the resulting value-added in the economic activity.

The four agro-industrial economies are:

1. Production of an undifferentiated primary commodity with no linkage between production and end-use characteristics in final consumption (examples: wheat, corn, soybean). Little value added.
2. Production of differentiated primary products where a linkage may exist between production and processing and end-use characteristics in final consumption (examples: fruits and vegetables). Some value added.
3. Conversion of primary products and commodities into semi-processed products for consumption (examples: vegetable oils, meats). Higher value added.
4. Conversion of primary and semi-processed products into processed consumer-ready products. Highest value added.

The importance of the three level of analysis of competitiveness varies in these agro-industrial economies. In the case of the production of primary products, the unit of analysis is a group of primary producers and the organizations responsible for cooperatively done functions, like marketing, technical



support, research, etc. Agricultural producers, in general, do not compete against one another if they produce commodities. Competitiveness in commodity production therefore refers principally to the meso, regional and national levels, as it depends on production, infrastructural or organizational factors bearing on the productivity or efficiency of a group of producers. These factors are consequently more important than capabilities at the level of the productive unit.

In the cases the production of semi-processed and consumer-ready products, competitiveness is located, in a first level of aggregation, in the firms manufacturing the product. But because of the dependence of their performance on down- and up-stream activities, i.e. the production and supply of prima material and key inputs as well as marketing of the products, these activities have to be included in the analysis. The broader formal or informal structures encompassing these different linked activities have been variously named production chains, agro-industrial circuits, agro-industrial complexes, "fillieres", etc.

Given the key role of the processing firms in organizing these chains or complexes, inter-firm competition becomes important. The higher the degree of processing, the more important competition based on differentiation of products, in contrast to price competition, becomes. The relative importance of the competitiveness factors at the firm level increases in this type of agro-industrial productions.

Determinants of agro-industrial competitiveness

The factors determining specifically agricultural competitiveness have to be analyzed for the three levels of competitiveness identified earlier. The most important of these determinants are discussed briefly next in the context of the four types of agricultural production, modified from a list proposed by Abbott and Bredahl (1992). As exemplified in Table 1, the factors differ in importance for each type of production demonstrating the specificity of competitiveness analysis to sectors and industries.

Firm level

Competitiveness at the firm level depends principally on the characteristics of products, the technology used, the scale of production, firm strategy and the human capital and managerial expertise available. Primary production units have relatively less control over factors such as product characteristics and firm strategy in comparison to firms producing semi-processed and consumer ready products. The complexity of technology and management related factors at this level also increases in the production of semi-processed and consumer ready products and, correspondingly, the importance of human capital and managerial expertise is more important for competitiveness in these situations than in the production of commodities and other primary products.

Meso-level

The important competitiveness factors at the meso-level are the industry structure (input supply, marketing and distribution channels) and the cooperative links and institutions for some critical functions like R&D, technical assistance and marketing. For groups of primary producers in particular competitiveness on this level will depend on the existence of adequate horizontal linking and coordination between them, to provide services and infrastructure needed by all and to relate to and influence other important actors for the sector as, for example, government or the processing industry.

Vertical relations and coordination become important in the case of production of processed products. Primary production must be linked to processing and commercialization to ensure opportunity, quantity and quality of supply. Prices and markets are the traditional coordinating mechanisms in these situations, but also vertical integration, be it through ownership or contractual relationships, are important.

Both horizontal and vertical relations constitute networks of firms and other organizations (research



and technical assistance, marketing boards, regulatory agencies, etc.) which as a group have competitive capabilities. The organizers of these networks can be large firms, producers associations or government organizations.

Public policy and the public sector generally play an important, in many cases crucial, role in this coordination of producers, firms and organizations, both by organizing of networks and by providing a supportive economic and institutional environment. Traditionally, the state has taken the responsibility of technological development and support for primary commodity production, because of the public good character of the technology, but also because of the economic, managerial and technological weaknesses of primary agricultural producers. Commodity marketing is another activity where the state has traditionally had a determining participation.

Regional/national level

At the regional/national level, competitiveness will depend in a first instance on natural resources and factor endowment, but also increasingly on the physical infrastructure (transport, communications, energy), the institutional infrastructure (legal, financial, export support and technological infrastructure), the macroeconomic, regulatory and incentives environment, trade policy and negotiations and the science and human resources development infrastructure.

The importance of natural resources and factor endowment for competitiveness is high for the production of primary products, but decreases in productions of differentiated and processed products. Higher degrees of primary processing imply less importance of this issue. This is directly correlated with the importance of cost reducing technologies, and inversely correlated to the importance of quality enhancing technologies for competitiveness.

The other factors are the result mainly of social and particularly governmental action. Ideally it is guided by a strategic choice of some products (and therefore productive sectors) with competitive advantages, that is, it should be seek specialization. Some of these factors are of more short term importance than others. A stable and export supporting macroeconomic environment and an adequate physical infrastructure are more or less immediate requisites for competitiveness. Given the characteristics of the international agricultural and agroindustrial markets, trade policy and negotiations are of critical importance to competitiveness in these sectors.

The existence of an adequate economic environment and scientific and technological support to innovations are of more medium or long term effect. This involves the provision of basic institutional and policy support, in technology development, trade, infrastructure development, etc, needed to orient and direct the efforts of the whole group of actors towards industrial and trade goals. The development of the technological, financial and managerial capabilities of the key actors is supported indirectly by the state through human resources development, basic scientific research, technical information and norms, etc. The different resources available in the system are mobilized towards common goals through linkage and financing mechanisms.

Agricultural competitiveness, and specially the production of commodities and differentiated primary products, on a medium and long term, depends on the maintenance of basic production conditions with reasonable costs, which implies the care of ecological aspects and natural resources conservation. Given the accelerated deterioration of natural renewable resources in many agricultural productions, the sustained use of soils, water resources, biodiversity, and other environmental elements will therefore be increasingly important factors in competitiveness.

Similarly, authentic competitiveness requires a stable economic and political environment, to permit the development of the minimum consensus between companies, managers, workers and farmers needed for



the cooperation, essential for national or sectoral competitiveness strategies and goals. In this sense, equity issues are important for long term competitiveness because a reduction in income distribution differences and the development of effective conflict management within a country will be critical elements of this cooperative atmosphere.

3. THE CONTEXT AND SOURCES OF AGRO-INDUSTRIAL COMPETITIVENESS IN THE 1990's

The context of competitiveness is changing rapidly due to scientific and technological developments and market and trade trends and their geo-political expressions. Behind these trends are profound environmental, social and cultural changes, reflected in new values, ways of life and consumption patterns. The conjunction of these changes and tendencies produce new ways of approaching basic social activities, and particularly, new ways of organizing the production process.

Global and regional trends

Agricultural and agroindustrial competitiveness will be influenced principally by developments in the areas of markets and trade, environment and science and technology.

Market and trade tendencies

Recent reviews of the global trends in agriculture (Brown and Goldin 1992) show that demand of basic food is slowly decelerating globally, as a consequence of slower population increases. The more dynamic products are responding to shifting consumption patterns produced by increasing income levels. Non-food uses of agricultural products could a great impact on agriculture and agro-industry³. International trade in agricultural products is projected to increase significantly.

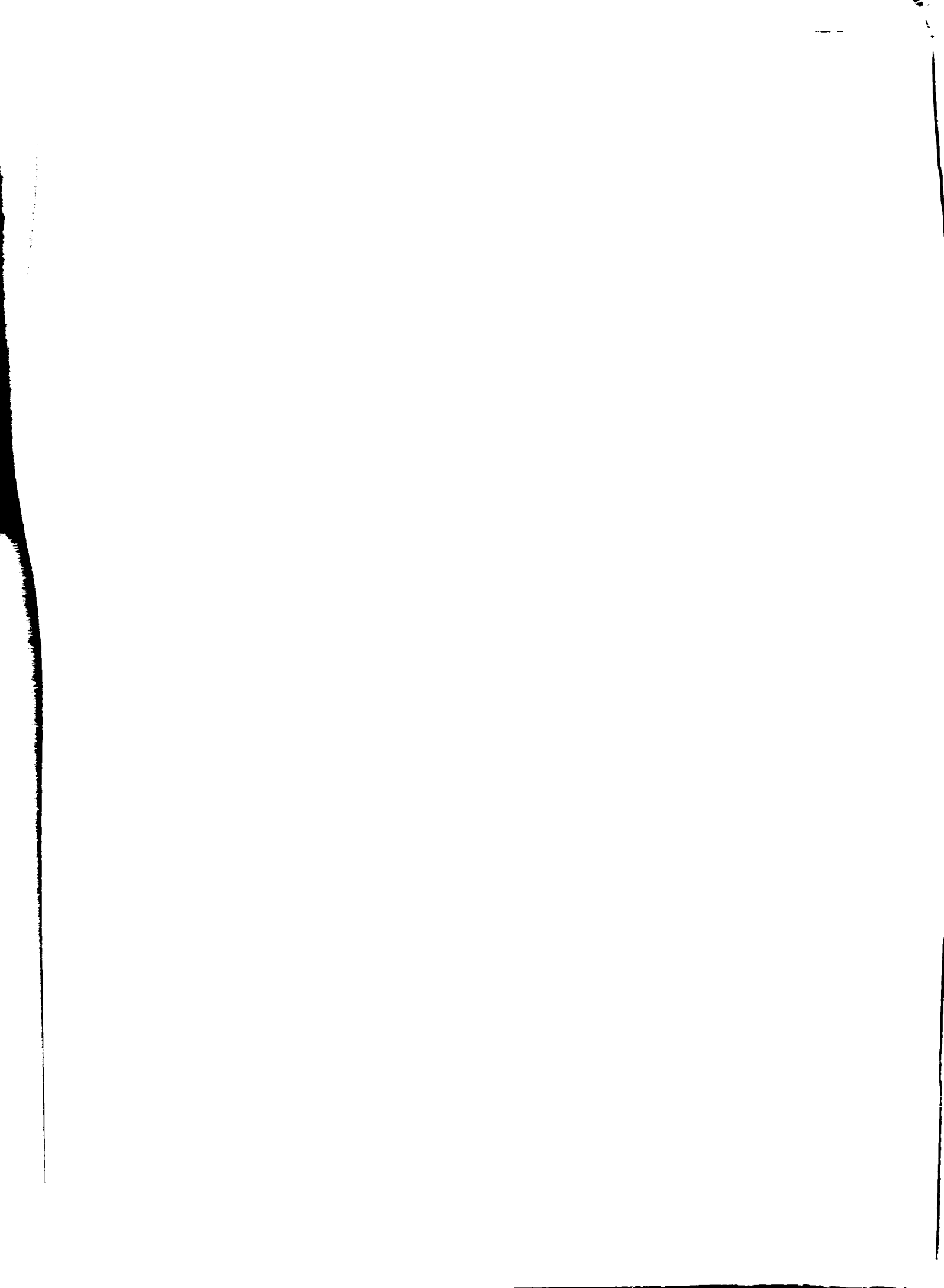
Higher income markets, in general, are evolving towards increased levels of segmentation in response to increased consumer interest in satisfying special and almost personal demands. This requires adaptation or development of differentiated products. In agro-industry, increased concern by consumers over health aspects, an expanding demand for convenience, greater environmental awareness and personal tastes and preferences drive the increasing differentiation of products. Denomination by origin, differentiation by production process (example: "organic" products) and specialty products are all examples of these trends.

International trade has been expanding constantly in modern times, being one of the crucial elements motorizing economic growth worldwide. The composition of this trade has been changing in an important way. The relative participation of primary products has been falling, and increasingly trade is in manufactured goods. The share of these goods in total world exports grew from 54.2% in 1980 to 70.0% in 1988 (Kuwayama 1992).

The current composition of agricultural commodities and agroindustrial products trade will change significantly if agricultural policies, and specially subsidies and protection, are modified in the U.S., Japan and Europe⁴. A reduction of protection is projected to shift current import patterns of towards processed products (Brown and Goldin 1992). The long term outcome of these changes could be an international

³ There are no mayor technological or industrial problems for a massive substitution of agricultural for petroleum-based products. Still prices favour petroleum based ones. That could change if restrictions of fossil fuel use are introduced and by cost reduction of biomass processing made possible by biotechnology and economies of scale.

⁴ This is only one of many wide-ranging effects of such a change. For example, Anderson (1992) has found that reducing agricultural protection in rich countries is likely to improve the environment, reduce the use of chemicals and increase the absorption of CO₂ rom the atmosphere.



specialization in agricultural production of some countries with special comparative advantages. Some are OECD countries but many of them are developing ones.

The increasing difficulties OECD countries subsidizing agriculture face to finance the costs of this protection points to its reduction in the medium term. This process will be slow and politically difficult as it entails complex negotiations on a national, regional and international level.

International trade is increasingly complex and interdependent. A high proportion of it is intra-industrial interchange, in which different types of a good are exported and imported between different countries. TNCs play an important role in a high proportion of the trade. These are reflections of the increasing internationalization of the technological and economic relations, because of the transnationalization of production and capital markets and flows.

One step in the slow development of a truly global economy is the formation of trade blocks and the economic integration of countries. Of special importance for LAC and its agro-industrial competitiveness are the free trade initiatives with the U.S. (NAFTA, Initiative for the Americas) and the formation of regional free trade spaces in the Southern Cone countries (MERCOSUR), Andean countries (Andean Pact), Central America and the Caribbean (CARICOM). These initiatives will produce new economic room for competition, with new rules and conditions.

Environmental constraints

The increasing evidence of the global effects of human activities on climate, the environment and biodiversity have only generalized concerns over the long term sustainability of productive activities, which had arisen in more limited geographic contexts in the past. Agricultural production, in particular, has had to confront its environmental effects and the constraints long term sustainability imposes on it for a long time. Problems like erosion, desertification, salinization, for example, have been important in many specific agricultural settings.

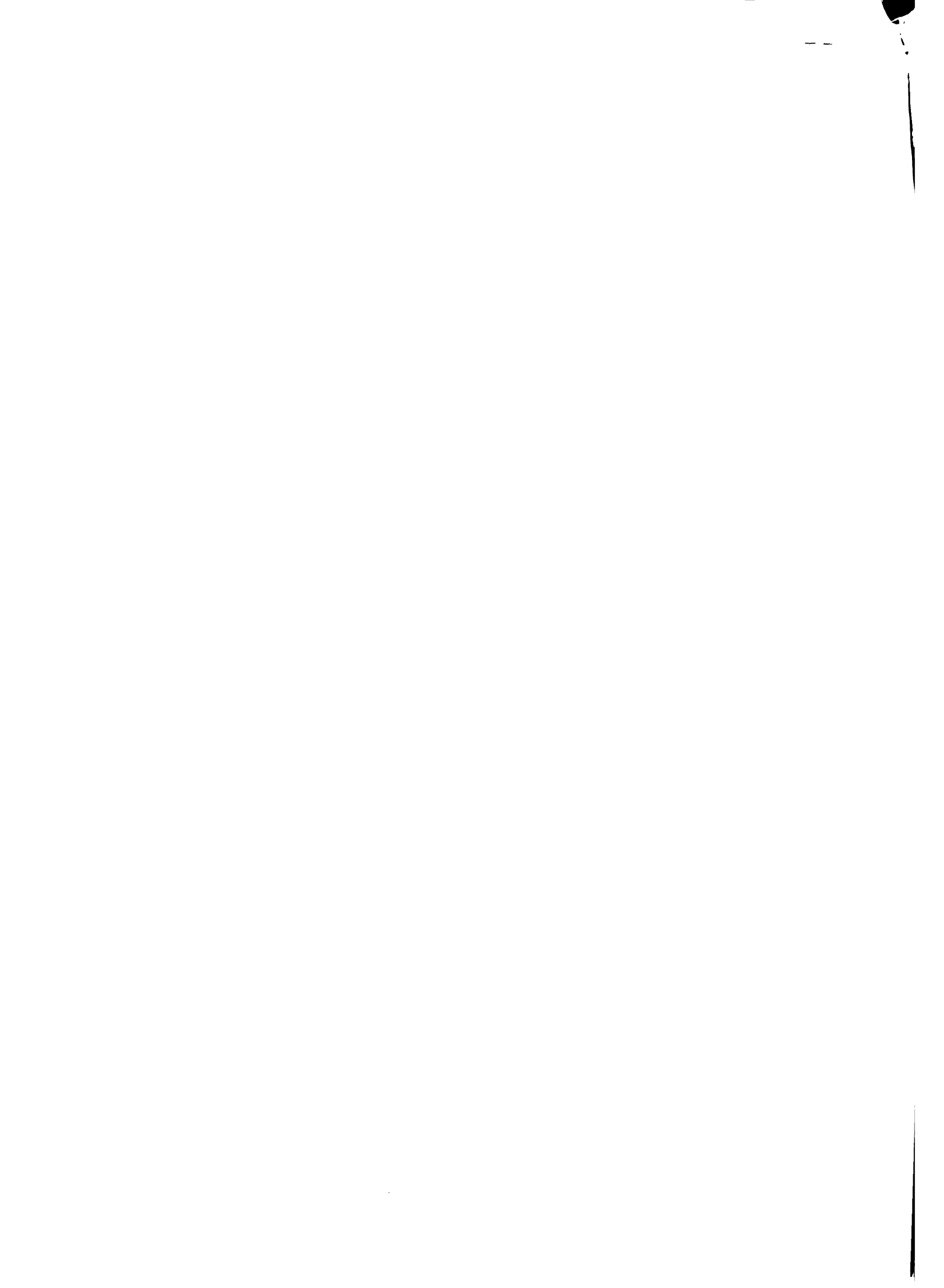
The generalization of these concerns means that increasingly agro-industrial production and policy will be determined by environmental constraints. This has important consequences for agro-industrial technology and the direction of its innovation, but also on the economics of many specific industries. New environmentally sustainable technology will be developed, minimizing energy and agro-chemical use (Munson and Runge 1990). In primary production, these "minimum inputs models" are basically information intensive activities which adjust in-puts and labor to amounts determined by constant monitoring and processing of relevant data.

In the context of the present discussion it is important to point out the change in the basic conception of agricultural production. In the new environmental paradigm, agricultural production will be viewed more in ecological than in the traditional mechanistic terms. Agriculture will be conceived more in terms of the management of a special man-made ecosystem, in contrast to the optimization of the biological performance of a crop, which is the paradigm still dominant today.

The control of the global effect of human activities on the climate and the environment will lead to important changes in energy use in particular. Restriction to the use of fossil energy sources, like the carbon emission tax already implemented in some countries, will accelerate the use of biomass for energy and industrial purposes, and so reverse the trend of decreasing use which has been in place since the surge of the petroleum industry.

Science and technology

Advances in science have spawned a group of new technologies, which will have wide-ranging and



profound economic and social impacts. Particularly important fields are solid state physics and molecular and cellular biology, as origins of microelectronics and biotechnology, both of which are influencing agriculture and agro-industry profoundly.

The deliberate modification and construction of living beings and their products which is the essence of biotechnology, permits a quantum increase in the manipulation and control of biological processes in general. The processing and transmission of huge amounts of data made possible by microelectronics allows new ways of organizing and executing productive activities, but also is a requirement for the full exploitation of biotechnology. Agricultural production and agro-industrial processing, the most important biologically based production processes, will be deeply affected by these technologies since uncertainties and risks will be significantly reduced and their economic possibilities dramatically increased (OECD 1989).

The most immediate general economic effect of biotechnology on primary production will be overcoming the biological limits to increases in productivity, and therefore on agricultural production. The success of the green revolution was based on the exploitation of the genetic potential of crops to increase their productivity. Traditional breeding technologies have been very successful in this task, so that in many crops the intrinsic genetic production potential has been exploited almost fully. This means that the production increases based on yield increases are decreasing and more difficult to achieve. Fundamental physiological and genetic limits have been reached, which traditional technologies can not overcome.

Biotechnology permits to surmount them, by direct manipulation of the genes and by overcoming the reproductive separation between species of living beings. It opens the way for manipulating such important functions as adsorption of nutrients, biological fixation of nitrogen, resistance to biotic and abiotic stresses, among the more important ones, and so keep agricultural productivity growing, as it has been doing since the last century⁵.

A second general economic effect will be the closer integration of the different phases of the production and commercialization process typical of agriculture and agro-industry. Biotechnology permits to efficiently modify the prime materials produced by agriculture so to adapt them to processing or market needs. For example, oil producing plants are modified to produce specialty vegetable oil for industrial uses, vegetables are manipulated to adapt them to certain marketing requirements, such as longer shelf life.

Thirdly, biotechnology is shortening the time needed to obtain new living beings or biological products. Correspondingly, this reduces the cost of this task. As a general consequence, the flexibility and speed of response to new challenges increase dramatically, and therefore the general economic efficiency, as new opportunities are exploited more rapidly.

The power of biotechnology to efficiently create new organisms or products from them will permit to overcome basic technological and cost constraints which have until now limited a fuller economic use of biomass. This could spawn new industries based on prime material produced by agriculture as well as displace the petrochemical industry as source of basic chemicals for energy and industrial use. This same power will be an important element in developing environmentally sustainable agricultural production processes, as well as new industrial processes in response to global threats to climate and environment.

The new technologies, generally speaking, reinforce or accelerate historical technological tendencies which provide the general direction for technical change and innovations and, as such, provide also a general context for competitiveness. The most important tendency of this type in agricultural technology is the increasing control of the primary production process. Technology development has historically aimed

⁵ The continuous reduction of production costs in basic food production is a key question for developing countries, as pointed out by Brown and Goldin (1992).



at reducing the uncertainties and therefore risks (and costs) of agricultural production.

Technological development of agroindustrial manufacturing processes has been characterized by several general tendencies. From the point of view of competitiveness, in particular, the historical tendency towards the obtainment of pure products is important. The stage of highly refined agricultural products is giving way to a new one of obtaining the basic functional constitutive substances of these products. So carbohydrates, proteins, fatty acids, vitamins, colorants, etc. are the new objectives of processing, to be later recombined into final products.

This trend has an important consequence for agroindustrial processes. Since the functional substance may be present in different prime material, they can be interchanged, depending on cost or other factors. The substance may even be produced by non-agricultural processes, as is the case of some flavoring substances, for example, which can be produced by fermentation technologies. On the other hand, prime materials are increasingly manipulated to produce specific functional substances of interest. For example, the proportion of a desirable substance within a prime material is increased.

Transition towards a new techno-economic paradigm

The process of technical change is an integral element of economic growth and social development. Processes and products are constantly changed and improved to adapt them to new market demands or production restrictions and opportunities. This incremental innovation process is sometimes interrupted or radically redirected by new technologies.

Some of these new technologies have broad economic and social impacts, because of their wide application to many economic sectors or their influence on the availability or cost of basic factors of production. They generate new industries as well as waves of innovations and new technological trajectories in crucial products and processes (Dosi 1982). Their intrinsic characteristics, as well as the requirements for their diffusion, use and innovation, deeply influence the organization and management of production and innovation processes generating new "techno-economic paradigms" which redefine the technical and engineering common sense and the management practice to obtain adequate efficiency (Pérez 1985).

The surge of microelectronics and biotechnology are clear signs that a new paradigm is in the making. The global economic difficulties of the recent past have been interpreted as manifestations of this transition from the post-war paradigm, based on cheap oil and other prime materials, towards a new paradigm, based on information. Biotechnology, in essence, converts the information on the molecular and cellular bases of life into a central input of production processes based on living beings and their products. In this sense, it is analogous and complementary to microelectronics, which has changed information use and management into a powerful economic force.

The general characteristics of the new techno-economic paradigm is the flexibility and adaptability of the production process to rapidly changing market demands and needs. Application of microelectronics and telecommunications has permitted reduction of the economic scale of production, decentralization of production, reduction of time and cost of the design of new processes and products and automatization, among other factors, which has led to smaller flexible production units (Pérez 1989). Many of these characteristics are synergic to the ones of biotechnology.

The greater economic importance of information as a production factor is in the last instance the reason for the increased worldwide interest in intellectual property protection. For agriculture in particular, this is a new situation with far reaching consequences. Most of agricultural primary production technologies have been traditionally in the public domain, because of technical difficulties for their private appropriation. Biotechnology offers ways to precisely identify biologically materials and thus opens the door for the protection of their ownership by legal means. The traditional roles of the public sector in agricultural R&D



is being affected by this trend.

Implications for agricultural competitiveness

The trends sketched in the previous section have many implications for agricultural and agroindustrial competitiveness. The most important of them are briefly identified next.

Trade patterns

The application of biotechnology and other new technologies to agricultural production and processing eliminates in principle many advantages derived from the location of primary production. Some agricultural production processes can be transferred completely to industrial settings, as the case of production of vanilla via tissue culture exemplifies. The possibility of interchange of prime materials leads to utilize locally available sources of the needed functional substance. As a consequence, agricultural production can be relocated to other countries and, therefore, trade pattern affected. This possibility forces threatened producers and countries to incorporate as quick as possible any new technology affecting their agro-industrial production so to maintain competitive advantages.

On the other hand, environmental, economical and political considerations will affect the general role of agriculture in some key advanced countries. One concrete result of this would be the reduction of the protection afforded to developed countries agriculture. In this way, competitive advantages based on natural resources and factor endowment and other factors could be expressed fully. This would lead to profound changes in agricultural trade and, in the medium term, to a specialization of some regions as global providers of agricultural prime material and foods.

Industrial organization

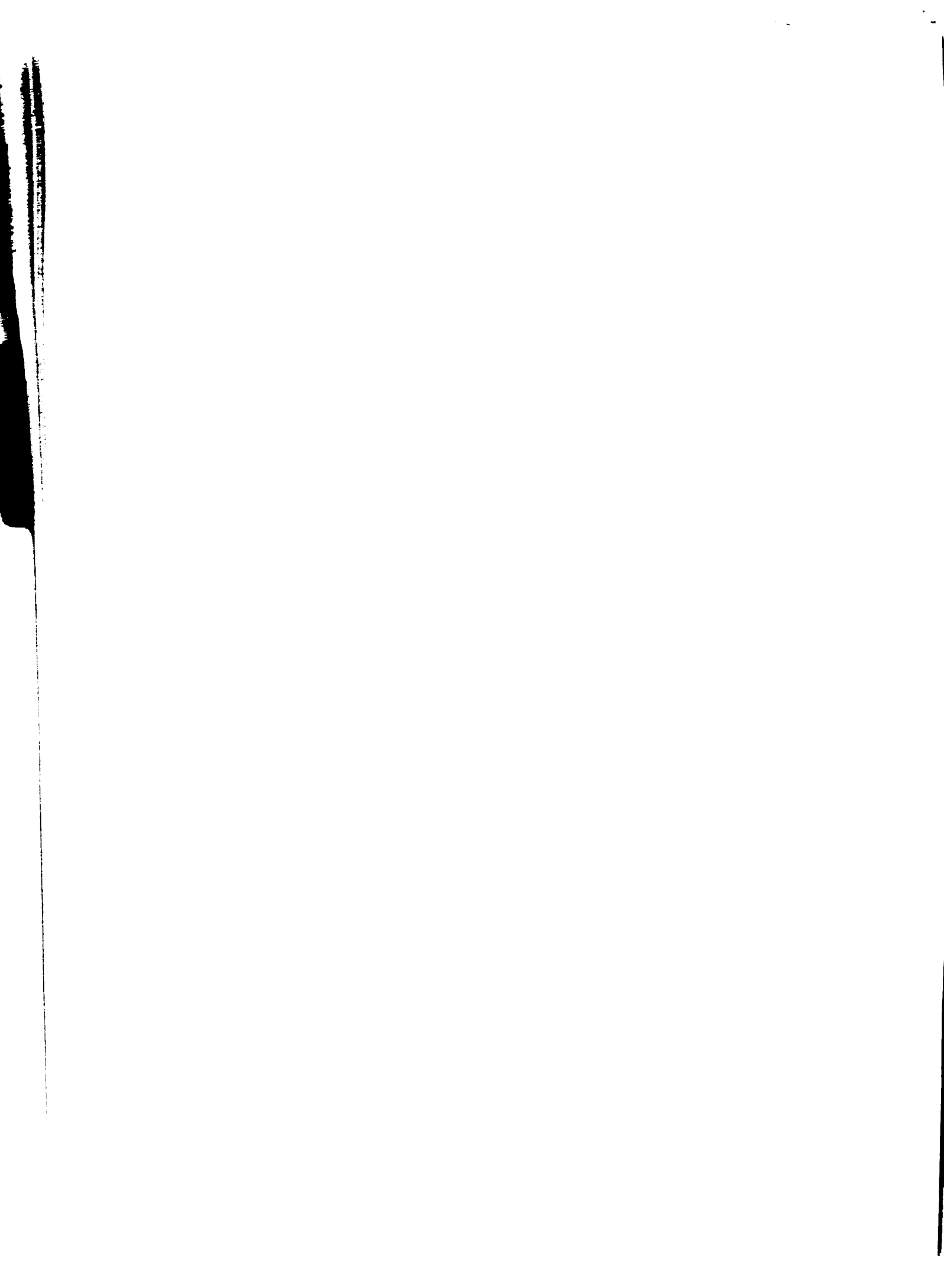
The increased importance of segmented markets and the possibilities offered by the new technologies are accelerating the trend towards a closer integration of primary production, processing and commercialization⁶. The need of close quality control and other factors drives this trend, which can lead to the increased vertical integration of production processes. The preferred mechanism of coordination is more and more direct investment or contractual relationships, instead of the reliance on market mechanisms predominant until now (Hudson 1990).

But the interchange of prime material made possible by biotechnology ruptures in many sectors the direct relationship between a given prime material and a processed product. This does not contradict an increase of the linking of primary production and processing, but would privilege again a higher degree of flexibility in the relationship between primary production and processing than direct investment by the processor into primary production would warrant. Increased vertical linking does not necessarily imply larger economic scales of production. On the contrary, increasingly segmented markets will be supplied by smaller production units, whose competitive edge will be the rapid response to shifting demands and new technologies.

In addition to vertical coordination, horizontal arrangements increase their importance. The networks linking the different organizations related to specific products or sectors become critical in providing the required resources and capabilities of production and export.

Finally, the direct origin of the new technologies in scientific research also has important

⁶ The proportion of primary production absorbed by the food, beverages and tobacco industries increases with economic development to reach a certain maximum level after which it decreases with higher development levels (Levet and Rodriguez 1987).



consequences on the institutional dynamics of the agricultural and agro-industrial innovation process. New disciplines become important in which existing research organization do not have adequate capabilities. New actors, such as start-up companies, appear on the innovation scene and assume crucial roles in increasingly complex systems, where innovation is the final product of intense interactions between academic organizations, government and industry.

Competitiveness factors

The characteristics of the new techno-economical paradigm, as well as of consumption trends, lead to the increased importance of information as a production factor and innovation as a competitiveness factor. This implies the progressive loss of the importance of the traditional comparative advantages of natural resources, location, cheap labor, etc. The capability to access and take advantage of information and to innovate in technology and on the organizational/management and institutional/legal level are increasingly the determining factors of competitive success.

For producers and firms this means greater attention to technology management, with the aim of developing and maintaining adequate innovation capabilities. In many cases, this means not so much the development of in-house R&D capabilities but the access to these capabilities in other organizations through linkages of different types. For primary production in particular, the increased importance of information implies the need of new capacities, which could mean an increase in the economic scale of production in many situations because of the associated costs.

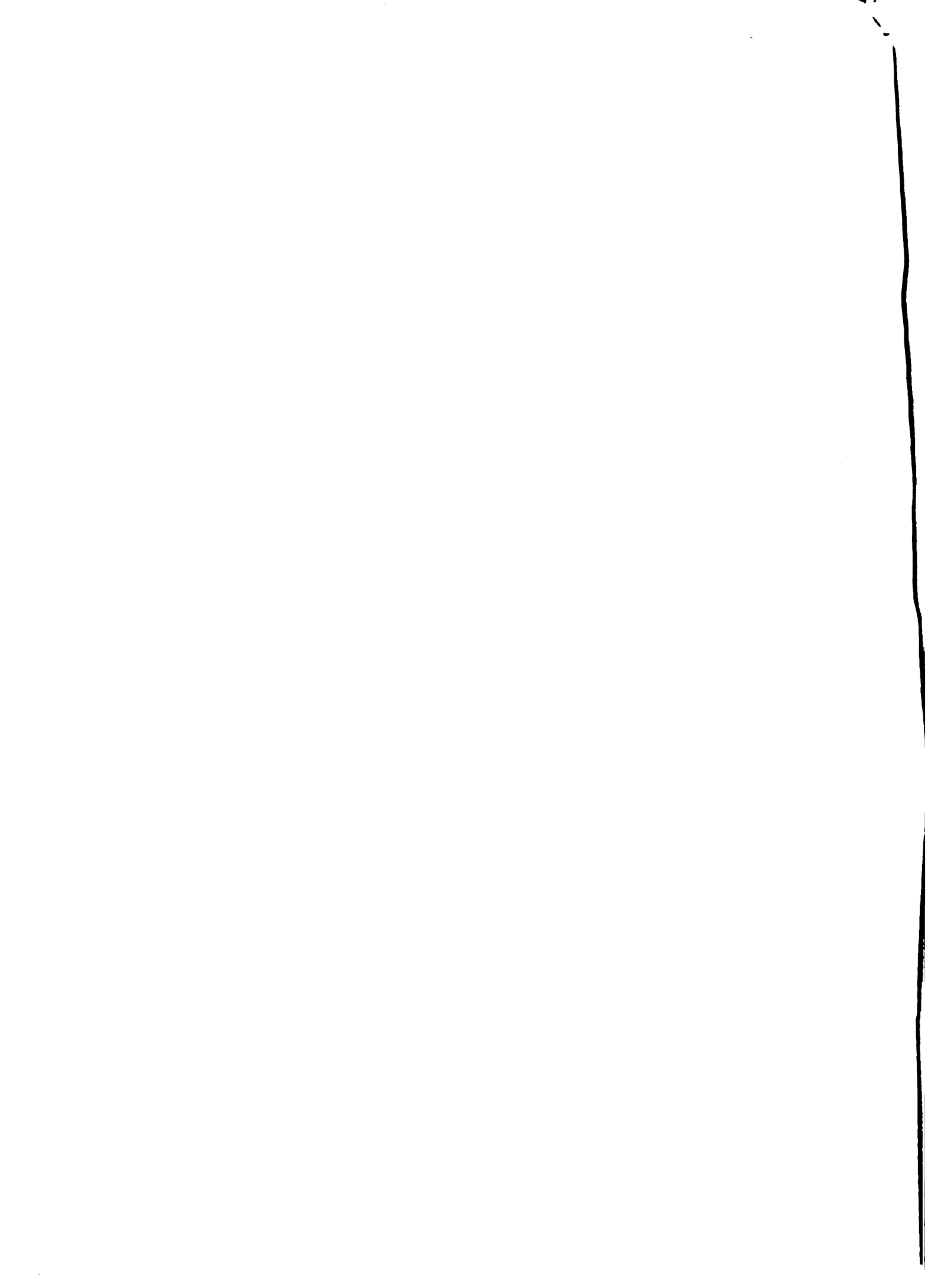
On the national level, new innovation systems have to be created, centered on the technological capabilities of industry, but including other scientific and technological organizations of the public and private sector, linked in networks of collaborative research, information exchange and joint-ventures in production and marketing (Avalos 1993). An explicit effort in the development of adequate capabilities to incorporate the new technologies has to be included in the technology development strategies. The goal will be the creation of a national "technology infrastructure", providing the basic research, technological information, normalization, intellectual property mechanisms, risk capital, etc. needed for sustaining the innovation capabilities of industry (Tassey 1991).

The emergence of environment conservation as a global issue transforms it into a new competitiveness factor. Environmental safeguards will be an important cost component in many productions and areas, and therefore affect the competitiveness of these zones. But also consumption trends are moving towards environmental friendly products, turning ecology and environment into a differentiation factor⁷. On the other hand, market access is increasingly tied to the respect of environmental safeguards, forcing producers to adopt new production processes and technologies.

4. LAC AGRICULTURAL COMPETITIVENESS

More than 10 years ago, the countries of LAC initiated a process of profound changes in their economic development strategies, as a response to the exhaustion of the previous model. The external debt crisis of the beginning of the eighties was the most direct sign that the old development strategy had to be revised. Import substitution was effective in creating an industrial base, and therefore initiating a new economy, very different from the traditional primary production economies typical of the region. Its policies were determined by the requirements of this infant industry, without too much considerations of the "true" advantages of the region.

⁷ Of special importance is the association of "natural" with high quality and more environmental friendliness. It has permitted, for example, that agricultural prime materials like leather, wool and cotton compete successfully with synthetic products (ECLAC 1989).



The crisis of the import substitution development model in LAC has been a consequence, among other factors, of its own success during the three decades after World War II. The emphasis on the internal market and a mercantilistic insertion into world markets was able to generate significant economic growth, but its logic isolated the region from crucial international developments, and specially, the tendency towards internationally integrated productive processes and scientific and technological advances.

The competitive performance of agriculture and agro-industry in LAC in the last decade shows the successes and failures to be expected for a period of deep transitions in the economic development strategies of the region. The increased international insertion of Latin American countries, as a result of the opening of the economies, significantly increases the sensibility, or vulnerability, of the region to global developments. The analysis and close monitoring of them is therefore of crucial importance for the future success of the economic development strategies, and in particular, for maintaining and expansion of competitive advantages.

Recent agro-industrial export performance of LAC

Aggregate analysis of the trade performance of LAC clearly shows that agro-industry has been one of the few internationally competitive sectors in the region. Coefficients of exports and imports show that food, leather products, foot wear, wood and its products and paper and its products, are among 13 industrial internationally competitive sectors in 1985. These product groups represent poles of competitiveness within sectors that process abundant natural resources, that is, basically exploit comparative advantages (Fichet 1991). Similarly, an index of regional competitiveness, calculated as proportion of world exports of the relation between exports and imports for 1986, shows that the most competitive of the only four categories of competitive products of Latin America, was agro-foods, followed by energy, textiles and steel (Rosales 1990).

A closer look reveals important differences between products and countries. Further, the qualification of competitive success on the basis of the dynamics of the OECD markets and country exports also shows that different situations are hidden behind these aggregated numbers. The competitiveness matrix of agricultural exports for 1989, constructed from a recent analysis of the export profile of Latin America and the Caribbean, which used the Competitive Advantage of Nations (CAN) methodology of ECLAC, confirms these conclusions (Buitelaar et al 1992). The agricultural exports of ALADI, the Latin American Free Trade Association⁸, member countries, of Central America and of the Caribbean (including Cuba) for 1989 are shown in Table 2, grouped according to their OECD market share increase or decrease and to the growth or decrease of the OECD market of the product.

Most of the agricultural OECD exports of ALADI member countries (54.7%) are gaining increased market shares in declining markets. Products in this vulnerability condition are coffee, animal feed, fruits and oil seeds. In a winning situation, that is, gaining market shares in increasing markets, are 20% of the agricultural exports, which include preserved and processed fruits, foot wear and fresh vegetables. Losing opportunities are 11.1% of the exports. Crustaceans and mollusks, leather and raw plant material are losing market shares in increasing markets. Finally, 14% of the exports, that is, fresh meat, prepared meat, cocoa, sugar, cotton, wool and cotton clothes, are sector defined in decline, which means the countries are losing market shares in declining markets.

The situation of Central America is quite different. Agricultural exports to OECD countries are 85.2% in the declining category, and they include coffee, fruits, fresh meat, sugar, cotton and tobacco. They are followed by 8% in the winning group, including raw plant materials, fresh fish, vegetables and fruits. Only

⁸ The following countries are members of ALADI: Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay and Venezuela.



oil seeds are in the vulnerable group, representing 1% of agricultural OECD exports. Crustaceans and mollusks and wood manufacture are losing opportunities and represent 4.9% of exports.

The Caribbean countries are in a somewhat similar situation as Central America. Most of their agricultural exports are also losing shares in declining markets. Sugar, coffee, tobacco and cocoa represent 55.7% of OECD exports. Losing opportunities are a bigger proportion of agricultural exports. Crustaceans and mollusks, alcoholic beverages, manufactured tobacco and vegetables in this category represent 24.2% of OECD exports. Products in winning situation, that is, manufactured leather and alcohol, represent 13.4% of exports. Lastly, 6.4% of agricultural exports (fruits) are in a vulnerable position.

ALADI member countries have been able to maintain and even increase markets shares of their most important exports, but they are declining markets. They have been relatively successful in tapping new opportunities, that is, growing markets. On the contrary, Central America and, to a lesser degree, Caribbean countries still are excessively dependant of exports in declining markets and they are losing market shares in them. New opportunities in growing markets are still relatively small, and most of these export are losing market shares.

Concluding, LAC still exhibits an agricultural competitiveness pattern characterized by its specialization on the basis of comparative advantages. It has been called a "perverse specialization" because it concentrates in declining markets (Rosales 1990). But the recent export performance also clearly shows that the region is moving away from this pattern, into more dynamic markets generally with processed and differentiated primary products. This could be a sign of a more positive "strategic" specialization in resource intensive but increasingly technology intensive sectors.

New economic directions in the region

In response to the debt and fiscal crisis and to the pressures of multilateral financial organisms, governments in LAC applied, in a first phase, policies that sought to reestablish basic macroeconomic equilibria. This was quickly followed by measures seeking to open the national economies, through general reductions of trade barriers and deregulations facilitating foreign capital influx.

A new economic model

This first phase of macroeconomic adjustment measures started a process of structural changes in the countries. Its immediate objectives were to restart the growth of the economy as well as the reconstruction of the fiscal basis of the state. The fiscal crisis had in effect forced the state to give up many activities, starting with most direct involvement in productive, generally non-profitable, activities. The capability for direct and indirect subsidies of productive activities has been severely limited. Fiscal reforms are strengthening the linkage of state income with the productive effort, away from taxing international trade.

This process should have, at least, three important consequences. The first one is the changes in the general productive structure. The new macroeconomic parameters and the reduction of protection redefines the basic economic viability and incentives of many sectors and enterprises, as well as the relations between them. Secondly, enterprises are forced into a process of industrial reconversion, to increase productivity and develop other competitive advantages. And, thirdly, the role of the state in the economy changes from direct involvement in productive activities towards the regulation and strategic orientation of the economy.

The strategies and policies seeking this structural change essentially represent a new development model, characterized by three elements. First, a new way of inserting the economies into the world market. Secondly, the use of market mechanisms for the reassignment of resources and priorities. The redefinition of the role of the state in the economy is a consequence of this fundamental strategy. And thirdly, the



specialization of the productive sectors, based on given, comparative advantages but more importantly on new competitive ones. Thus, international competitiveness becomes the pivot point of this new development model.

The new development model has important implications and consequences for agro-industry. In a first instance, the establishment of favorable exchange rates and the reduction or elimination of taxes on exports increases the income of agricultural production units and makes exports more attractive. This permits to better exploit the comparative advantages of the sector and specially the technological advantages accumulated during the import substitution phase in many sectors in LAC.

But, on the other hand, as a consequence of fiscal austerity and privatization the traditional support of the public sector for agricultural production in particular is been weakened or abandoned as research by the OECD has shown (Brenner 1992). Agricultural research and extension, quality control of exports, marketing boards, etc. are examples of this. There is a clear danger of disrupting the complex process of scientific and technological accumulation which until now has been located principally in public sector institutions without any private organization being able to continue or replace it.

The unilateral reduction and elimination of trade barriers is threatening directly the existence many agro-industries in LAC, which face the competition of subsidized products from some OECD countries. This is redefining the basic parameter of production, starting in many instances with the minimum economic scale of production and the degree of linkages between primary production, processing and marketing, but also forcing a reassessment of production, marketing and technologies so to maintain productivity and competitive advantages.

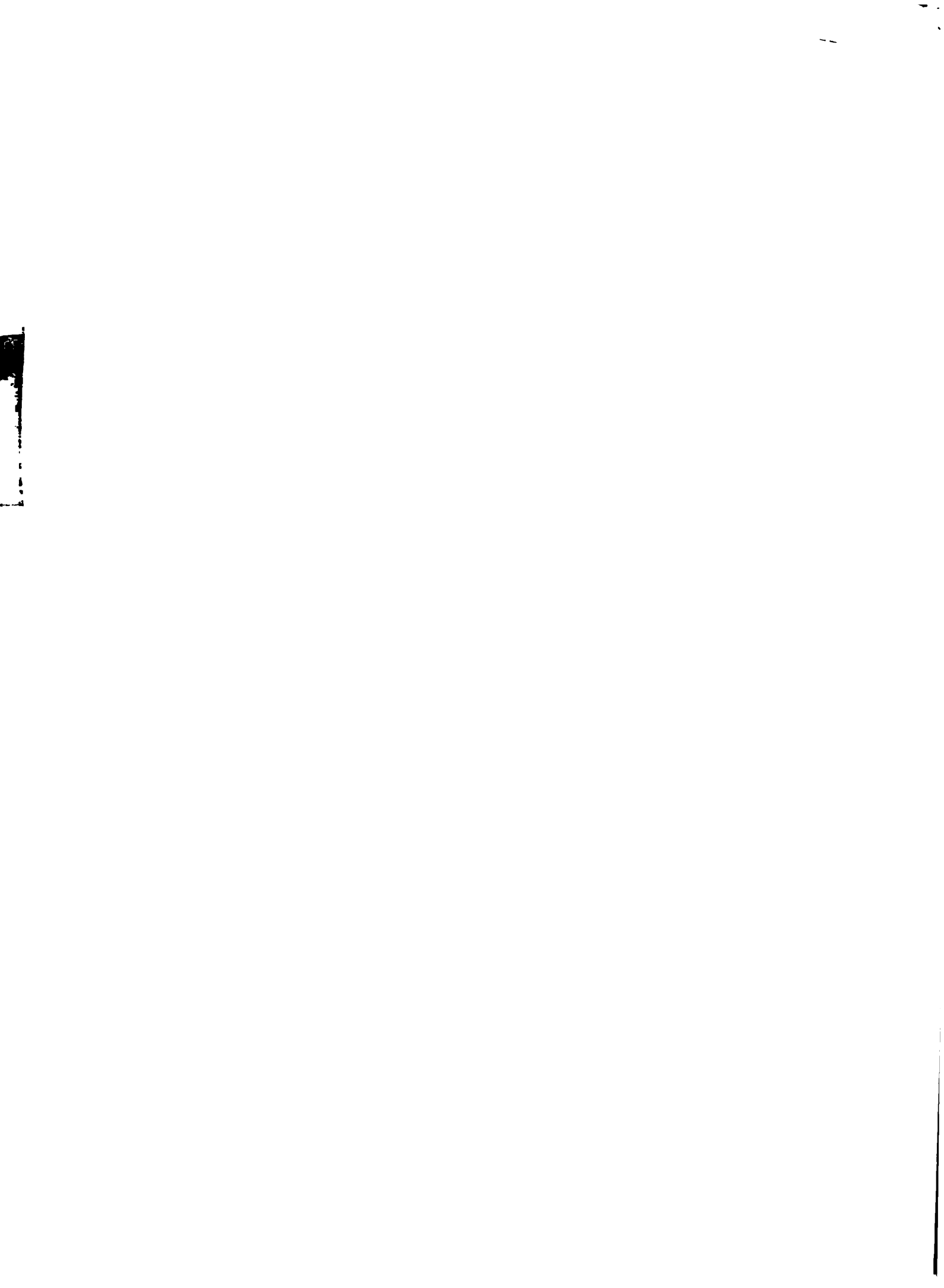
The competitive pressures of the new economic model are being met by many firms and countries at the expense of workers and the environment. The traditional and orthodox macroeconomic view of competitiveness is based on devaluations and control of wages as policy instruments (Chudnovsky and Porta 1990). Increase of poverty and the deepening of the traditional gap between subsistence and small scale peasant agriculture and commercial agro-industry in the last decade in the region is a clear indicator of the prevalence of these views. The advantages of the new model have been mostly for this second group of producers and, on the contrary, peasants have been subjected to new pressures and strains which have aggravated poverty, environmental degradation and migrations.

But these policies can only be maintained in the short and medium term, as sustained competitiveness requires a high degree of social and political consensus, both at the national and firm level, as well as avoidance of environmental bottle-necks. The challenge facing LAC is to move away from these "simple" competitiveness factors towards the "complex" ones, which permit wage increases and exchange rate revaluations (Chudnovsky and Porta 1990).

Agro-industry, and specially agriculture within it, has a crucial role to play in the new development model which is progressively consolidating in LAC (IICA 1989). Its competitive advantage is being exploited to provide crucial foreign exchange to the countries. The multiple linkages it has or could have with other sectors are a dynamizing force for the whole economy. And lastly, its employment potential and crucial role in the conservation of natural resources makes it a strategic element in overcoming equity and environmental sustainability limitations to social and economic development.

Competitvity factors

Agricultural competitiveness in LAC is, in a first instance, the outcome of a modernization process of agriculture, which has produced relatively advanced sectors, from a technology, market, industrial organization, infrastructure and management point of view. As this process progressed over three decades in the region, agricultural primary production has incorporated increasing amounts of inputs, be they



mechanical, chemical or genetical, and in the process created markets for these products that were originally non-existent. In some of the larger countries, an agricultural inputs industry developed to supply these new markets. Industrialization of agricultural prime material has increased to include a high proportion of primary production in most countries. This has been tied to the development of a processing industry which has been mostly directed towards internal markets.

The agricultural supplies and agro-industrial processing industry includes both locally owned companies and transnational corporations (TNCs). Local manufacturing facilities have been created by TNCs in the countries with larger markets. In the cases of smaller markets, local distribution channels for imported products have been established. TNCs play a dominant role in many sectors and countries and therefore are and will be an important factor in competitiveness.

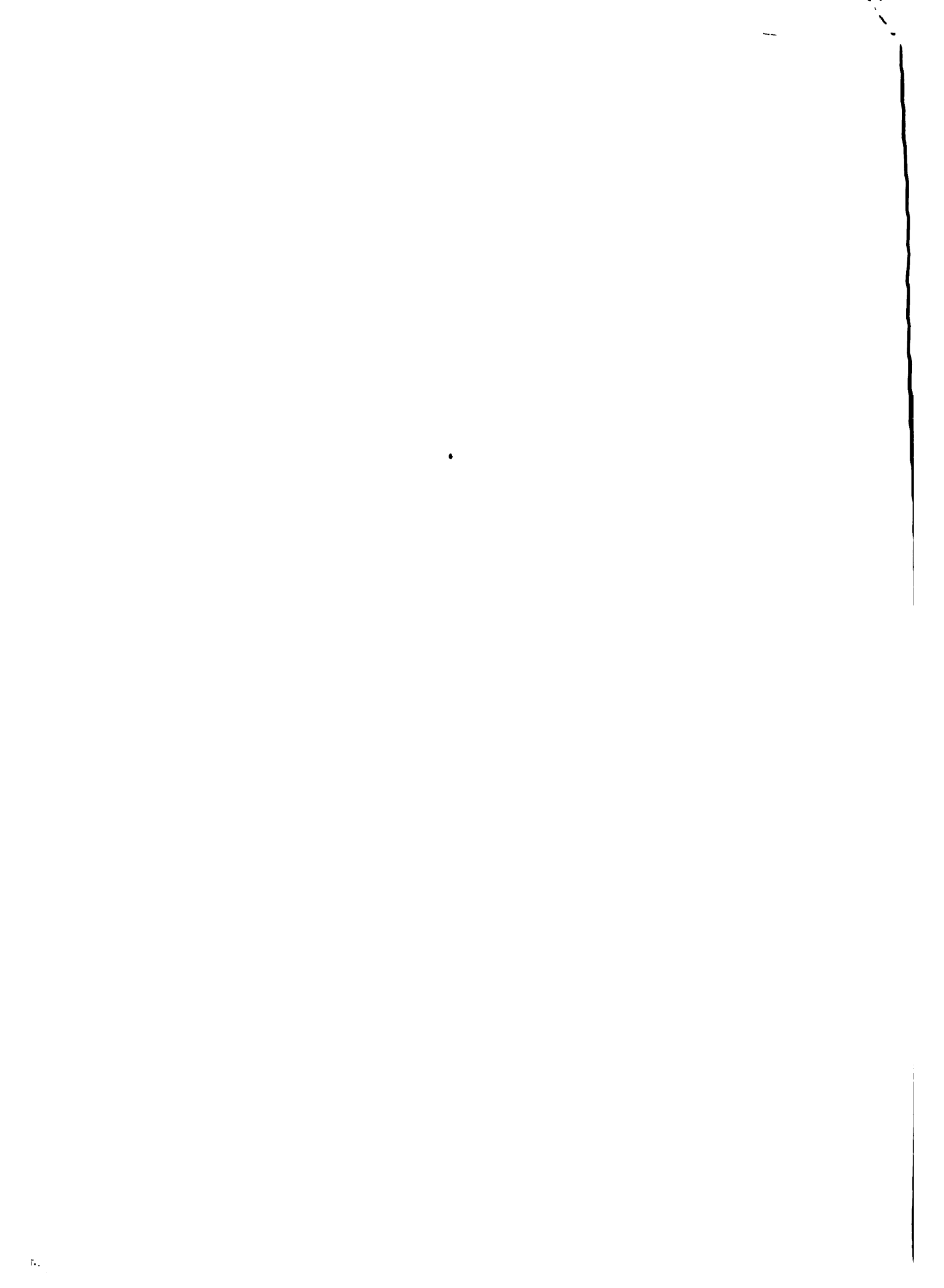
The available evidence on agricultural competitiveness factors in Latin America refers mostly to undifferentiated commodities and differentiated primary products. It shows that the factor endowment, and specially natural resources, is still an important component in this competitiveness. Nevertheless, the exploitation of these comparative advantages has required important efforts in management, technology, marketing and public policy, to maintain internationally comparable productivity levels. The failure to maintain adequate productivity advances and market structures has been identified as causes for the loss of competitiveness in traditional exports (ECLAC 1993).

A crucial component of the modernization process of LAC agriculture has been technological innovation. An important technology infrastructure of research institutes, agricultural universities and extension services was created by the public sector to supply the needed technology. As PROOTAL showed, organized primary producers in many specific situation had been able to efficiently link their needs for higher yields and agronomic productivity with the internationally available technological potential and the adaptive research capabilities of these public sector institutions (Pifeiro and Trigo 1985). Organized primary products producers were able to coopt public research institutions for their particular interests. The previous investments by the public sector for the development of a national agricultural research infrastructure and the technological advances achieved in the international agricultural research centers and others were crucial factors in this success.

The important point from the perspective of competitiveness analysis is that R&D in these situation was directed towards overcoming basic production constrains and to increase yields and productivity, that is to reduce costs. The transfer of the basic technology to the countries and their adaptation to local conditions has been in general successful in maintaining an adequate productivity in primary production, a basic requisite for international competitiveness.

But this strategy is not enough when production moves towards more differentiated primary and processed products. The path of transfer, adaptation and development of these technologies is different. Constrains in the availability and access to post-harvest and processing technologies call for different strategies and policies, which until now have been tried with lesser success in the region. One central piece of the general technology development strategy in the area of processed agricultural products, the specialized agroindustrial industrial research and service institutes, has been much less successful in fostering adequate technological capabilities, for example.

The case studies done by IICA (1990) confirmed the importance of new technology strategies and instruments for the successful export of differentiated primary products. The need of a better match of the international demand has driven organizational and technological innovations, first, in the direction of better quality and, secondly, to differentiate products and to supply them in favorable periods of the year. The control of commercialization channels through forward integration has been important in these cases, not only as a way of capturing a higher proportion of the value, but also as a way of directly monitoring changes in markets and consumer preferences. Institutions geared towards identifying and efficiently transferring post-



harvest and processing technologies, as well as being able to catalyze the creation of new companies were crucial in these successes, as shown by the examples of Fundación Chile and Fundación Sinaloa in Mexico.

Competitiveness of semi-processed products, and principally of processed consumer-ready products, in Latin America has been less studied. In many industries of these types in the region, with a dominant presence of TNCs, exports will be determined by the business strategies and global logic of these firms. The question here is what factors affecting local production conditions induce the TNCs to produce for export. But other sectors are dominated by locally owned companies (wine, poultry, for example) and they have shown a very dynamic export behavior.

The case studies mentioned above permitted to conclude that competitive success under the new economic conditions in the region is generally dependant on a greater control of market access, efficient linkages between the different activities within the chain of production and the supply of more differentiated products, closer matched to smaller and more special markets. This depends critically on the quality of management in production, processing and commercialization firms.

The capability to establish joint-ventures or other linkages with suppliers and distribution firms is one important element of successful management. The establishment of new relations between primary producers, firms and workers has led to a more efficient linking of the different activities in the production chain. This means that for competitive success it is critical to overcome the traditional adversarial relationships between these actors.

Finally, the case studies showed the importance of public policy in the modernization and competitiveness⁹. General incentives like exchange rate levels, support to exports, salary and taxation levels, financing and interest rates, have all been behind success in varying degrees. But also more directed policies have been important. The creation of a pool of trained professionals and technicians, the establishment of a technological base, information services, are some of these specific policies.

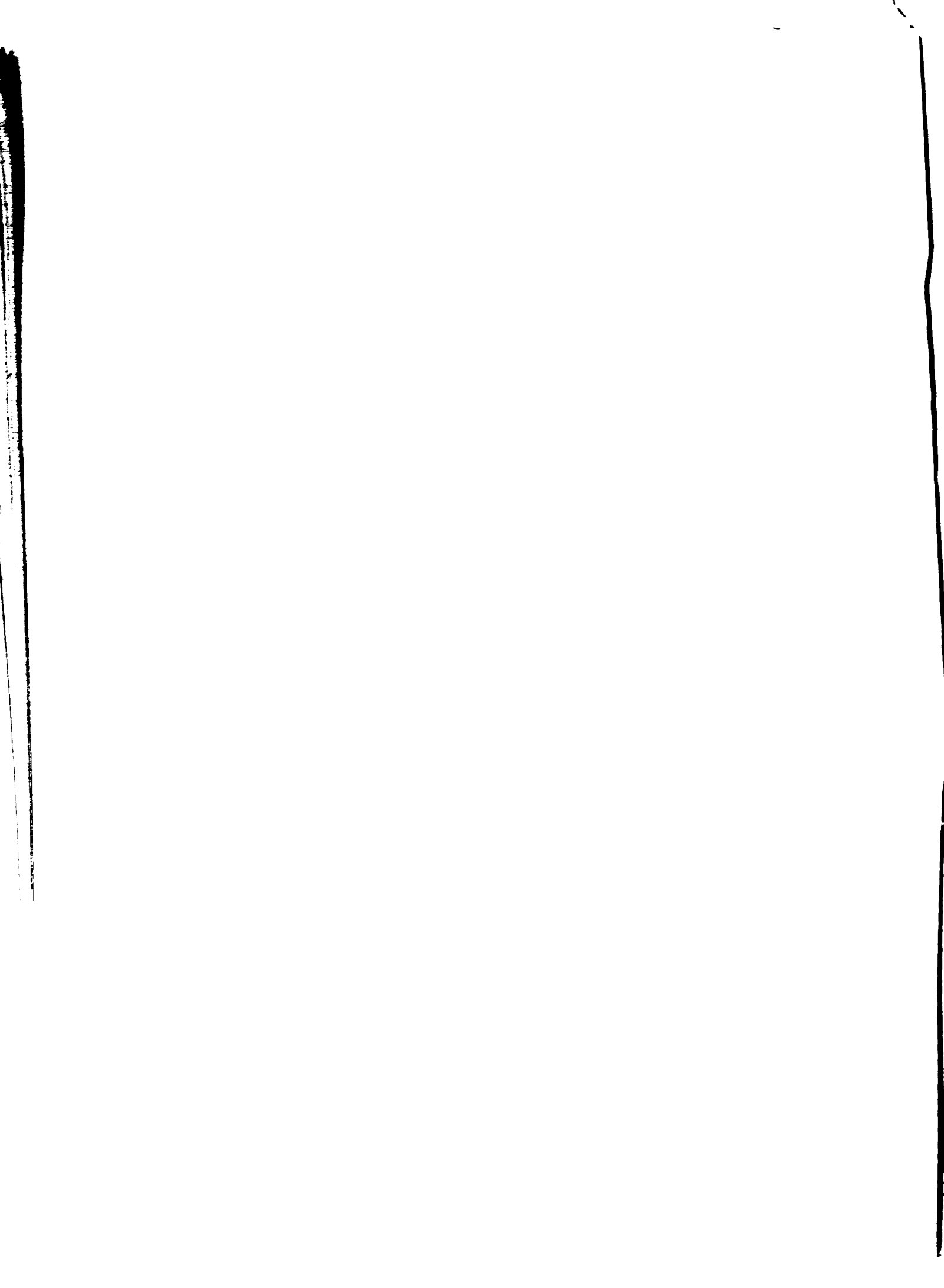
The importance of the care of ecological and environmental factors in agricultural competitiveness has been highlighted by the loss of competitiveness of some agricultural products in LAC. For example, the practical disappearance of the once very important cotton production in some Central American countries has been attributed to civil wars as well as the steep rise of production costs due to the need of excessive use of pest control agents (ECLAC 1993).

5. TOWARDS AGRO-INDUSTRIAL COMPETITIVENESS POLICIES

Agro-industrial competitiveness in LAC faces huge challenges in the international sphere. The emphasis on primary production and cost competition strategies, which has characterized agro-industrial development until now, has to be revised to take into account the new realities. The declining importance of commodities and semi-processed goods in international trade means that many prevailing strategies have to be revised. The determinants of competitiveness of differentiated and processed products will define these revised strategies and policies.

On the other hand, political fragility of many democracies in LAC and the recognition of global threats to climate, health and environment have propelled the equity and sustainability issues to the forefront of the political and international cooperation agenda in recent years. The adjustment of existing economic and technological policies to include social and environmental concerns has to be based on a better

⁹ Empirical evidence exist for a relationship between protection and agricultural competitiveness. Econometric analysis shows that higher competitiveness (measured as relative export advantages and revealed competitiveness) is correlated with less protection (quantified as producer subsidy equivalents) in wheat, coarse grains, rice and soybeans (Vollrath 1989).



understanding of the impacts on these issues of the development of internationally competitive agroindustrial export sectors.

Agro-industrial competitiveness options for LAC

The agricultural competitiveness matrix for LAC suggest possible broad options. They are indicated in Figure 1. The first one would try to move products from low to high efficiency. That means maintain and expand market shares both in declining and growing markets. Maintaining and decreasing costs is the starting point for this, to keep new-comers out of these markets and slow the decline in consumption. Higher quality, new presentation forms, better supply in time, etc. can all be important strategies to reach this goal. But the limitations of these firm level strategies have to be kept in mind. In the context of strong protectionist tendencies in most markets, negotiations will perhaps be the strategy with the most impact on competitiveness.

The other broad option is to try to influence consumption trends. Reversing the declining consumption of a product will depend less on its cost than on its functionality and other value for the consumers. That means that changing a market from low to high dynamism is basically a question of differentiating the corresponding product in such a way as to create new value for the consumer.

From the point of view of the exporter of primary products, this increased differentiation is closely linked to the sale of products with a higher level of processing. They can seek to increase, not the level of differentiation from perspective of the consumer, but the differentiation of the exporting country products portfolio, and therefore capture a higher proportion of the added value. This option implies a forward integration strategy for the commodities exporting countries, to enter into the processing and distribution of final products.

The four types of agriculture defined before offer an useful context for the identification and discussion of specific strategies possible for pursuing these option.

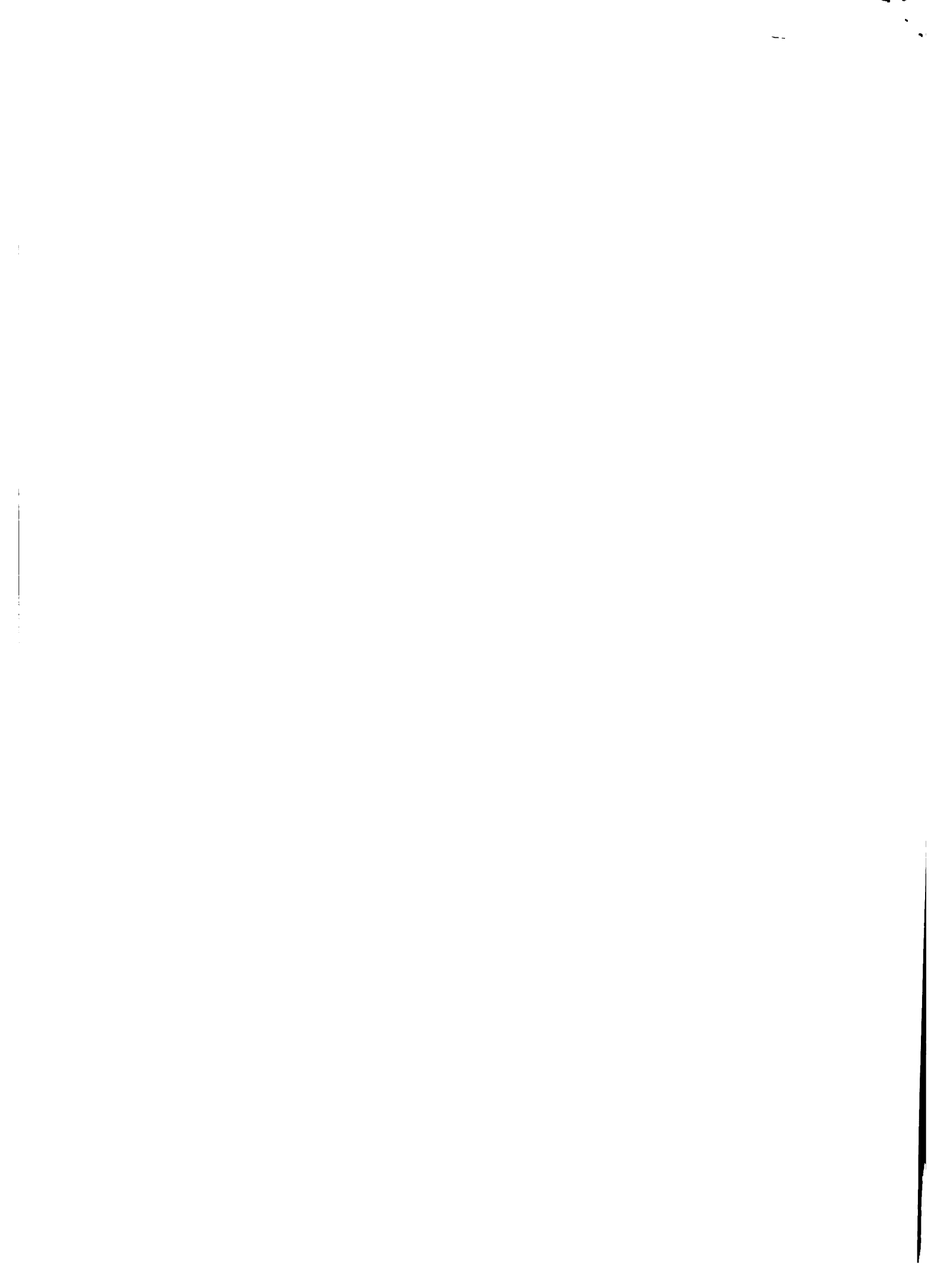
Undifferentiated primary commodities

Competitiveness of the production of this category of products has to be based fundamentally on cost leadership strategies, which, on the other hand, have to be referred to a whole group of producers. Individual producers only have an limited influence on important elements of their cost structure, like technology, infrastructure, commercialization channels, etc. Negotiations between them and other actors influencing the sector, like processing industry, governments, etc. are therefore a crucial element of these strategies. Products characteristics and non-price factors are of little importance, as they are clearly defined and codified in grades and standards.

The dynamics of technology for the production of these products reflect this situation. The direct producers do not normally directly develop the technology they use. This is done by the public sector in the case of non-appropriable technologies and by the input producers in the case of appropriable technology. As a consequence, technology is highly mobile, generally available to the producers.

Biotechnology has increased the importance of biological inputs, and specially genetic inputs, for primary production, vis a vis agronomical practices and chemical inputs. As a consequence, the existence of a local biological inputs industry will be a strategic element in the future competitiveness of regional agro-industry (Jaffé and Trigo, forthcoming).

Commodities can be differentiated to some degree. Products from a defined region can be identified by origin if the quality is higher or different. Similarly, a certain differentiation can be achieved by using specific processes with advantages for consumers. So, for example, some coffee producers have created a high quality image for their product, and others use processes with special appeal to some consumers



(e.g. "organic" coffee).

Differentiated primary products

Advances in genetics and post-harvest technologies have made possible the differentiation of many primary products, which used to be undifferentiated commodities. This process has been facilitated by the direct consumption by consumers of most of these products, like fruits and vegetables, and the existence of high degrees of variability in the species. But, they being primary products, still costs are crucial for their competitiveness.

Differentiation of these products is on the basis quality. Increasingly these varieties are proprietary and frequently brand-names to identify them are used. Important strategies are also identification by origin and increasingly, given growing environmental concerns, by production process.

Of particular importance for the competitiveness of this category of products is the influence on marketing and distribution¹⁰. The development of the quality image of these products requires good information of consumption and markets trends, which is facilitated by being close to final commercialization of the products. Cooperative efforts between primary producers, packers, trading companies and the public sector are therefore crucial in the establishment of competitive advantages.

Semi-processed products

Semi-processed products, in general, are undifferentiated products, traded in bulk. Differentiation possibilities for these type of products are limited since they are inputs to other processing industries. Cost leadership strategies are therefore the most important ones. Quality is crucial for these products but can be only used in limited form to differentiate them from competitors¹¹.

Production of these products, on the other hand, strongly responds to economies of scale. Their production is therefore generally concentrated in large units of production. Advantages exist in vertical integration, both forward into the production of consumer ready products, so to gain a guaranteed outlet for their products, as backwards to control supply and quality of prime materials.

Consumer-ready products

The production of consumer-ready processed agricultural products is generally a highly competitive activity, as it is dominated worldwide and also nationally by few large firms. In recent years, large food and drink companies have become increasingly interested in international business. Nevertheless, this industry is perhaps more a multi-domestic rather than a global industry, in which TNCs integrate all their activities on a worldwide basis. The competitive outcome for a food and drink multinational has been mostly determined by conditions in each country. These companies are oriented towards domestic rather than export markets (Rama 1992).

Competitivity is strongly based on differentiation. Technology has been relatively less important for it than packaging and use of brand-names. Indeed, a majority proportion of technological innovation in this

¹⁰ The Mexican vegetables export production loses its cost advantages due to lower wages than in the U.S. because of higher transport and commercialization costs, for example (Gómez et al 1992).

¹¹ Even a limited use of quality as a differentiation element can be important, as the examples of leather, wool and cotton demonstrate. They have been able to successfully compete against synthetic substitutes by promoting a higher quality image for them (ECLAC 1989).

industry, as is the case also semi-processed products production, is done by other industrial sectors, like equipment manufacturers, chemical companies, industrial control firms, etc. (Ettlie 1983, Rama 1992). But the global scientific and technological trends will increase the importance of technological innovation also in this, until now, traditional industry. On the national level, this means an adequate "technology infrastructure" (Tassey 1991) for this sector has to be provided, so to develop and maintain its innovation capabilities.

Agricultural competitiveness policies in LAC

LAC as a region has been in general relatively successful in maintaining and even slightly improving the competitiveness of its agriculture and agro-industry, as has been already said before. The export facilitating macroeconomic policies have had a positive impact on the short term competitiveness of the sector. Other policies, both governmental and private sector ones, have been also important in this performance.

But the experience of the last decade also shows that great doubts about the ability of government to implement macroeconomic and agro-industrial policies and more so strategies are justified. Overcoming this central problem of governance (Brown and Goldin 1992) directly depends on the maintenance and deepening of the democratization and decentralization efforts in the region.

General competitiveness policies

Competitiveness policies are those directed towards the creation of a favorable economic climate for competitiveness and towards the strengthening or creation of sources of competitiveness (innovation, information, negotiations, infrastructure). These policies, generally the responsibility of the government, have to address, at least, three broad goals (Pérez 1989).

Macroeconomic context

The creation of a favorable macroeconomic context for competitiveness is the first phase of any national competitiveness strategy. It is a prerequisite of the development of the capacities at the microeconomic level, which are the key competitiveness factors (OECD 1992). This entails, at the minimum, the identification and elimination of general obstacles to competitiveness. In practice, public policy at this level in LAC has been directed towards correcting macroeconomic biases against exports (exchange rates, taxation), as well as reducing the state intervention in the economy (subsidies) so to let companies compete and survive the most successful ones.

Macroeconomic adjustment has been, in general, successful in the Region in stabilizing the economies. Less success has been attained in creating favorable macroeconomic conditions for long term and high risk investments and the channeling of savings to sectoral investment priorities (Chudnovsky and Porta 1990). High interest rates and the inexistence of long term and high risk financing are the most important macroeconomic limitations for the accumulation of competitive capabilities in LAC.

The opening of the economies to heavily distorted international agricultural markets has put many governments before a difficult dilemma. Resistance to the productive restructuring of agriculture has been gathering strength in many countries. With the argument of the unfair competition against subsidized products, strong political pressure from agricultural sectors is being applied to maintain its protection. Governments resist to exclude some sectors from the liberalization program fearing to endanger it as a whole.

In theory, this fear is not justified. A liberalization program does not necessary exclude the selective use of protection as a economic policy instrument. The question is more about the capability of governments of making a selection based on a strategic vision of the competitive advantages of the



countries and not simply as the results of pressures. And this bears directly on the problem of governance mentioned before.

The favorable macroeconomic environment should include the necessary controls so to guarantee that the competitive effort will be an "authentic" one. The attention to environmental factors in production and competitiveness is not only an imperative for long term sustainability of production but also increasingly a condition for market access and increased sales.

Resources for competitiveness

On a second level, the public sector has to supply the resources needed for competitiveness. Financing, infrastructure, human resources are three crucial areas (OECD 1992). The role of the public sector here is basically to reduce the costs and risks for companies who want to export and to innovate. Given the increased importance of technological innovation in competitiveness, the provision of an adequate "technological infrastructure" will be a crucial role for the public sector.

Here lies perhaps the greatest challenge for LAC countries and their governments in the short term. After the ravages of the crisis of the eighties in many instances the task is nothing less than the reconstruction of governmental institutions. This presupposes in most cases a previous generation of a new fiscal basis for the state, a politically difficult and slow process.

Support to synergies

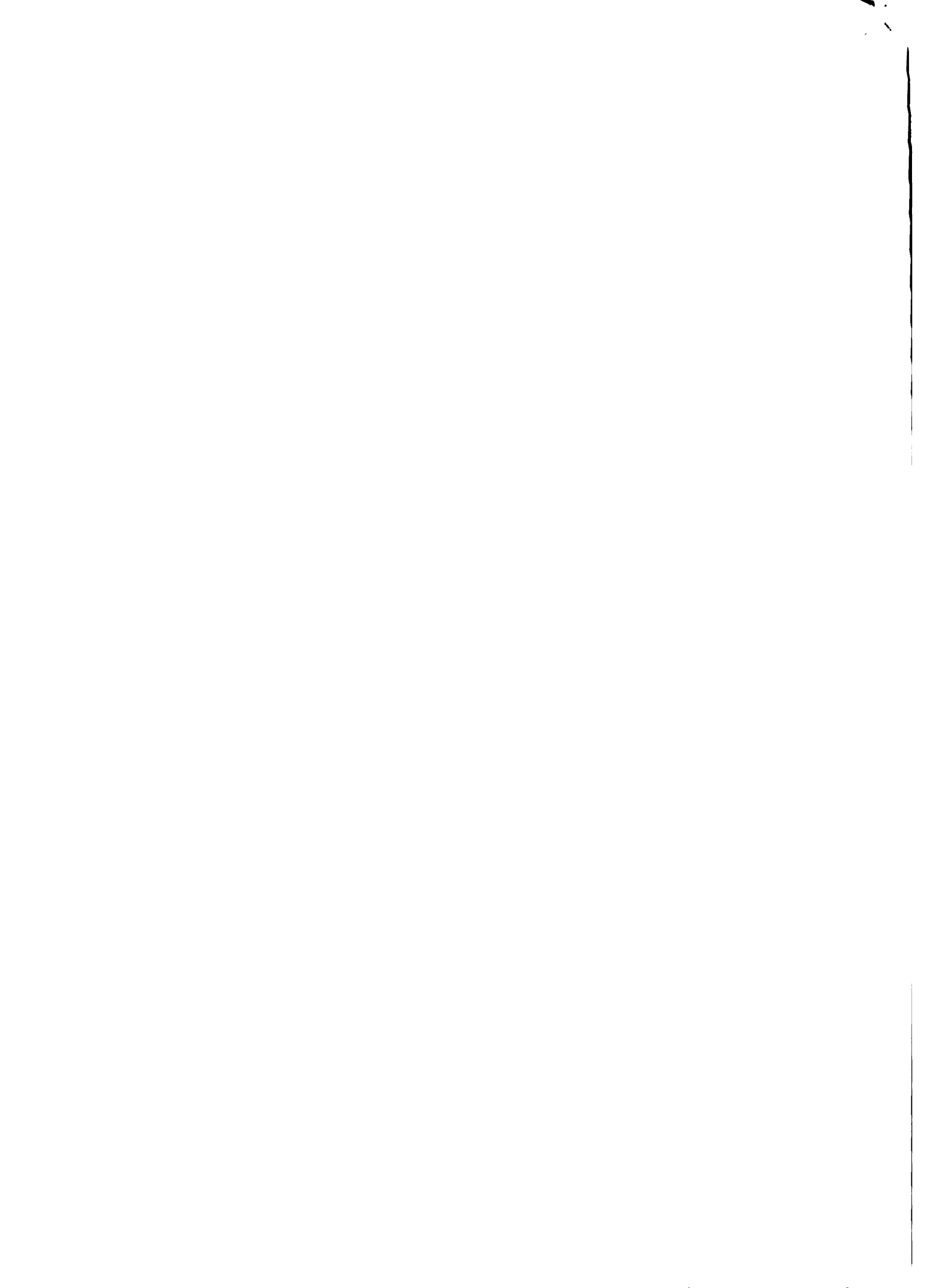
Lastly, governmental actions have to be directed toward the creation of the needed national or regional synergies between many companies, suppliers and producers of prime materials. As pointed out before, competitiveness capacities are within a system of economic agents, which ideally conform an innovation system. A general consensus on development or economic goals and strategies is a requisite for the development of this system, and government has a crucial role to play in its creation and fostering. The mechanisms which induce and facilitate the necessary cooperation and concertation have to be the focus of the public sector policies seeking competitiveness.

The public sector in LAC has relatively little experience in this task. It demands respected, technically competent, functionaries, capable of providing the strategic vision required. But they also need equally competent counterparts in the private sector who understand the benefits of cooperation and concertation¹².

Market mechanisms play an important role in the process of accumulation of competitive capabilities but the long term, public-good character of some of the crucial factors bearing on competitive success, like the needed scientific and technological infrastructure, human resources and physical infrastructure, for example, demonstrate that government is also an indispensable element.

The dichotomy market-government so commonly used to justify the economic policies of the last decade in LAC is therefore a false one. As the international experience clearly shows, competitive success requires a strong and intelligent government intervention. The crucial challenge facing LAC countries is to refocus government intervention from direct support of productive activities to support the process of accumulation of competitive capabilities within a framework of guarantees for an equitable distribution of its benefits and the conservation of the environment.

¹² An interesting example of a government initiative for facilitating the linkage of small farmers and agro-industry are the "Asociaciones en Participación" in Mexico. This program provides a legal framework as well as finance and technical assistance for cooperative ventures between these sectors (Dutrénit and Oliveira 1992).



Specific competitiveness policies

Policies directed explicitly or implicitly towards the development of agricultural competitiveness has been implemented in LAC, in some cases for a significant period of time.

Export promotion has been probably the most common competitiveness policy. It rarely is limited to agricultural exports, but the great weight of agriculture in most countries determines that most of these efforts have been in this sector. These policies seek to provide the resources and capabilities needed for exports, mainly financing, market information and trade and management expertise. Financial incentives for exports used to be common, but are being phased out in the open market policies. Special organizations have been created, both by the government, the private sector or by other governments through bilateral aid programs, to provide technical assistance and training.

A crucial part of export promotion has been international trade negotiations. This important function of governments relies critically on a correct strategic vision of the technological, production and market perspectives of the sector or products involved. The weakness of economic and technological perspective in the region, as well as of the monitoring of trade and industrial trends, suggests that this is a critical area to be strengthened in the future.

Conceptually closely related to export promotion are agricultural diversification programs, which try to offer new opportunities to producers affected by reductions of traditional export earnings and markets or by lack of opportunities in the internal markets. These can be also a government initiative but examples of programs created by producers and other private sectors organizations exist. Research is an important component of these programs, which also include technical assistance and training.

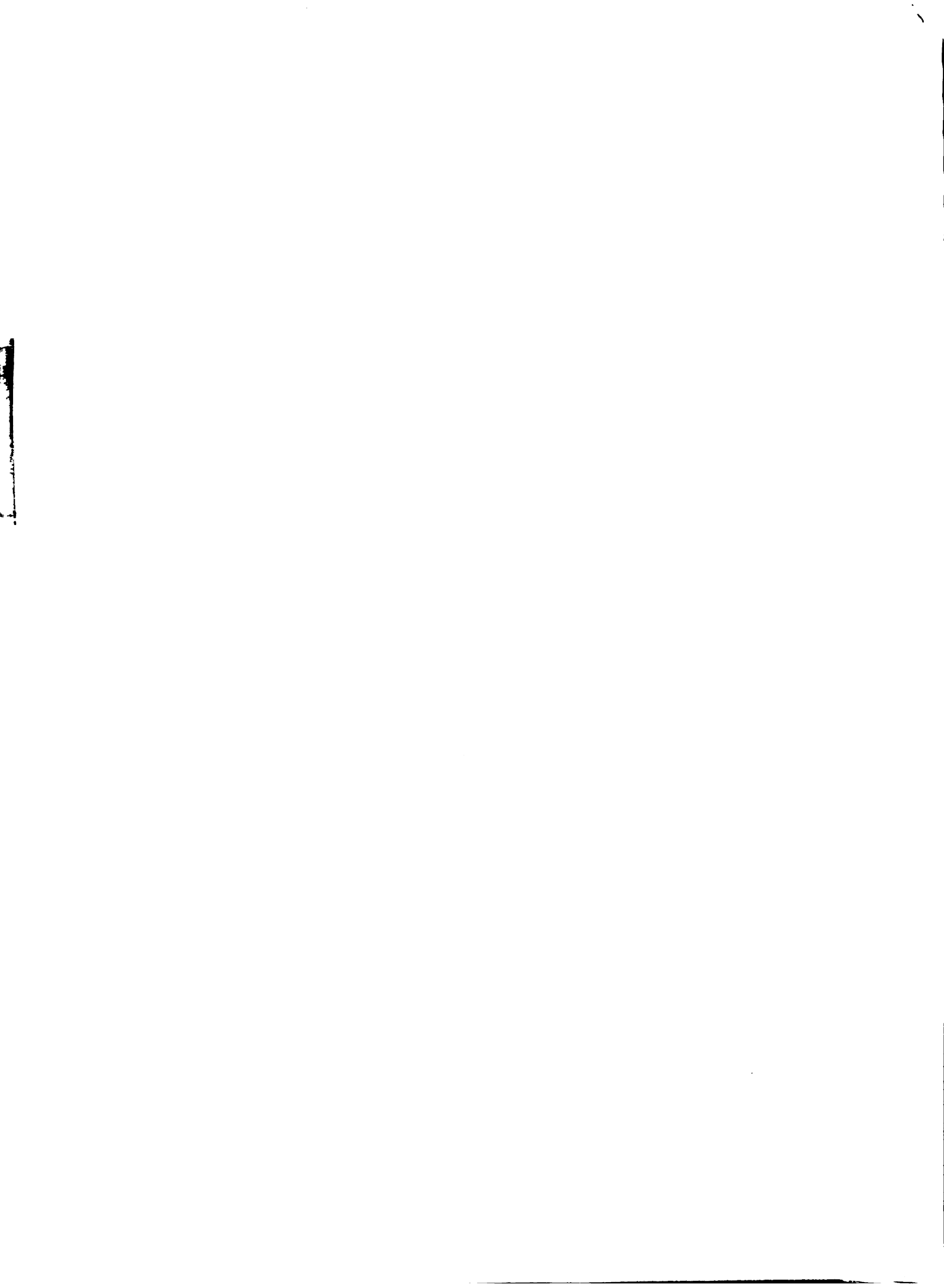
Industrialization or added value policies is another category of policies which could have explicit or implicit competitiveness goals. Seeking to increase the degree of local processing of primary products, mostly export products, they provided R&D, technical assistance, finance and other incentives. Common during the import substitution phase, they have been abandoned in the new development policies. But within specific strategies to increase the competitiveness of selected sectors they definitely have an important role to play.

Technology policies

Given the central role technology and innovation play in competitiveness, special attention has to be given to technology innovation strategies and their supporting policies. A better understanding of the process of technical change in agriculture and agro-industry in open economies is needed for their design and implementation. Research on this theme in LAC has concentrated on primary production, on the one hand, and of industrial firms in general, on the other. An integrated idea of technical change within the agro-industrial complex in LAC is still needed.

The technology strategy in primary production in the region has relayed on the international transfer of genetic and input technology and on the adaptation of it for local use. Some of the relatively more developed countries have been able to develop more advanced capabilities which has led to some limited creation of technology associated with the development of an Indigenous, mainly genetic, inputs industry. Agro-industrial processing technology is less developed in the region. Mostly embodied in equipment and complex inputs, the one used in LAC is mainly of imported origin. This reflects the weak development of this type of industry in the region¹³.

¹³ Processing technology priorities are more directed towards the mastery of the technology used than to the development of products and processes. A study done by the Technology Innovation Center of the UNAM in Mexico identified control and instrumentation, industrial, process and electro-mechanical engineering and management and finances as priority areas for the Mexican agro-



The general agro-industrial technology strategy in the region should continue to be based of the international transfer of technology, particularly in regards to the new technologies. But the build up of competitive capacities requires that firms in LAC abandon their traditional technological passivity and use imported technology as the starting point of their innovation strategies. An explicit recognition of these basic principles can help to focus the attention on the efficient incorporation and mastery of the needed technologies on the firm level, so to rapidly increase work productivity (Pack and Westphal 1986).

Increasingly this is a task of the agro-industrial inputs and equipment industry which has assumed a central role in technological innovation. The public agricultural research and extension systems will continue to play a crucial role in non-commercial sectors, but has to develop new capabilities to support technological innovation in the inputs and processing industry.

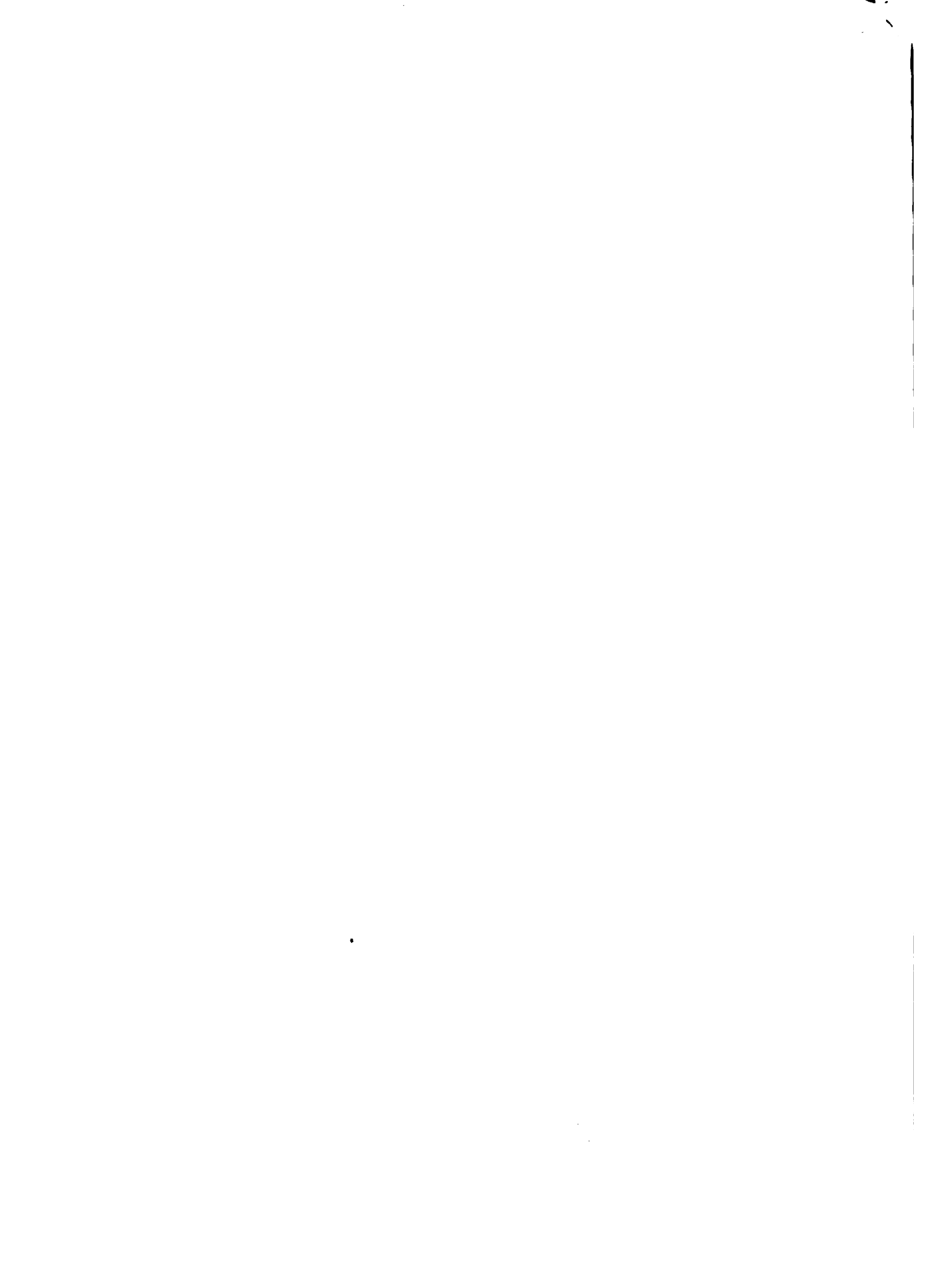
The organization of the technology support infrastructure for agro-industrial competitiveness goes beyond the traditional national agricultural research systems to include other public research organizations, specially in the area of processing and inputs manufacturing technologies, extension and technical assistance services, sanitary and quality control services, technical information, normalization, intellectual property protection, among the more important ones. Agricultural research and extension systems have to be adjusted to take into account the new technologies as well as the role of the public sector in technological innovation.

The relative weakness of technological support to agro-industrial processing technology in the region has to be overcome through the strengthening of industrial norms, quality control and technical information services, as well as contract research and industrial services for agro-industrial firms.

The increased privatization of agricultural technology brought about by biotechnology, as well as the greater complexity of the national technology support systems calls for more attention to the regulatory and incentives environment for technological development. Better intellectual property protection, stricter safety, environmental and quality safeguards, clear rules for public-private sector interactions are examples of the required instruments.

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