INTERNATIONAL COMPETITIVENESS AND SUSTAINABLE DEVELOPMENT

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Contents

Summary

This chapter attempts to develop a clear view of the problems related to competitiveness and sustainable development policy, using for illustration a wide range of information available on firms in Europe and elsewhere. We provide a conceptual framework that will be useful for assessing technological, institutional and social risks, as well as the prospects for environmental quality associated with firms' actions in the context of economic and ecological globalization. The analysis is focused on technological change, and the fundamental role which innovation can play in procuring greater freedom for firms to opt for environmentally sound strategies. We also discuss public policy and the

capacity of governments to bring about changes in market conditions through the creation of regulatory institutions and concertative governance.

1. Introduction: The New Paradigm of Competitiveness and the Emergence of the Concept of Sustainable Development

Competitiveness has become the catchword in a great number of debates, even though it is difficult to define the term accurately. The dangers of overuse have been pointed out by economists, who fear too much is being claimed in the name of competitiveness and other terms associated with it. Nevertheless, the idea remains in the forefront of debates on economic policy. For example, in Europe, the Commission's 1994 *Livre Blanc* (Official Report) refers to competitiveness as a key issue in a chapter entitled 'Towards global competitiveness'. Likewise, in the United States, the Competitiveness Policy Council reports annually to the President and to the Congress.

International competitiveness takes on different meanings depending on whether it is viewed at the level of the firm, industry, or government.

From a business point of view, major competitiveness factors are still those described by the traditional variables in competition - profitability, keeping costs down, price-setting - even though these variables are greatly influenced by how a company adapts to and positions itself in the market. Firms will focus particularly on their own input and output markets, and this competitiveness can be illustrated by the adoption of inter-firm networks such as cooperative forms. On the other hand, states are deeply involved in international competitiveness for sectors as a whole, such as those measured by aggregate trade flows and so on. This can be complicated by different interplays between a firm and the state. In its home country, a firm or an industry may consider environmental pressure as a constraint and therefore oppose the application of controls. Yet, after regulations have been adopted, industry may cooperate with the government to ensure that other countries enact rules that are at least as strict. Hence, the same regulation can represent a constraint for an industrial company at the domestic level, whereas it can represent an opportunity in the international marketplace if the country manages to impose it internationally in such a way that it works to its own advantage.

However, since the 1980s, the world has witnessed the development of what Porter (1990) refers to as the new competitiveness paradigm based on dynamic vision. According to this view, competitiveness, whatever the level, may well be achieved not through higher productivity or lower prices, but rather by the ability to provide different and better quality products thanks to technological innovation. So, technological innovation is now the driving force behind competitiveness. This means that science and technology are currently playing an increasing role in international competitiveness. It is for this reason that Futures Studies have made a remarkable comeback in the 1990s under the label of *foresight* to help decision-makers define their strategy of scientific and technological innovation in order to maintain their international competitiveness. In this context, the European Commission, recognizing the importance of science and technology for the prosperity and well-being of Europe, has proposed a number of ideas to rejuvenate Europe's research efforts, in particular through the creation of "European research areas ".

With the concept of sustainable development, we move beyond the notion of environment as simply an additional constraint of an ecological sort on economic growth, as was the norm in the 1970s, with the concept of zero growth, which was given publicity after the Report of the Club of Rome. Indeed, sustainable development aims at reconciling the pursuit of goals traditionally associated with economic growth (such as material wealth and consumer satisfaction) with ecological protection (see also *Biophysical Constraints to Economic Growth*). This new social project was confirmed during the Earth Summit in Rio in 1992, and reiterated one year later, for example, in the 5th Framework Programme of the European Commission, called "Towards Sustainability."

A similar development has taken place in the private sector. Firms are increasingly considering the necessity of 'taking the environment into account' not as an externally imposed cost or constraint but as a strategic opportunity. The term, "win-win strategy," indicates a firm's (or even a government's) strategy that enables it to maintain or even to increase its level of competitiveness while at the same time respecting the concern for environmental quality and the imperatives of sustainable development. What functioned only in the form of regulatory necessity in the 1970s and 1980s is being turned into competitive advantage terrain in the 21st century.

However, it cannot simply be assumed that these simultaneous changes in public attitudes, business policies and government regulations are going to guarantee the right conditions for long-term ecological, social and economic sustainable development. It is necessary to look with an open mind at the prospects for reconciling international competitiveness with the priority of implementing sustainable development policy. This is what we intend to do in this chapter.

The debate about the compatibility of sustainable development and competitiveness hinges on whether technological change is considered to have the potential to reduce pollutant emissions and to improve the efficiency of natural resources and land and water use. For this reason, the first section contains a discussion of the importance of environmental technological innovation in the search for an international competitiveness edge, and in the implementation of a sustainable development policy.

There is more and more discussion suggesting that major business corporations and alliances are in a position to influence the direction taken by environmental technological innovation. It is increasingly accepted that decision-making should be based on a "precautionary principle" when environmental risk is involved (see also *The Precautionary Principle in Sustainable Environmental Management*). However, application of these principles can involve significant irreversible investment for firms. Such a situation can encourage various strategic behaviors aiming at alignment of the final decision with the firm's own interests. In the second section of this chapter we analyze the competitiveness strategies of firms. We also discuss suggestions that allowing competition among firms to become the only factor determining the formulation of environmental technological change could lead to "locked-in" options which contribute neither to overall goals of sustainable development nor to competitiveness in the long run.

Many analysts are pointing out the role played by "governance", which defines broader social responsibilities at the local, national and international levels in the search for firm "win-win" strategies, and which seeks to combine international competitiveness, social cohesiveness and improved environmental performance.

The problem of governance arises as a matter of public concern whenever the members of a social group find that they are interdependent, but potentially in conflict. The actions of each member impinge on the welfare of the others, and the efforts of individual actors to achieve their goals may interfere with or thwart the efforts of others in pursuing their own ends. Governance does not presuppose the need to create material entities or organizations of the sort one normally might think of as governments in order to administer the social practices that arise in the functioning of governance. It does, however, more specifically imply the development of sets of rules, decision-making procedures, and programmatic activities that serve to define social practices and guide the interactions of those participating in these practices. Approached in this way, the initially counterintuitive distinction between governance and government, as well as the growing interest in the idea of "governance without government" becomes clear.

In this way, the European Commission has defined governance as : "… the sum of the many ways individuals and institutions, public and private, manage their common affairs. It is a continuing process through which conflicting or diverse interests may be accommodated and a co-operative action may be taken. It includes formal institutions and regimes empowered to enforce compliance, as well as informal arrangements that people and institutions either have agreed to or perceive to be in their interest."

The third section of our study, then, introduces the discussions focusing on the proposals of other notions such as public interest and collective responsibilities for the future which function as complements to international competitiveness. In this regard, the main proposal is to reach a "concertative governance" by building a partnership between the main stakeholders involved in sustainable development policies.

2. International Competitiveness, Sustainable Development and Technological Innovation

In this section, we review the complex relationships between the triad of international competitiveness, technological change and sustainable development. We examine the major role played by technological change in the implementation of "win-win" strategies and the risks involved.

2.1. "Win-win" Strategies or Environmental Regulation as a Motor of Competitiveness

Environmental technological change plays a key role in the new dynamics of international competitiveness.

On the one hand, in the course of the 1980s and 1990s, a certain number of sectors were placed under increased pressure in the field of technological competition, due (to a large extent) to the detection of new environmental problems and regulations. The chemical industry (e.g. CFC and its effects on the ozone layer, phosphates in detergents) as well as the automobile industry (e.g. catalytic converters vs "clean motors" and acid rain) were particularly concerned by this development. In this way, the environmental dimension thus contributes more and more, in the long run, to the determining of viable technologies and so to the competitiveness of firms and even of states.

On the other hand, according to studies done by Japanese government agencies, 40% of the world's production of goods and services over the first half of the 21st century may come from environment or energy-linked products and technologies. In this perspective, respecting environmental regulation (or the anticipation of regulation through the pro-active strategies of firms) becomes most important for the choice and diffusion of technologies within the framework of competitiveness. Most of the futures studies on technological innovation confirm that after 2010, there will be an explosion of radical innovations aimed at reducing and/or avoiding environmental impacts and offering renewable energies.

This point of view, moreover, is shared by the two important philosophies coexisting at the international level and relating to the synergy between technological policy and the policy of sustainable development.

- The first philosophy is that conveyed by the USA, aiming at the maintenance of economic leadership. According to this goal, the R&D areas selected for promotion are those that provide the greatest returns in enhanced value, specifically in accordance with the number of patents. Environmental fields offer interesting prospects from this point of view. The American technological foresight, called "critical technologies," regularly carried out by the Rand Corporation at the request of Congress is, in this respect, particularly revealing.

- The second philosophy first enquires about society's objectives in terms of sustainable development and then enquires about the means to satisfy them. Technological innovation geared to improving the environmental efficiency of products, processes and activities, as well as the institutional or organizational changes, is then considered. This conception, in which the Netherlands has acquired an undeniable lead, prevails in a number of European countries engaged in reformulating their R&D policies in response to the requirements of sustainable development. Thus, technological innovation constitutes one means, but not the only means, to reach the social and economic objectives of sustainable development.

According to these two philosophies:

- The environmental field forms an integral part of the broadly identified topics where technological innovations are likely to occur in the first quarter of the 21st century. The following list which is the result of the synthesis of most of the technological and social foresights, proves this point and includes energy, environment, the agricultural and farm-produce industry, information and communication, new materials, robotics, space, transportation, medicine and genetic engineering.

- There is a broad consensus on the emergent technologies in the environmental field for the 21st century. The technologies in question are the following: advanced detectors, biotechnologies, clean-car technologies, product-recycling, intelligent water treatment, cleaner industrial processes and micro-production, renewable energies, and new energy technologies such as photovoltaics.

- Most of these innovations will depend on advances in the two large technological sectors leading the technological revolution; namely, information technologies and genetic engineering (see also *Management of Technological Resources for Sustainable Development*).

- The market for these environmental technologies is estimated at several hundred billion US dollars over the 25 next years. It is for this reason that many countries are currently supplementing their technological foresights by "opportunities matrices" so as to evaluate the potential opportunities for these technologies in the industrialized countries, the newly industrialized countries, Eastern and Central Europe and also in the developing countries.

In this perspective, respecting the ecological dimension becomes most important in the choice and diffusion of technologies within the framework of competitiveness. Moreover, technological change is not, in this context, considered an exogenous variable of an unknown nature. On the contrary, innovation potential is seen as closely related to political choices, social conditions and economic institutions.

2.2. The Apparent Symbiosis of Technological Innovations and Sustainable Development Policy

In the two most widely debated conceptions of sustainable development, the role of technological change is determinant in protecting the environment and more broadly in enabling a sustainable development path.

The so-called “weak sustainability” approaches draw their inspiration from neoclassical capital theory extended to include natural capital. While the models are disparate in their details, the weak sustainability literature generally seeks a definition of conditions under which per capita consumption does not decrease (see *The Limits of Capital Substitution*). This preoccupation remains more or less in line with the results produced by Stiglitz’s (1974) pioneering model. It is presumed that technological change/progress can, automatically, through market mechanisms, offer some relief from environmental constraints, through some combination of substitution (from natural capital towards human and produced capital) and uninterrupted increases in factor productivity. According to this vision, competitive forces will push the economy progressively towards the application of “backstop technologies” involving high marginal productivity of scarce natural capital (such as nuclear fusion or high tech solar energy or technological capture emissions, etc.).

The so-called “strong sustainability” perspective as expressed, for instance, by Hermann Daly emphasizes a high degree of complementarity between technical (produced), human and natural capitals. Natural capital is viewed as heavily constrained (by carrying capacity, rates of renewable resources, assimilation capacity by waste ecosystems), and hence a long-term sustainability requires the limiting of the volume of economic activity to what is compatible with these ecological constraints. This can lead to the old propositions for zero-growth of economic activity, based on the structures of complementarity, as alternatives to propositions for implementing policies for increased "eco-efficiency" through the dematerialization of economic activity. This means reducing throughputs of the material and energy "services" of natural capital for a given level of economic goods and services production (see also *Biophysical Constraints to Economic Growth*).

In either approach, the view of technological change potentialities determines the vision of sustainability and how to attain it. Correspondingly, both schools propose that measures of technical change and production levels can be key indicators of success or lack of it in the implementation of environmental and sustainability policies.

2.3. Technological Innovation and Sustainability: An Ambiguous Relationship

In the spirit of these two preceding visions, it can readily be agreed that advances in science are opening up new areas of potential technological innovation with potentially vast consequences if applied to human health, energy supply, food production and environmental engineering. These fields of advancing knowledge bring much new hope for humanity. However, they also bring new risks for society and can lead to new forms of pollution. The new technologies such as genetic engineering that show potential for relieving some environmental constraints, also entail an increase in environmental, health and technological risks (see *Management of Technological Resources for Sustainable Development*). One feature of these (and other) domains of science-based innovation is their involvement - by accident or design - in complex biological and ecosystem processes where quality assurance in terms of outcomes is almost impossible to guarantee .

One lesson that may be drawn from many historical examples (CFCs, the nuclear sector, catalytic converters, etc.) is that the relationship between advances in science and science-based technologies on the one hand, and sustainable development on the other hand, is multifaceted and ambiguous. Just as the recognition of ecological constraints on the scale and form of sustainable economic production and consumption means that "more output" is not the same as "good input," so it has to be noted that more scientific knowledge applied to innovation does not necessarily lead either to better environmental quality or to a more sustainable economic process.

Moreover, when one technology is abandoned for a new one (for example, nuclear energy in Germany or the exploitation of coal mines in the past in France), its environmental impacts are not immediately solved. For example, in France, because of the flooding of the old mines, there is currently an incidence of water and soil pollution. In Germany, several future generations will have to live with the potential risks of nuclear waste. With the life cycle of technological innovations becoming shorter and shorter, a new vigilance challenge arises *vis à vis* the obsolete or abandoned technologies. The necessity of maintaining a technical knowledge of obsolete technologies will become more and more relevant in the future as part of the effort to avoid negative environmental impacts.

The promotion of science and innovation for sustainable development requires procedures for evaluating the contributions of science and technology against criteria for environmental quality, particularly from the point of view of intergenerational equity. This is not offered by either of the two conventional economic perspectives on sustainability explained in the previous section.

The reason for this common blindness towards the ambiguous character of technological innovation in the environment can be seen in the similarity of the conception of economic production and technological change in the two approaches of "weak" and "strong" sustainability. Indeed, the question of production is reduced, at the aggregate level, to a problem of growth (or non-growth) and technological change is correspondingly reduced to one single dimension, a simple rate, where the maximum is presumed to be exogenously determined.

This one-dimensional conception means that neither party is really able to incorporate the multidimensional nature of technological change, which, in qualitatively different ways, bears on (*inter alia*) prospects for economic production, natural resource availability, waste production, mitigation of the adverse environmental impacts of pollution, species viability, ecosystem conservation, and biosphere life-support functions. Moreover, even if the rate of technical change is considered, in some sense as an economic variable, little insight is given into the institutional, political or other determinants of the actual changes that might take place. Furthermore, abstract parametric formulations fail to help in the understanding of the roles of stakeholders (firms, citizens, governments, etc.) in the dynamics of technological change.

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