

Keynote Speech

Science and Technology for Sustainable Development

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I - Part I will address the notion of "sustainability". The concept of sustainability needs to be examined in the context of economic growth. This presentation will focus on that context, with primary attention on the economic situation confronting the advanced, industrialized countries. In the most general sense this refers to the OECD member countries, but although the most specific attention will be devoted to Japan and the US).

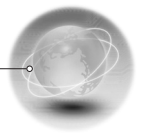
The central concern is, "sustainability" with respect to what? One working definition of the term is that the next generation should not be handicapped, in its pursuit of economic growth, by the availability of a smaller stock of natural resources than that of the previous generation. The presumption is that a smaller stock of natural resources will translate into a lower level of per capita income than that of the previous generation. In recent years, two additional concerns have become more prominent: (1) maintaining the integrity of the natural environment, and (2) the unique circumstances attached to energy supplies. Our primary focus will be on the availability of natural resources.

II - Historical materials on how successful industrial economies have managed to overcome the emergence of natural resource scarcities can provide important insights. It would, of course, be naïve to suggest that our strategies for the 21st century can be based upon a simplistic, mechanical copying of what has been successful in the past. However, analyzing some historical experiences can provide valuable insights into approaches that have proven to be successful, as well as the reasons for that success.

[Historical data]

III - Most of the discussion of sustainability has focused upon supply side considerations, i.e., the adequacy of natural resources to sustain economic growth at some given rate. This approach neglects the changes on the demand side as per capita income has grown. In fact, economies that have experienced significant industrial development, and growing levels of affluence, have experienced very sizeable changes in the structure of the economy in order to accommodate the changes in the patterns of household consumption. These changes have brought with them drastic reductions in the need for natural resource inputs.

[Data], Engel's Law, etc.



IV - Furthermore, the growing sophistication of new technologies has provided a wide range of products that require far smaller amounts of natural resources in their production. At the same time, other new technologies have had the effect of expanding the resource base in a wide variety of ways. Perhaps even more important, if one takes an aggregate perspective, manufactured goods have come to constitute a much smaller share of the output of industrial economies, as well as a drastic increase in the demand for services that, for the most part, are much less resource-intensive.

V - If I were to be asked what was the most important organizational innovation of the 20th century, I would reply that it was the institutionalization of research. This is, by itself, a very large subject; it will include a discussion of the Japanese innovation system, as seen in the larger context of the other OECD countries. An important feature of the Japanese research system is that it has been experiencing considerable alterations over the past fifteen years or so.

The notion of sustainability relies very heavily upon an economy's scientific and technological sophistication which, in turn, is dependent upon its R&D capabilities. I would like also to emphasize a closely related point: economic success depends upon the capacity to shift human resources from one direction to another. In a competitive world economy, the ability to shift research capabilities to more productive uses, whenever possible, will be a critical determinant of success.

The reasoning is straightforward: The notion of sustainability relies very heavily upon an economy's technological sophistication which, in turn, is dependent upon the economy's R&D capabilities. I would like also to emphasize a closely related point: economic success relies very heavily upon the capacity to shift human resources from one application to another, however painful it turns out to be. In a competitive world economy, success depends upon the ability to shift research capabilities to more promising uses, whenever possible.