

SMALL HIGH-TECHNOLOGY BUSINESS FOR SUSTAINABLE DEVELOPMENT

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Summary

This article shows that sustainable development is impossible without science, and that small-scale hi-tech business, being closely connected with science, is a very important mechanism for sustainable development. It provides the stability of economic and social situation and addresses environmental issues. Small High-Technology Business has an important role in the effective introduction of scientific innovations to industrial production, and then to everyday life. It serves as a testing ground for management and production of new high-technology products. On the other hand small hi-tech business influences progress in scientific research, enabling many scientific innovations to come to market, and stimulates new research. Currently in Russia, small hi-tech business helps to orient the psychology of researchers towards market economics. However, a mechanism, even an important one, is only a tool, which can be used to bring benefit or harm. To use mathematical terminology, small-scale hi-tech business is an essential but insufficient condition for sustainable development, which will also require additional factors steering business in the right direction. Some of these factors are connected with environmental and social problems. If small-scale hi-tech business is an actor mainly in the technical sphere (see Figure 1), the fact of its intersection with social and environmental interests should influence business planning. The correlation and relationship of mutuality between business, society and environment can be understood through analogy with a waterway: the water flow is business, directed between the shores of environmental and social factors. Business for the purpose of maximum material gain is not limited to relying on feedback: it can operate effectively only by means of moral and ethical factors. Moreover, the attitude of the world community and each member must change from aiming for possession of the maximum to aiming for use of a sufficiency: this is extremely important. In this transformation, an important role must be played by science, culture, art, and religion.

1. Introduction

In recent decades the world civilization has discovered the futility of basing its development of humanity on the maximization of profit and on consumerism—the concepts at the heart of modern-day market economics. Although these concepts led to the creation of the industrial society, and made it possible for a number of states to attain considerable material prosperity, this prosperity did not solve social, ethnic and national conflicts throughout the world community and in individual countries. The significance of this problem is confirmed by computer calculations of development models for the international community ordered by the Club of Rome, as discussed by D. Meadows and his team in 1972.

The need to search for another way has now become apparent. Thus the paradigm of sustainable development was accepted at the Rio '92 UN Conference as a rational development path for mankind as a whole, as well as for individual states. Implementation of the paradigm depends heavily upon the use of specific mechanisms, one of which is the Small Hi-Tech Business. The issue of the importance of Small Hi-Tech Business in sustainable development is a new one, and so it is worth trying to understand its nature. One could say that the experience of Small Hi-Tech Business in Russia is insignificant since it is at an early stage of development. However, Russia has certain particular features in this matter: Small Hi-Tech Business there is developing during a period of transition from socialist to free-market capitalism, and Russia

possesses great scientific and industrial potential, as well as highly qualified engineers and scientists. According to Russian specialists, namely V. Koptuyug and his team (1997), there are a number of reasons why Russia is prepared to move towards sustainable development. Among these are:

- Territorial potential
- Nature potential
- Histories and relations of the nations inhabiting its territory

From this it follows that the experience of Russia, as of any state, is valuable to humankind, for, as D. Meadows and his colleagues (1992) confirm, variety is the reason and consequence of stability in nature and therefore the same must be the case for human society.

1.1. Definition of Sustainable Development

In discussing sustainable development, we shall follow the definition given by the World Commission on Environment and Development (1987): The term “sustainable development” implies a model of development which provides all the essentials of life for the present generation without depriving future generations of such a possibility. This is a general definition and does not specify any mechanisms or specific actions that enable implementation of the paradigm. Human psychology requires a clear and detailed starting picture, and so the Rio '92 Declaration on the Environment and Development provides twenty-seven principles constituting sustainable development. The paradigm is based on a human-center approach, with human interests at its heart in both the present and the future. The next principles are connected with establishment of fair demographic and social relations, both inside countries and between them, and establishment of a fair and rational relationship with the environment and natural resources.

One important principle is that of preventative actions. This means removing the sources of negative factors rather than their consequences. As D. Meadows and his group (1992) state, mental and ethical principals are also of importance. They transform the philosophies of both the international community and the individual from an attitude of consumerism to one of sufficiency. The latter can be achieved through culture, science, morals, and religion. A separate group consists of principles concerned with the development of perfect technologies and production techniques, and with rational use of the environment.

It is evident that sustainable development requires actions, technologies and methods that satisfy the conditions of sustainability and management. They must have negative feedback loop; be maximally efficient, rational, flexible; and must be aimed at fulfilling the cardinal principles of sustainable development, i.e. they must provide for social and national equality in conservation and improvement of natural resources and the environment. The conditions also include organizational structures participating in implementing sustainable development as it is imperative that they satisfy as far as possible the principles described and do not conflict with them. They must also be organized and self-organizing.

1.2. The Role of Science in Sustainable Development

Most of the principles in the Rio '92 Declaration cannot be implemented without participation of science. Moreover, as W. Ruckelshaus (1989) states, only science, with its foresight, can become the foundation of sustainable development and ensure the management of the process. Indeed, full comprehension of the real conditions of the environment requires not only scientific understanding of global and specific natural processes and anthropogenic impact, but also requires constant scientific monitoring of the process. Only science can find solutions for rational use of resources. The main solutions, according to G. Hinteregger (1993) are:

- Introduction of new resources-economy products and processes
- Creation of low-waste and waste-free technologies
- Conservation and increase of renewable natural resources

The role of science is also important in implementing the principle of preventative action. It allows for early recording of negative processes and prediction of solutions. An example of such use of science is the computer modeling of the development of humanity carried out by D. Meadows and his team since the seventies.

Science is also important for social principles: without study and scientific understanding of the experience of humanity and of particular states, our society will continue making the same mistakes. A correct scientific analysis of the demographic processes and problems is essential, as the population in terms of both numbers and composition is the main restricting factor in the system with limited resources which is our Earth. It is difficult to disagree with J. Mykletun (1993), who believes that the influence of science on the moral and ethical factors which form the relationships of man with society and with environment is less apparent, but no less important to society.

1.3. Outline of the Relationship between Science and Sustainable Development

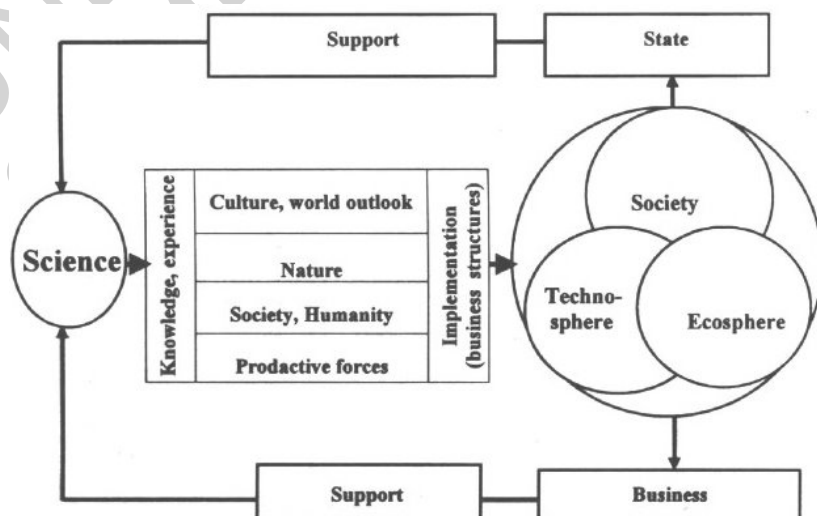


Figure 1. Relationship between science and sustainable development of society

The outline of the relationship between science and sustainable development of society can be seen in Figure 1. In accordance with V. Koptug and his team (1997), we shall present the community as the noosphere, which is a crossroads between three spheres, namely society, the techno sphere and the ecosphere.

The varied knowledge and experiences used by the community and obtained from scientific research and analysis can be divided into four groups:

- Knowledge, which makes up culture, world outlook, and ethics
- Knowledge of the surrounding world
- Knowledge of society and humanity
- Knowledge needed for the development of productive forces

Enterprise structures are one of the most important factors in technological development of the society. These enterprises transform knowledge into products and technologies.

The development of a science-community system is possible only through feedback loop, from which science receives its much-needed moral, financial and other support. There are several existing forms of feedback loop, but the main one, and in a system of central planning the only form, is through the state.

The state controls relations between the groups, supports science in material terms and creates a good reputation for science. In this case science works in the interests of the entire state. Among other feedback loop types is business, possible in market-economy countries. Although personal or group interests are central to such feedback, in the end result scientific achievements become the property of the society either directly or indirectly.

If state support allows development of all directions of scientific activity, including fundamental directions, business support on the other hand is usually targeted towards applied studies related to the development of producer forces, and so is of a largely material nature. Another difference in the nature of feedback loop is bureaucracy, the sluggishness and lack of focus that characterize state feedback loop, as opposed to the responsiveness and targeted-ness of the business feedback.

The latter generally makes more efficient use of investment. These channels are not alternatives to each other, but complementary, as is necessary for normal development of the science-community system. This can be illustrated through the example of Soviet science, which was supported exclusively by the state and hence was entirely controlled by the state. This led to the illogical, politically motivated “abolition” of entire fields of science, such as cybernetics and genetics.

The business channel with its pragmatic and profit-centered approach might be able to level this distortion. The variety of channels supporting science can only be welcomed, as this is one of the main conditions for successful sustainable development as mentioned in the Introduction. The most natural recipient for business support is high-technology enterprise, one part of which is small business.

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Biographical Sketch

V. M. Bouznik graduated from the Tomsk State University. He has been working at the science organizations of Siberian and Far Eastern Branches of the Russian Academy of Sciences since 1966. The science fields are radio-spectroscopy and chemistry of non-organic materials. He is an academician of the Russian Academy of Sciences, a doctor of chemistry. Hi is interested in high technology products production at the science institutes, and sustainable development problems.