

ENVIRONMENTAL EDUCATION, INNOVATION AND HIGH TECHNOLOGY CLUSTERS

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Abstract: The paper demonstrates that environmental and noospheric education should be regarded as the leading factor, the basis for building of a new life style necessary to ensure sustainable socio-economic development. The attempt is taken to rethink the traditional concept of “technology transfer” based on the creation of “clusters” of firms, research and educational institutions and business.

Introduction

It is now generally accepted that the future prosperity of an area (whether a province, a region, and, gradually enlarging the horizon to the whole world) depends on its ability of innovation. The “knowledge based economy” paradigm has been formulated as an approach to deal with the two large-scale phenomena which have begun to transform the economy and daily life of the world since the 90s of last century: first, the emergence of globalization, with increasing interdependence of the world economies and, secondly, the technological revolution, with the arrival of the Internet and the new information and communication technologies.

During the period of global ecological crisis irreversible changes occur in the biosphere, which limit the possibilities of human life. In this situation environmental and noospheric education should be regarded as the leading factor, the basis for building of a new life style necessary to ensure development of sustainable socio-economic development on the regional, country and international levels.

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It is new ambition for the European Union to develop knowledge-based economy in the field capable of sustainable economic growth with more and better jobs and greater social cohesion. The areas identified as priorities at the European level in this regard are energy, information technology, nanotechnology, space technology and services, and the life sciences.

The ability to support innovation in these and other sectors depends on many factors, summarized in the figure of the “knowledge triangle” [1] of Education, Innovation and Research, which begins with the dissemination of technical and scientific culture (and here one should address the great question on the adequacy of the school systems), and continues with entrepreneurship and with initiatives to support programmes of research and development.

Environmental Education

In Russia, like in many other countries, there are two principle targets which are set on the governmental level. They include the transition of economy to an innovative way through the development of human capital, and the solution of social problems like implementation of social rights and guarantees of citizens.

The movement into this direction requires a new model of environmental education and training, appropriate to modern social and economic requirements. This educational model should include the following:

- provide opportunities for continuous environmental education at the all levels in accordance with the inclinations of the individual and the needs of the society;
- restructure the system of environmental education management on the basis of the joint responsibility of state, municipal education authorities, education institutions for ensuring citizens' rights to get environmental education;
- develop and implement environmental educational projects and programmes in educational institutions;
- accompany environmental education by scientific, methodological methods and appropriate information;
- provide appropriate training and retraining of teaching staff;
- provide information on the state of green environment and measures on its improvement;
- develop of a resource, information, investment, human resource potential of environmental education.

Ecological Movement is expanding educational space, implements the involvement of children and youth in a significant public activity on the unity basis of cognition, communication, and creativity processes aimed at their self-education and self-determination. Participation in environmental events and activities creates a lot of new social relations.

Considering the role of teachers in environmental education and upbringing, it should be noted that this process can be effective only if there are essential competences, which are formed by:

- the system of course preparation;
- organizing and conducting research and experimental work;
- creation and accumulation of information resources on environmental problem;
- sharing teaching experience through fairs, auctions, round tables, scientific and practical conferences.

Innovation and High Technology Clusters

It is now clear that it is necessary to rethink the traditional concept of “technology transfer” as a stream of information flowing from universities and public research institutes to companies, to identify and pursue more effective methods and models of co-operation between different actors, to develop new products, facilities, services and, eventually, succeed in today's competitive markets.

While it is true that it is necessary to support and promote “curiosity-driven research” from which they can (and indeed they did in the past) give rise to “revolutions” in the quality of life, it is also necessary to support the so-called “on-demand research” that improve it continuously. It is consequently necessary to make these mechanisms more efficient: it means that enterprises can no longer think (as often happened in the past, though not always) to draw upon a reservoir of knowledge held by universities and research centres when needed, without worrying about who and how that tank filled. In this just sketched framework, an operational methodology is emerging ever more distinct: working side by side, researchers from companies and universities to better connect the two worlds. A second step will be to stimulate enterprise creation by researchers (promoting spin-offs, start-ups and the like realities) and involving businesses in ambitious research programs, projecting applications in the medium (but also long) term.

This is particularly true for small and medium enterprises (**SMEs**) which constitute the vast majority of the business but that can hardly have the strength to develop their own research alone.

One of the most effective approaches to promote this type of cooperative approach emerging internationally is the creation of “clusters” of firms, research and educational institutions and businesses. The main purposes for promoting cluster creation can be identified in the following:

- to make the public and private, business and university sectors and various research centres not only to communicate with each other but also interact;
- to involve SMEs and foster cooperation between large, small and medium-sized enterprises in innovation projects;
- to improve the competitiveness of the public research system;
- to improve the quality of training and the number of human resources in the scientific and educational sectors;
- to stimulate employment for researchers;
- to rationalise financing for research and innovation.

Basic conditions necessary for the creation of a High Technology Cluster are the presence of local universities or research centres that are able to provide pre-existing knowledge on the specific field of activity of the cluster, an industrial network which is able to receive this knowledge, SMEs as "technology partners", which can become the glue between universities and large enterprises. Anyway, ultimately, the key factor for the success of a vital action of the cluster itself is its ability of becoming the main driving force for development, coordination and sharing of research policies of industrial high-tech enterprise system.

The action guidelines consist of six types of intervention:

- 1) the initiation and management of the district
- 2) implementation of its infrastructure
- 3) identification of lines of industrial research to pursue
- 4) the provision of related training
- 5) principles of technology transfer and competitive development,
- 6) internationalization programmes.

Conclusions

The development of a continuous ecological education system, the structural elements of which are ecological world-view, the complex of scientific knowledge and relevant skills, a clear legal and moral position is focused on achieving a high level of environmental culture, ecological consciousness and global noospheric thinking of the younger generation.

Another initiative has been recently promoted: the European Institute of Innovation and Technology (European Institute of Innovation and Technology – **EIT**) [2], founded in 2008 with headquarters in Budapest focused its activities during the past year specifically on three issues of particular relevance:

- climate change mitigation and adaptation;
- sustainable energy;
- future information and communication society.

The mode of action of EIT will be primarily the identification and establishment of the corresponding *Knowledge and Innovation Communities* [3] which should take the concept of “clusters” but leading it to even higher levels of excellence.

With respect of a specific situation (a city, a region, a country) all these can be particularly useful to understand what are the possible guidelines to follow to pursue the competitiveness and development of the area.

The final question that should be then posed is whether, in a territory, all actors (from national and regional government authorities, to the system of enterprises of all sizes, and to the system of universities and research centres and schools, to the financial actors (banks and venture capitalists), business organizations, and – finally – the high technology clusters) share this vision and are ready to face this scenario (and determined to do it) or, at least, if they establish a roadmap to reach it.

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Экологическое образование, инновация и кластеры высоких технологий

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Ключевые слова и фразы: кластеры; модель экологического образования; ноосферный подход; передача технологий; социально-экономическое развитие.

Аннотация: Показано, что экологическое и ноосферное образование должны расцениваться в качестве ведущих факторов, как основы построения нового стиля жизни, необходимого для устойчивого социально-экономического развития. Сделана попытка по-новому взглянуть на традиционную концепцию «передачи технологий», основанную на создании кластеров фирм, научных и исследовательских учреждений и бизнеса.

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