

Approach to launch a modern infrastructure in the field of biotech industry in Plovdiv region

Krasimir Davchev, Alexander Davchev

University of Agribusiness and Rural Development - Bulgaria

Abstract

The paper deals with an implementation of a project to launch a cluster in biotech industries for conducting a joint scientific, technological, investment and market policy and training of staff within the municipalities of Plovdiv region.

Key words: *infrastructure, biotech industry, cluster.*

Bulgaria has old traditions in the field of biotechnology, but the current stage of development of this sector of economy is not smooth. Of priority for the Bulgarian economy in 1989, it is completely ignored after 1990 that led to a drastic decline and painful recovery after 1997.

Bulgaria has the experience, equipment (though not quite modern), technology and manpower to such branches of biotechnology as: fermentation biotechnology and pharmaceuticals (antibiotics and other products of fermentation technology), enzyme technology, inorganic biotechnology, genetic engineering (plant and microbial). Among them, the most developed are the antibiotics industry and mineral biotechnology and the most promising genetic engineering.

Bulgaria has a training system in the field of biotechnology in three university degrees (bachelor, master and doctorate), as well as two colleges preparing biotechnology specialists. There are many research institutes and university departments currently working on many projects related to biotechnology. Although biotechnology in Bulgaria has a great potential as a whole it is not developed enough due to acute shortage of funds, the slow privatization and volatile economy.

In recent years the economic conditions in Bulgaria are gradually improving, which is favorable for the development of Bulgarian biotechnology. Some of the oldest

biotech companies are restarting operations through borrowing money, while others have been privatized and reorganized into new companies. R & D in universities and research institutes is re-activated on received foreign grants and international research programs. The education system was reorganized in conformation with western standards and restored education in biotechnology at several universities, although in different forms. It can be concluded that the Bulgarian biotechnology is now in a stage of slow recovery. This process continues most successful in the field of fermentation biotechnology related to the production of antibiotics and other pharmaceutical products, which is one of the first privatized industries in the country. Other areas of biotechnology are still lagging behind due to lack of funds supporting their development.

During the period 1984 - 1990 r. Plovdiv and the region was a center for the development and implementation of industrial biotechnology. The accumulated over the years experience and created staff warranted the possibility of revival of this high-tech sub sector of the economy of the region. In a deficiency of finance in the individual companies such revival may be accomplished by applying a cluster form to the organization of the process.

Essentially cluster is a group of companies, which are usually geographically close to each other and have some experience in cooperation. The cluster is one of the tools of competitiveness. Yet it is not the only approach to building competitiveness. Various measures aimed at firms in terms of innovation, design, quality, product development and marketing are equally important. What one can achieve using cluster form, however, is a joint step towards entrepreneurship and incentive for development of assets, technology, infrastructure and joint investments, things that could not be achieved by a single company. These advantages enable cluster form to initiate the creation of the organization and implementation of a project to launch a cluster in biotechnology and related industries through vertical integration: science-production, product diversification and horizontally by building a structure for conducting joint scientific, technological, investment and marketing policies and training of personnel in the municipalities in the region of Plovdiv.

The establishment of such a regional integrated technology cluster in the region of Plovdiv is an expression of a systematic approach to organization, management and operation of a complex system through combining the interests of the territory, science, production and training of personnel in a market environment. In practice

this means regional integration of companies, universities, research institutes and municipalities for the implementation of certain key technology areas on a regional basis. Linking systematic approach to regional technology integration provides significant advantages:

- Enabling a higher degree of motivation of the participants in the region, driven by the goals and objectives for optimization of the economy on a biotech base with multi-effects on the horizontal and vertical business;
- Promoting a high degree of technological specialization and the formation of conditions for large-scale development in concurrence key biotech areas;
- Technological revolutionizing of already existing production facilities using new methods, processes, technological systems and the production of special products related to their application;
- Optimizing the structure of capital investments: mainly targeted investments to create small high-tech enterprises with high added value for production of not only end used products but also for the production of new methods, processes and technology systems and their application;
- Linking tasks of universities and research institutes with the purpose of further development of technological fields and the formation of new approaches for interaction between universities, institutes and companies;
- Formation of a new target staff training and integration of the universities with industry and the municipalities.

The project suggests several important requirements regarding the coordinating role of the individual policies within the cluster:

1. Conducting a joint scientific policy in the field of agriculture and related biotech industries through:

- Applying modern agro-processing technologies and cultivation of the land to reduce production costs;
- Using new hybrids (applying technologies for tissue and cell culture and other biotechnology methods) capable of withstanding extreme weather conditions to increase yields and reduce losses;
- Development of schemes for multiple application of end used in various industrial fields.
- Development and implementation of waste technologies (making use of residual plant matter);

- Development of technologies for the production of organic products for the needs of the population and livestock (diversified approach).

2. Implementation of a unified technology policy through the creation and development of the following sample technologies for which there is historical backgrounds and experience

2.1. Recombinant DNA and cell engineering technologies

Proposed is the development of the following basic technologies:

- Recombinant DNA technology;
- Cell engineering technologies;
- Technology for virus free seedlings.

The development of these technologies can be multiplied in applying the following systems:

Recombinant DNA technology:

1. Technology for constructing strain producers of organic products.
2. Diagnostic kits for determination of viral diseases in plants.

Cell engineering technologies:

1. Create a starting material for the selection of new varieties.
2. Preparation of secondary metabolites by culturing plant tissues and cells.

Technology for virus free seedlings:

1. Technology process system for the preparation of kits for the diagnosis of viral diseases in plants.
2. Advanced technology for rooting of oil yielding rose.

2.2. Fermentation technologies

Proposed is the development of the following basic technologies

1 Production of organic products:

- For livestock breeding;
- For plant growing;
- Supplements for the food industry.

2 Production of organically enriched foods such as:

- Production and application of microbial starter cultures;
- Production of extruded foods;
- Manufacture of food products with controlled composition based on complex processing of fruits and vegetables.

2.3. Technologies for recovery of waste organic resources:

Proposed is the development of the following basic technologies:

1. Processing of cellulose-containing wastes from agriculture and wood industry (organic fuel).
2. Biogas production from livestock waste.
3. Processing of waste from the food industry.
4. Processing of waste from the dairy industry.
5. Processing of waste from the canning industry.
6. Processing of waste in the spirits and wine industry.
7. Processing of waste from the milling industry.

Of course these areas are only possible framework for technology integration, the choice of priorities and laying the beginning of their implementation will depend solely on the interests and financial capacity of the project partners.

3. Conducting joint investment policy aimed at:

- 3.1. Needs assessment and funding priorities
- 3.2. Determination of the most important activities of the cluster (Annual Action Plan)
- 3.3. Investing in R & D and innovation of the cluster.
- 3.4. Investing in technology center and / or park
- 3.5. Cluster support entrepreneurial activity
- 3.6. Launching an information system on available EU funds and coordination of the activities with the municipal and state authorities
- 3.7. Lending projects
- 3.8. Pooling of financial resources of the participants in the cluster.
- 3.9. Creation of a filter for evaluating projects
- 3.10. Forming a group for the development of new and follow-on projects.

4. Implementation of joint market policy and branding of the region, which includes the following activities:

- 4.1. Developing a marketing strategy for the brand
- 4.2. Evaluation of the current position of the cluster and the physical / communication plan
- 4.3. Promotion of regional clusters as trademark
- 4.4. Introduction of strict guidelines for using the regional brand
- 4.5. Formation of export networks

4.6. Targeted search for domestic investment to correspond with the strategy for regional brand

4.7. Establishing a marketing unit, that promotes foreign trade activities as well.

5. Conducting scientific and technical personnel policy through training

Examples of these features:

- Linking the themes of the research plans of universities and institutes in key technological fields;
- Consideration for award of scientific research;
- Analysis of the training needs of businesses within the cluster;
- Forming partnerships between educational institutions and clusters;
- Establishment of centers for qualifications related to the activities in the cluster;
- Training to work in cluster environment;
- Implementation and certification of training;
- Evaluation of training conducted annually or every six months.

6. Organizational and management structure

The institutionalization of the project can be specified after taking into account the interest of the universities, scientific and research institutes researchers, companies and managements of the municipalities Plovdiv, Maritsa and Rodopi, both as a company and as part of public-private partnership. Fundamental in this case is how the business to business relationships are organized and how the public sector aims to support the development of the cluster. The initiative for the formation of the cluster comes in almost equal parts of the business and the state. In most cases, however, the companies are the most important players in the construction and management of the initiative. There must be a shared framework for competitiveness. Interests of the different constituencies of the cluster need to be managed. There will be a need for a small operating budget to be provided to finance the designated office.

Requirements for cluster organization mainly include:

1. Cluster identity and recognition from the state
2. Corporate identification (type of organization).
3. Availability of a strong business leadership.
4. Active recruitment of members.
5. A clear mission, goals and business plan.
6. Motivated staff.

7. An interactive web portal.
8. A plan to raise contributions or plan for the formation of income.
9. Offering of real services.

An important element of the sustainability of the cluster structure is the need of coordination to ensure the constant flow of communication, coordination of activities and the concentration of the interests of the partners. Furthermore, the absence of coordination would cause excessive transaction costs for individual partners. Of great significance is the control of some of the key processes of coordination in the cluster as:

- Exchange of information and communications
- Achieving a balance of interests and the settlement of conflicts
- The establishment of mutual trust among the partners in the cluster
- Preparation of solutions
- Building and strengthening the overall interest.

Characteristics that are of great importance for the start of such an organization should include:

- Strong branch association
- A newly formed group
- 5 to 6 active companies
- A good start for the group, which has built a spirit of cooperation and trust.

Regarding the organization of the cluster network of entities, the balance of interests among the partners must be permanently guaranteed. Culture of trust and understanding is essential for the successful development of a technology cluster network. Moreover, the managers of the cluster must be sufficiently qualified and to work effectively in reducing the cost of the network partners.

References

1. Markova, M.: “Biotechnologies and biotech achievements”, IP Bulgaria, 2007.
2. PHARE Project BG 2003/004 – 937.02.03, “Introduction of the cluster approach and the establishment of the cluster model”, working version, 2006.
3. Porter M.: “Location, Competition and Economic Development: Local Clusters in a Global Economy” – Economic Development Quarterly, Vol. 14 (2000).