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Biotech Estonia 2020

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Purpose

The main aim of the eForesee project "Biotechnology Foresight in Estonia" (2002-2003) was to help develop innovation and industrial policy measures and elements in order to create long-term (10-20 years) possibilities of sustainable growth in biotechnology and related industrial sectors in Estonia. It focused on the development of institutional, economic and legal measures for the creation and sustainability of biotechnology as a new paradigm leading industry; through these measures, the management of various economic, developmental and social 'side- effects' – due to the development of biotechnology within and outside Estonia – were also achieved.

Trying New Tools for Policy Planning

This foresight exercise was launched as part of the EU-funded FP5 project eForesee and constituted a relevant forum for discussing the perspectives of biotechnology development in Estonia. Through this exercise many stakeholders were involved in a discussion, which reached above the daily policy process and politics and helped build a consensus about the options a small country like Estonia has on this field.

The project "Biotechnology Foresight in Estonia" was focused on analysing and forecasting the innovation and industrial policy development in the context of technology advancement in the coming 10-20 years and developing the innovation and industrial policy measures in discussion and cooperation with stakeholders from biotechnology industry, academic and political institutions. The exercise was based on constituting a new set of policy planning tools to be used more broadly by Estonian public, academic and private sector.

The focus of the pilot study was on biotechnology and it set out to identify the resources available for development of this sector in Tartu, in order to develop an action plan, building on the findings of the previous Biotechnology Foresight project for Estonia as a whole.

Economic, Political, & Social Aspects Considered

The project aimed at developing policy instruments to:

- Enable growth **in biotechnology as industrial activity** in Estonia taking into account its particular economic, political, and social situation. In economic and market terms, Estonia represents a small peripheral country. This brings both disadvantages as well as advantages – Estonia can equally loose out or win in the biotechnology revolution. Thus, it is pivotal to develop 'made-to-fit', yet flexible policy instruments, which will enable catching-up, re-orientation and re-allocation of human and market resources. This includes necessary changes in various fields from education to tax policy and financial capital as well as concentrated legislative efforts.
- Avoid possible "lock-in" and "crowding-out" effects inherent to a small economy via enforcing **increasing internationalisation** of academic as well as industrial activities. This means both bringing in researchers and

companies from other countries as well as strengthening Estonian ties to the European Research Area.

The project also aimed at raising awareness about opportunities and threats of biotechnology in related economic sectors – and even remotely related – to biotechnology. This includes touching upon ethical and social issues as well as developing industrial policy measures, both horizontal and activity-specific, in order to prepare the economy and its social base as a whole for the biotechnology revolution. This will also help embedding biotechnology industry into the Estonian economic landscape without large-scale social irruption.

Creating a Learning Environment

For the implementation of the exercise, the creation of an effective learning environment for building the required theoretical and practical framework of different methodologies as well as familiarisation with best practices in other countries was considered as a prerequisite. Through mapping and co-nomination process, a list of 60 names who indicated their direct interest in the activity and their willingness to participate in expert panels and workshops in personal capacity. This meant that it was necessary to choose methods that would be suitable for smaller groups of experts with more active participation in the process.

On March 19th of 2002, the foresight exercise was **kicked-off** in Tartu and was attended by 50 persons representing policy makers, business and academic community. The kick off was initiated with laying down the strategic objectives, specific goals, timetable and methodological basis of the pilot exercise. An overview of other relevant foresight activities in Europe and elsewhere were given and the conclusions of various studies on biotechnology were presented.

The expert panels were asked to prepare a **SWOT analysis** of the sub-sectors of the Estonian biotechnology. Based on the relevant background of registered participants, **five expert panels** had been designated. Three of them were technology panels on biomedical, agricultural and environmental biotechnology respectively and two of them were policy oriented expert panels on economic and social aspects of biotechnology respectively.

The first task of the expert panels was to critically review the results of previous cluster studies on biotechnology and provide a SWOT analysis in the corresponding field. The results of each of the expert panels were later sent to other expert panels as well in order to ensure the coherent approach to the issues raised.

The next milestone had to do with the **scenario-drafting workshop** that was held on the 17th of April in Parnu. The main objective of this workshop was to agree on the main dimensions of the possible scenario development. Based on the results of the previous SWOT analysis meeting, the expert group started identifying both internal and external key drivers, trends and factors of change to have an expected impact on development of biotechnology. The identified factors were then linked in terms of importance and probability. Combining some of those factors with each other was used as a brainstorming session to identify the most relevant dimensions of the scenarios.

Will Biotech Become the Next Techno-Paradigm in Estonia?

It was finally agreed that the most important external dimension is whether the biotechnology will be the next techno-economic paradigm and most important internal dimension will be whether a viable **biotech cluster** will emerge in Estonia or not. Combination of those two dimensions will allow developing up to 4 macro-scenarios on the prospective development of Estonian biotechnology.

Yet, another **expert panel meeting** was held in September in Tartu, to discuss the technology trajectories of identified technological platforms of biotechnology in Estonia. The main objective was to analyse which technologies are still in the initial phase of development, which are rapidly developing and which are already in the phase of decline both at global and Estonian level, so that it would be possible to identify any major discrepancies with local and global development.

Finally, a **foresight conference** was organised in Taagepera on December, where the results of the biotechnology pilot exercise were presented to the relevant stakeholders. This conference was the chance for a final discussion on outcomes, which resulted in the **final report** of the eForesee Estonian pilot exercise. It was also agreed that this report would be used as an input for the preparation of the national strategy on biotechnology for the years to come.

When the foresight exercise was coming to an end in December 2003, Ministry of Economic Affairs and Communication took the initiative to start **preparing a national biotechnology strategy**. The outcomes of the foresight pilots in terms of conclusions and recommendations were integrated into the terms of references for the drawing up of the national biotechnology strategy.

Three Scenarios: Relocation, Human Resources, Internationalisation

Once the first draft scenario was prepared, many workshops were carried out in order to elaborate and further exploit them. A two dimensional matrix was chosen and three scenarios were extracted so as to illustrate the possible future. The first dimension was about whether biotechnology will be the next enabling techno-economic paradigm in the world and the sec-

ond dimension was whether Estonia will succeed in developing a full-fledged biotechnology sector.

Three "possible scenarios" were developed according to the final pilot report:

- It is necessary to establish legislation and policy measures that will promote relocation of the medium-tech industries to the Baltic States.
- It is imperative for the government to facilitate development of strategic long-term technology roadmaps, and to provide support for the development of human resources so as to increase and enhance the levels of competitiveness of specific sectors where Estonia is possessing comparative advantage
- Estonia is unable to compete in development of new platform technologies due to its small size. However, acknowledging the limitations of S&T foresight in a small and technologically backward country, one should focus in attracting investments on the emergence of new disruptive technologies internationally rather than specific domestic specialization.

Sharing the Experience: Biotech in Small Candidate Countries

An **international conference** on the topic of foresight on biotechnology in small candidate countries took place in September 2002. This conference provided valuable insights on general policy formulation as well as inputs to the pilot foresight actions to be implemented under the eForesee project. The specific objectives of this conference were:

- Contribution to the **policy formulation capacity** among policymakers and policy researchers in the Baltic States,
- Contribution to the **awareness raising** on the role of foresight in R&D management among biotechnology researchers and entrepreneurs,
- Development of the knowledge and understanding of policy makers and policy researchers in Estonian and the Baltics on issues related to the **implementation and design of foresight activities,**
- Discussion of all the relevant perspectives and challenges related to the development of biotechnology especially in **small candidate countries,**
- Discussion on how the establishment of the **European Research Area** will help in the formulation and coordination of RTD activities and policies in the biotechnology sector in small candidate countries.

Building Momentum

- The foresight exercise resulted in a clear vision on the determinants of Biotech innovation in 2020 and in detailed analysis of what are the most critical components enabling the vision to become reality.
- Biotechnology foresight contributed to the process of elaborating the **national strategy on biotechnology**, which will lay down the foundation for a national biotechnology programme. This process of strategy building has been integrated in the policy process since the first half of 2004.
- One of the direct results of the foresight activity was the still pending question whether the Estonian state should carry out a **national foresight in order to set its long-term priorities**, particularly having a clear need to increase the coherence and quality of the policy planning process for next implementation periods of the European Structural Funds. The example of the eForesee experiences provides a strong case for undertaking such an exercise on broader scale to generate input for the next National Development Plan.
- The foresight process included all the **major Estonian stakeholders from public, academic and the private sector** in the field of biotechnology. It is to be hoped that the common vision, which emerged from the exercise, will be carried on to various initiatives and programmes those stakeholders are preparing and implementing.
- For the implementation of the exercise, there was a close collaboration with the **Estonian Biotechnology Association**, which includes all the major Biotech companies in Estonia; at the same time, there was also direct involvement of academic institutions, which enabled foresight to become a catalyst for reinforcing or creating new partnerships in light of the discussion on development perspectives of the whole biotechnology sector.
- Foresight was extremely beneficial in terms of exploring the foresight methodology and providing basis for further foresight projects in Estonia. **Tacit knowledge**, which resulted from the process, was spread broadly over the wide range of stakeholders who can turn this into new foresight type of activities.

Recommendations for a Five-Year Period

In order to fully exploit the commercial potential of biotechnology in Estonia a dual approach is recommended aiming at both, to develop biotechnology as an important field in the high-tech sector, namely the biomedical area, and as tool to increase innovativeness of the economically more relevant low-and medium-tech sectors such as food-processing, wood-processing and the chemical industry. The proposed dual stage master plan of Biotechnology Implementation into Economy

allows synergistic effects between the biomedical sector, which is already advanced in scientific and technical terms, and low-and medium-tech industries. This will allow us to miss-out the initial establishing problems in the latter. Additionally, it can be assumed that the two-stage strategy allows partly the external financing of otherwise internal costs.

A set of measures were proposed for a five-year period in order to improve the Estonian situation in three areas:

Knowledge base

- Set up a specific programme for interdisciplinary research in life sciences by the ESF - European Structural Fund,
- Provide specific funds for updating scientific infrastructures,
- Set up a programme for supporting the adoption of biotechnology in agro-food and chemical research units including funds for modernising infrastructures.

Education

- Establish business education centres at universities,
- Set up an education programme providing grants for international scholarships,
- Introduce industrial internships into master programmes,
- Develop and implement a modern curriculum for education technicians,
- In addition, interest of high school students for science and engineering should be improved by e.g. initiating awareness campaigns at schools.

Commercial development

- Establish science parks related to life sciences activities,
- Build up information programmes on marketing and business strategies for biotech SMEs,
- Set up a programme informing traditional industries about biotechnology potentials and providing advice for adoption,
- Set up a procurement initiative for the development of new or improved products based on modern biotechnological methods and tools,
- Initiate a round table for established financing institutions in order to increase awareness for high technology financing.

Upgrading Existing Industries, Investing in Niche Markets

The conclusions of the biotechnology pilot were mainly related to the timing and the development of the necessary public policy tools for the integration of biotechnology within the next 10-15 years.

In order to properly meet this challenge, instead of focusing on the advancement of commercial science and initiation of spin-off activities, greater public policy focus should be put in **upgrading existing industries**.

Estonia's current low national investment into high-tech industries should be exploited as a strategic advantage. As Estonia has no long-term high-tech industrial investments to defend, this gives the country freedom to be opportunistic by trying to **enter various new niche markets**. To exploit these possibilities, Estonia should proactively seek for ways to enter disruptive technology based on new markets via **targeting inward FDI** (Foreign Direct Investment) from non-traditional to Estonia investor countries in Western Europe, USA, East Asia and China.

To enable this strategy and to ensure also sustainability of Estonia's socio-economic development in medium-term, already now primary education and research policy focus should be put to **increasing human capital** provision in biotechnologies.

In terms of competence building, it is recommended to undertake mainstream activities of the European RTD programmes, especially those of the **Nordic countries** that have close trade and investment linkages with Estonia. In parallel to the participation in European Research Area, also active participation in the **USA and East Asian RTD programmes** should be favoured by funding Estonian successful participation in competitive projects from the National RTD funds.

Along with the above mentioned FDI strategy and subsidising choices of large companies, foresight processes and constant market research activities need to be embedded into the STI governance system as well.

Sources and References

- http://www.eforesee.info/estonia
- Final Report on Estonian Pilot No. 2 - The Biotechnology Pilot