The Economic Benefits of the Estonian Genome Project: Myth or Reality?

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Focus
• Problem 1: Does the Estonian Genome Project (EGP) give hope for economic development (according to innovation theory)?
• Problem 2: What are the benefits for the nation in the Estonian Genome Project?
• Innovation
  – Concept of innovation
  – Concept of National Innovation Systems
  – Innovation and economic development
  – Technological paradigms
• The case of the Estonian Genome Project (EGP)
  – EGP and innovation
  – System of contracts
  – Beneficiaries
  – National Innovation System
• Conclusion

Innovation
• Innovation is an economic term
• Innovation is the transformation of an idea into a new or improved product introduced on the market, into a new or improved operational process used in industry and commerce, or into a new approach to a social service (OECD, Franscati Manual)
• Typical misleading terms used as synonyms to innovation are:
  – R&D
  – Invention
  – New
• Potential innovators operate in the National Innovation System (NIS). NIS is a set of institutions whose interactions determine the innovative performance of national firms (Nelson).

Innovation and economic development
The essential character in the innovation process is the ENTREPRENEUR.
Entrepreneurs generate new products, new methods of production and transport, new markets, and new systems of industrial organization in order to gain short term monopoly.

Productivity growth (the rate of growth in output per unit of input)
Economic development (growth in GDP)

Five technological revolutions in last 200 years
Kondratiev – economic waves; Schumpeter - successive industrial revolutions; Nelson – change of technological regimes; Perez – technological paradigms

207? Biotechnology, nanotechnology, bio-electronics (???)
1971 Information technology, knowledge and global telecommunications
1910 Mass production, automobile, air travel ja petrochemicals
1875 Steel, electricity and transcontinental communications
1830 Railways, coal and steam engine
1771 Industrial Revolution

The succesion of Paradigms in the 20th Century
(Carlota Perez)
How does the theory apply to the Estonian Genome Project (EGP)?

- **EGP and innovation**
- **Finance scheme**
  - Investments and Returns (according to contract system)
  - Beneficiaries
  - Comparative aspect
- **National Innovation System**

EGP and Innovation

- **Research and Development**
- **Estonian Genome Project**

  - Considering the wave theory the timing is excellent
  - There is hope for short time monopoly (?)
  - US markets show positive trends in the sector
    - Employment from 75,000 to 181,000 (1985 – 2002)
    - Capital raised from $30 M to $1,425 M USD (1995 – 2002)
    - Revenue from $8 M to $266 M USD (1995 – 2002)
    - New drugs and medicines approved from 2 to 35 (1982 – 2002)

Comparision of deals: Iceland (deCODE) and Estonia (EGP)

<table>
<thead>
<tr>
<th>ICELAND</th>
<th>ESTONIA</th>
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<tbody>
<tr>
<td>Annual payment 900 000 EUR, indexed</td>
<td>Annual payment 300 000 EUR, indexed</td>
</tr>
<tr>
<td>Annual profit payment 6 % calculated on EBIT, max. 900 000 EUR</td>
<td>Annual profit payment 0.5 % calculated on EBIT, unlimited</td>
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<tr>
<td>No transfer of patent rights as in-kind contribution</td>
<td>All the patents are going to be in equal co-ownership of EGen (EGeen has exclusive commercialisation rights for 25 years) and EGP</td>
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<tr>
<td>No payments on commercialisation of IP rights</td>
<td>3 % of the turnover from transfer of created IP rights</td>
</tr>
<tr>
<td>No shareholding in the company commercialising the data</td>
<td>Guaranteed shareholding in the company commercialising the data; 2.5 % anti-dilution clause</td>
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Beneficiaries

- **Investors (invested 4.25 M USD so far)**
  - Exit Strategies
  - Profit
- **Entrepreneurs/Other companies (in some cases investors)**
  - Providing services to EG
  - Development of new products and services (commercial relations to EG)
- **State and society (invested 130 000 USD & 260 000 USD loan from ESTAG in-kind)**
  - Annuity
  - Patent fees
  - Synergies (generation of new jobs, increase in FDI, improvement of human capital) which are highly dependent on national innovation system

Estonian National Innovation System

- **Indicators**
  - Financing: 0.75% of GDP (1.85% EU); 64% public investments
  - Patenting: 0.1 applications per 10 000 inhabitants (0.3 EU); 1 000 000 applications, only 12 from Estonian residents
  - Human capital: 4.3 R&D related persons per 1000 employees (5.3 EU)
  - Weak relations across disciplines
  - EGP can easily change the picture
  - The project is not the outcome of the state R&D related activities
Conclusion

• Problem 1: Does the Estonian Genome Project (EGP) give hope for economic development (according to innovation theory)?

YES

• Problem 2: What are the benefits for the nation in the Estonian Genome Project?

The returns for the state are higher than its contribution to create/initiate the project. However, in order to maximize the benefits systematic approach towards development of the innovation system is required.