

Insights into Finland: Sustainable Development as Growth Factor

**Nordic Council on Ministers
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Overview of presentation

1. Growth within a small open economy
2. The Finnish biotechnology sector as an example of: small, unprofitable, chaotic?
3. Finnish biotechnology and International trade literature –a quick review
4. The dynamic framework
5. Implication: A Sustainable Development Strategy for Finnish Biotechnology
6. Crossing borders: Top of Europe?



Supranational threats behind the strategy

1. Global population demographics → Europe: retirement system and healthcare costs
2. Extensive use of fossil intermediates → pollution and climate changes
3. Reduction and geographic concentration of stocks of fossil fuels → strain on existing economic and political balance
4. Globalisation entered its third stage → R&D functions relocated to developing countries
5. Technology orientation and digitalisation expand to all areas of human life



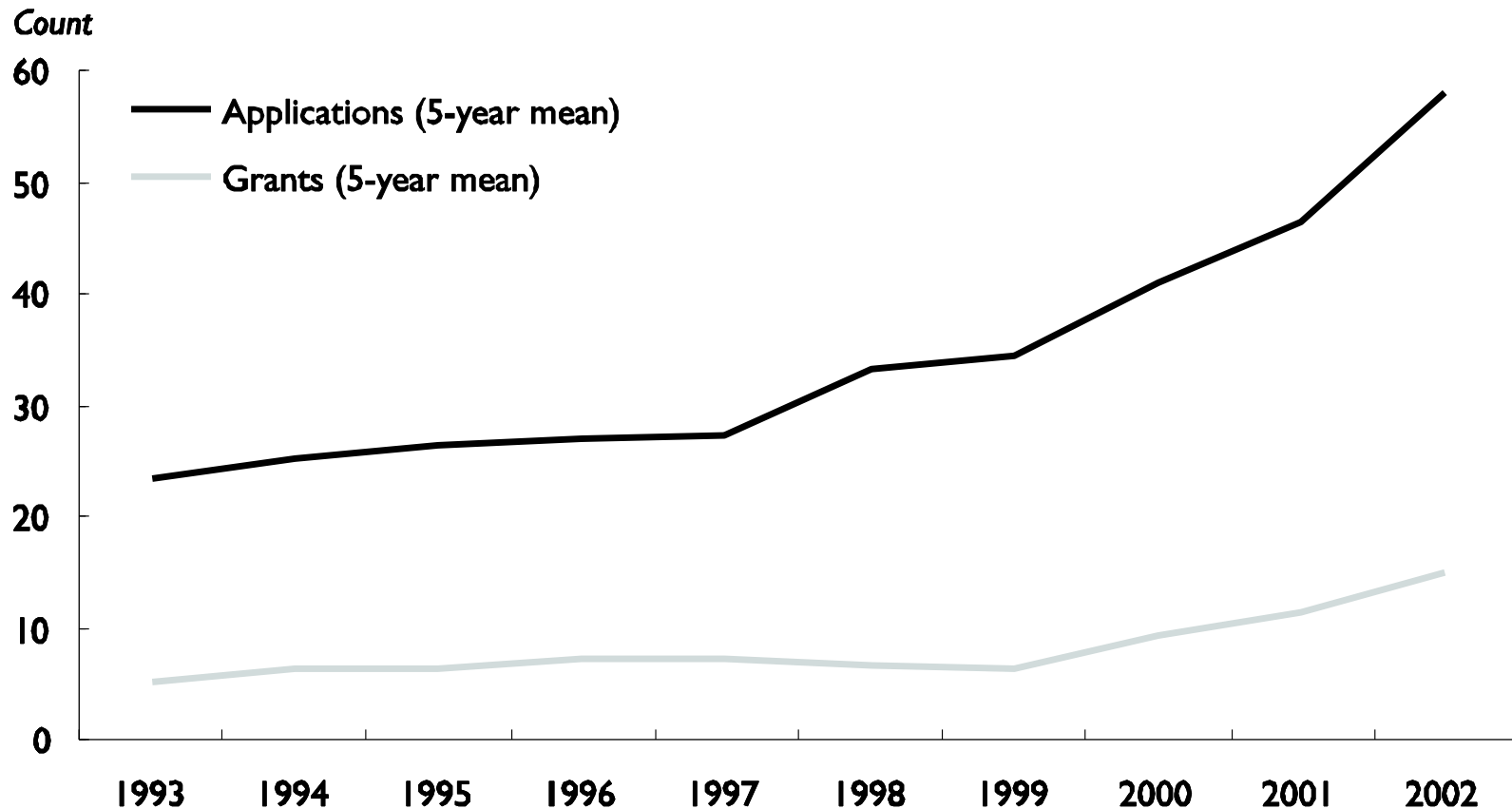
Profitability of the small biotechnology industry in 2003

Million euros

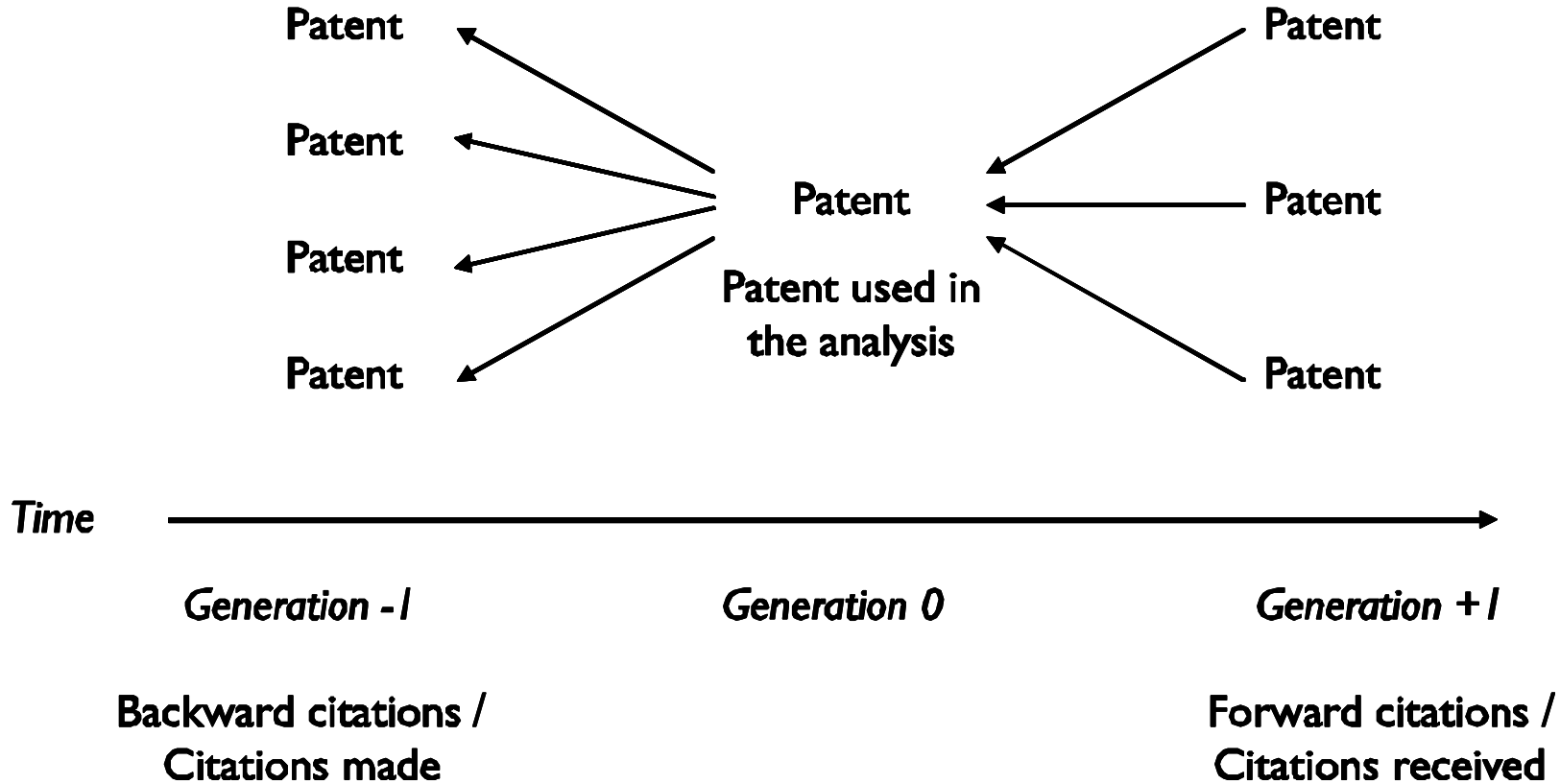
Sales	332
Operating profit	-60
Net profit	-70



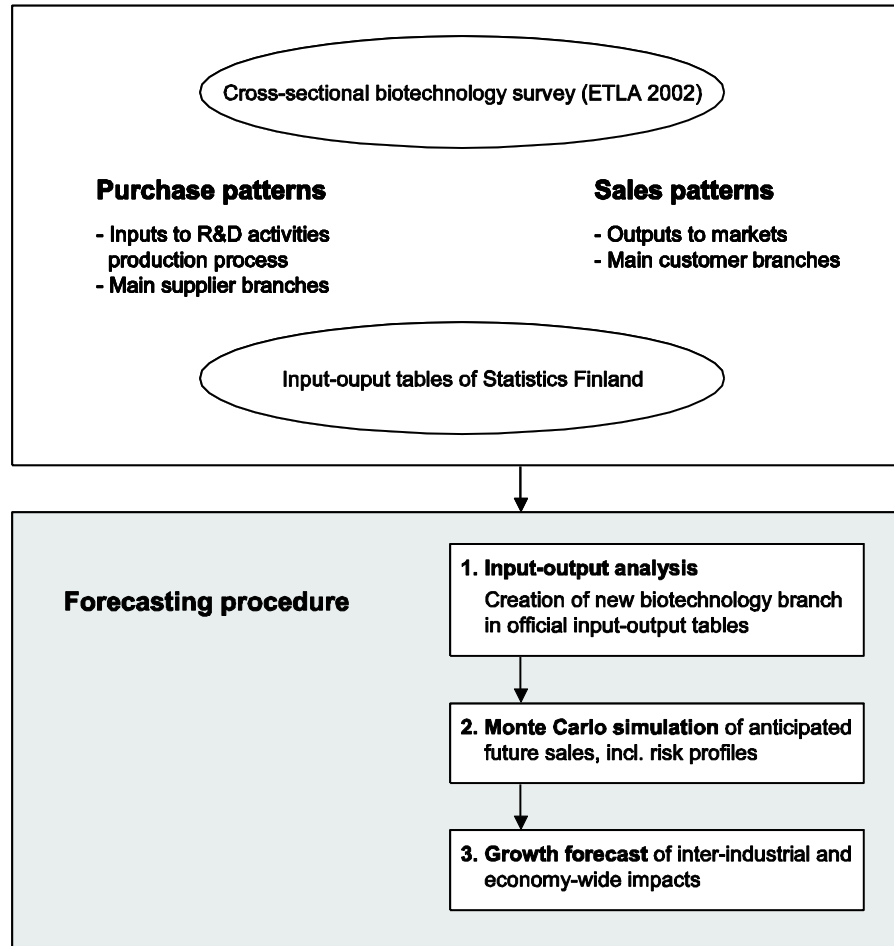
Moving average of granted patents and patent applications in EPO



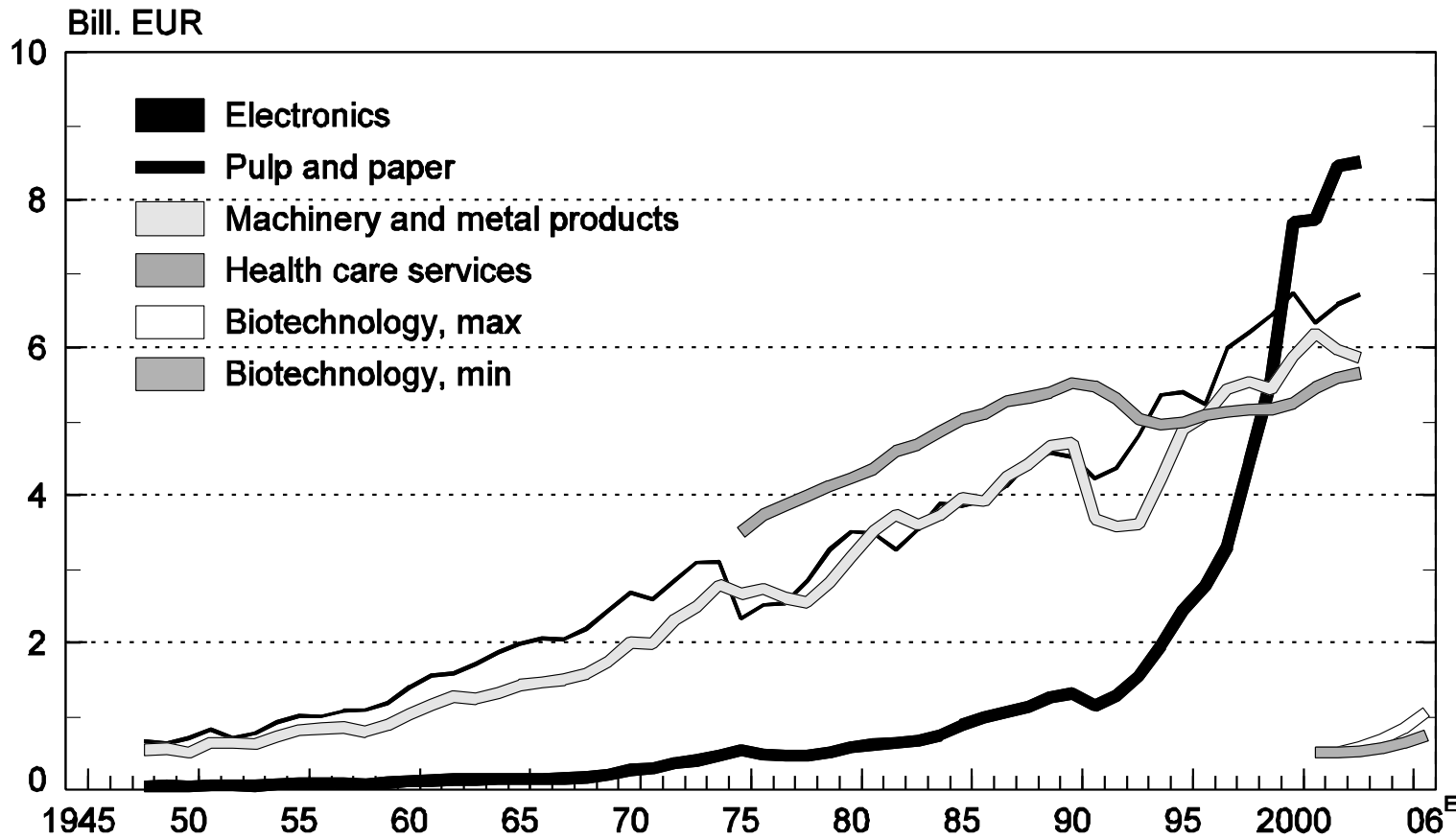
A promise for the future: Patents



Framework of forecast model



Industrial production by sector 1948-2002, in year 2000 prices



Analytical Background of the Strategic Initiatives (International Trade Literature)

1. International Trade and the Comparative Advantage
2. Market Structure and Spatial Agglomeration
(Chamberlin 1933, Dixit & Stiglitz 1977, Krugman & Venables 1995)

Peripheral regions can attract companies as a basis for value-adding activities if there is a critical mass of location-specific but globally scarce resources available in the periphery.



Analytical Background of the Strategic Initiatives (International Trade Literature)

1. International Trade and the Comparative Advantage

(Ricardo 1817, Heckscher and Olin 1919, Samuelson 1986)

There will be economic overall gains within a free trade area if an industry utilizes a resource combination that is domestically comparatively abundant.



Local Collaboration Networks of the Small and Medium-Sized Industry

Specialization index	Drug development	Diagnostics	Biomaterials	Bioinformatics	Enzymes	Food and Feed	Agroforest	Environment	R%D services
Helsinki	3	5	0	2	2	1	2	0	1
Turku	4	4	2	5	0	0	0	4	4
Tampere	0	0	5	0	0	0	0	0	2
Kuopio	4	4	0	0	0	0	0	0	4
Oulu	0	0	2	0	0	0	4	0	5



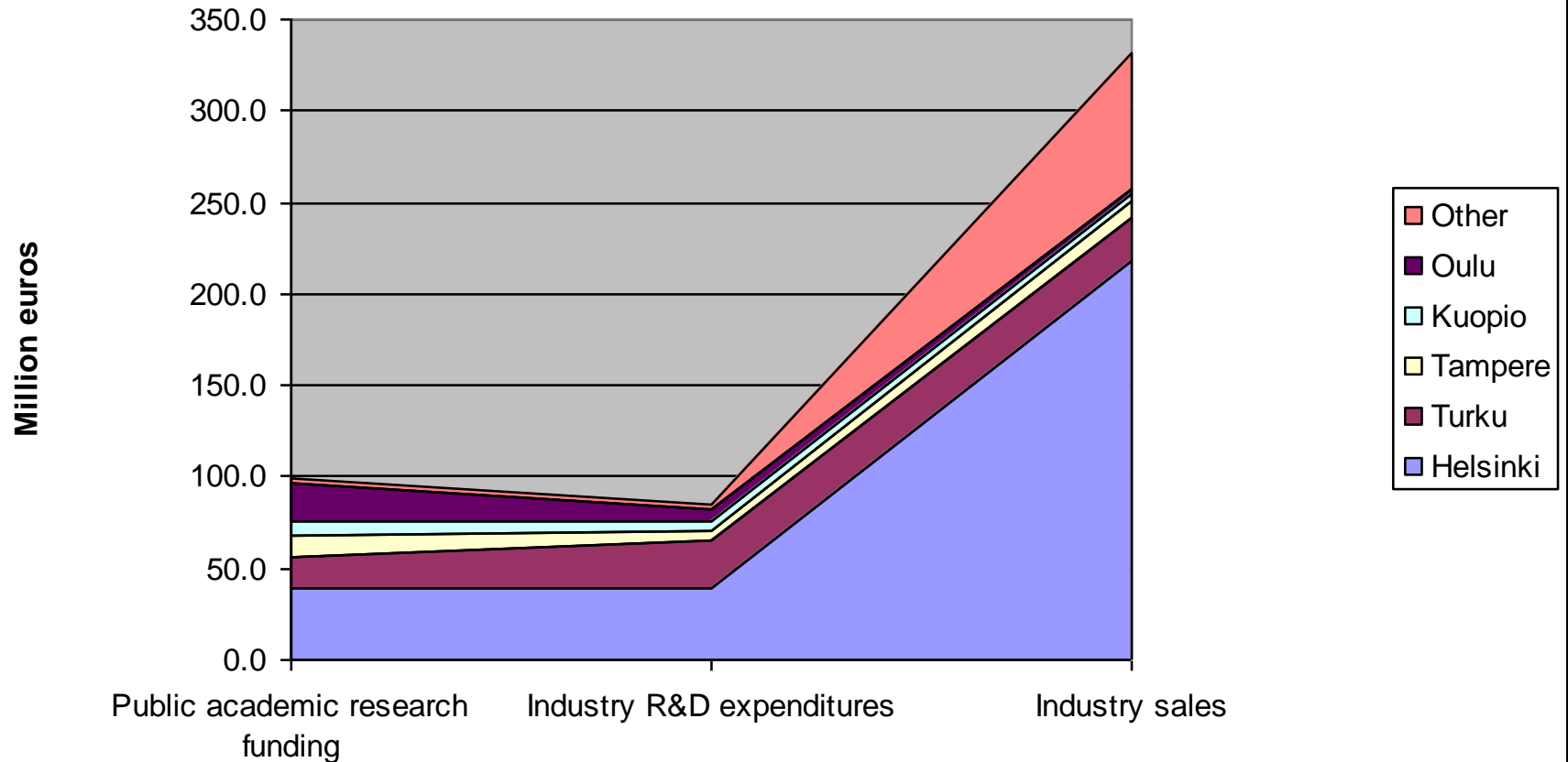
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Public academic funding, industry R&D expenses & industry sales by region



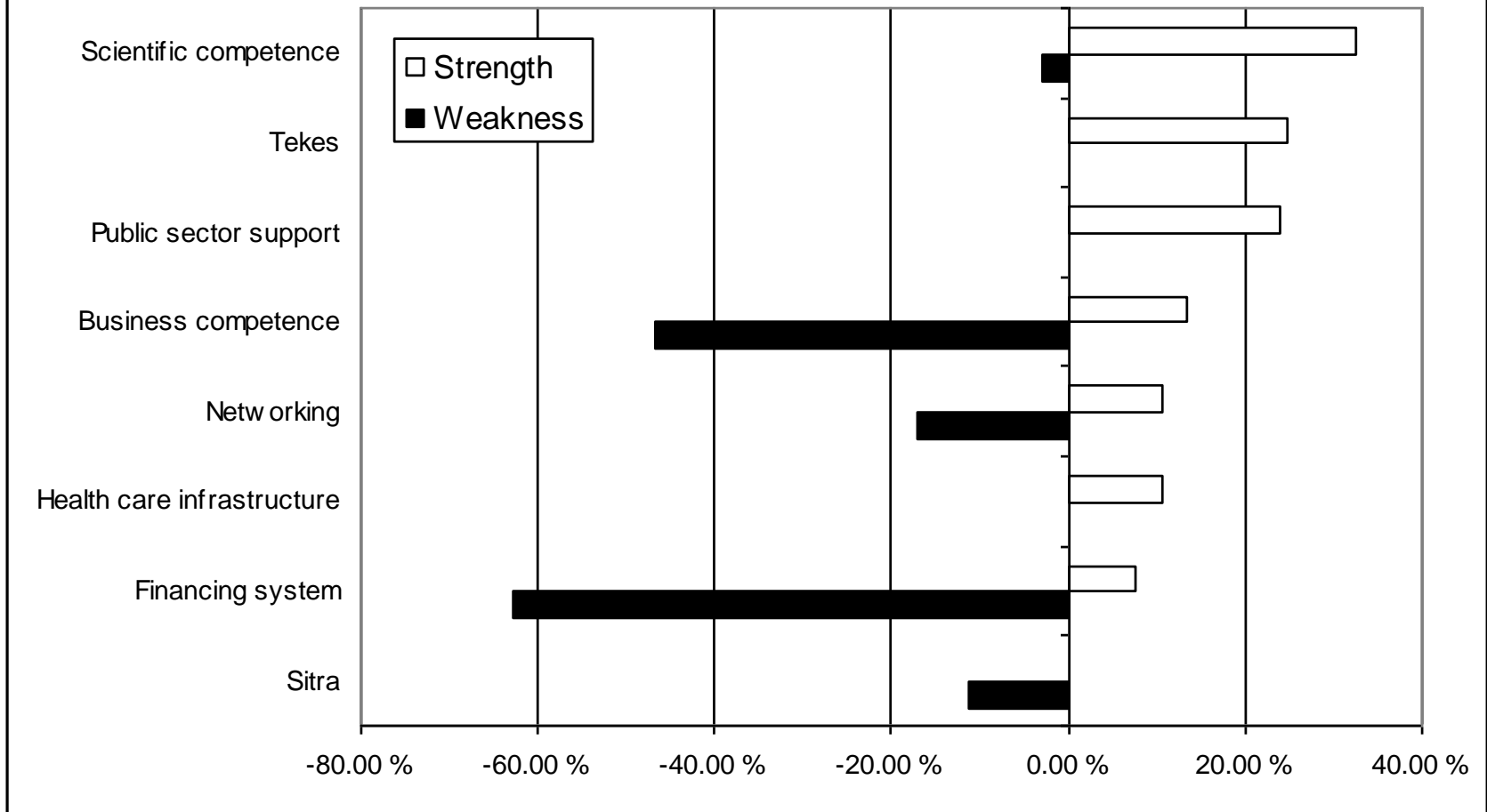
Analytical Background of the Strategic Initiatives (International Trade Literature)

1. International Trade and the Comparative Advantage
2. Market Structure and Spatial Agglomeration
3. Infant Industry Argument
(Hamilton 1791, List 1841)

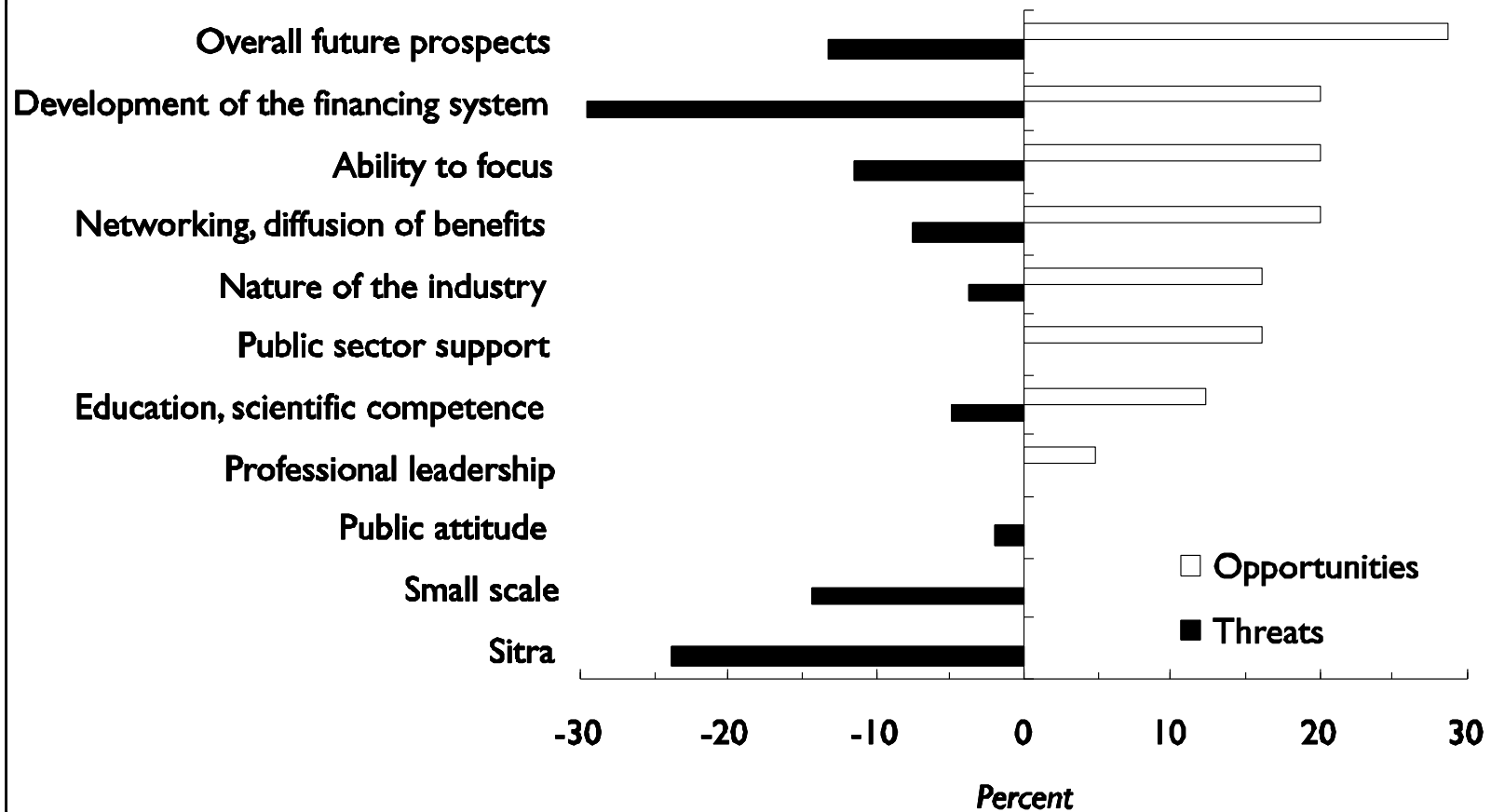
A short-term injection of governmental promotion for the strengthening of some emerging critical resources within an infant industry aims at providing positive externalities and an economic upside in the long term.



Short run strengths and weaknesses



Long run opportunities and threats



Analytical Background of the Strategic Initiatives (International Trade Literature)

1. International Trade and the Comparative Advantage
2. Market Structure and Spatial Agglomeration
3. Infant Industry Argument
4. Cluster Dynamics
(Porter 1990)

The interaction of highly specialised resources, sophisticated domestic customers, internationally competitive supporting industries and hard domestic competition creates an innovative and competitive industrial cluster.



Strategic Implications

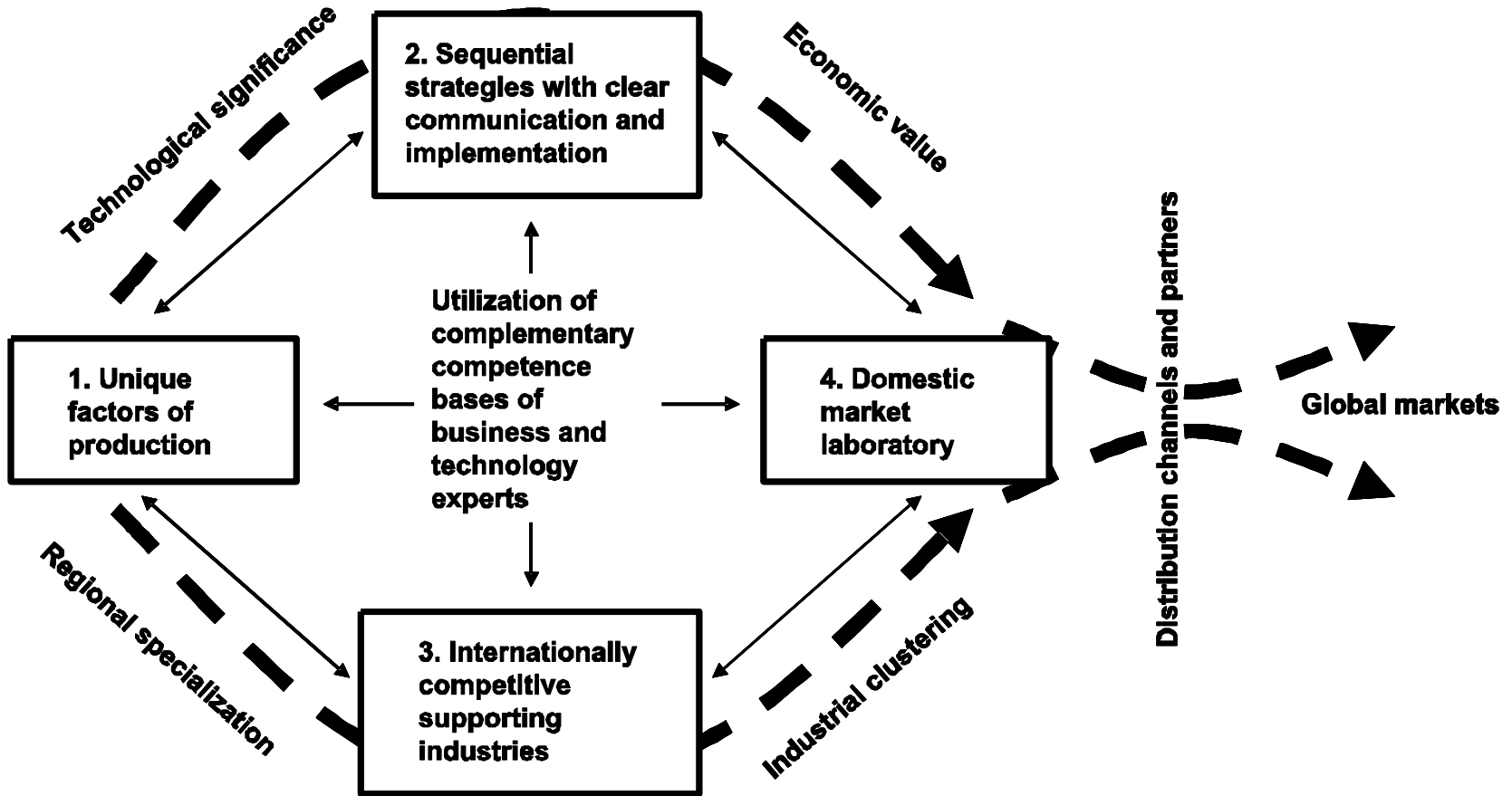
Create a relatively abundant, location-specific and globally scarce interactive combination of

1. Competent factors of production and infrastructure
2. First-class and demanding domestic customers
3. Internationally competitive supporting industries
4. A competitive domestic environment

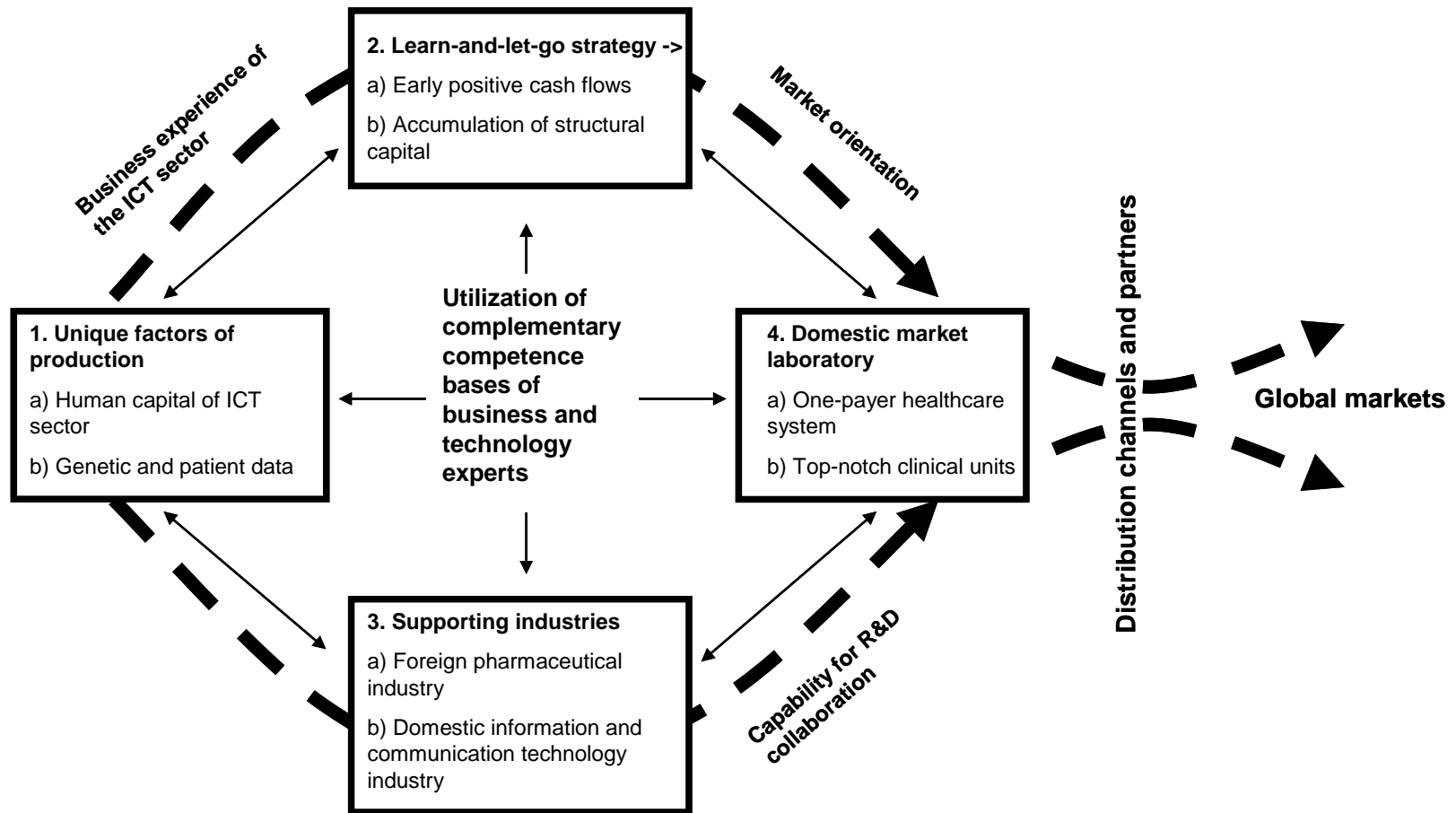
by strengthening temporarily those parts of the infant industrial cluster which are critical for the long-term growth and success.



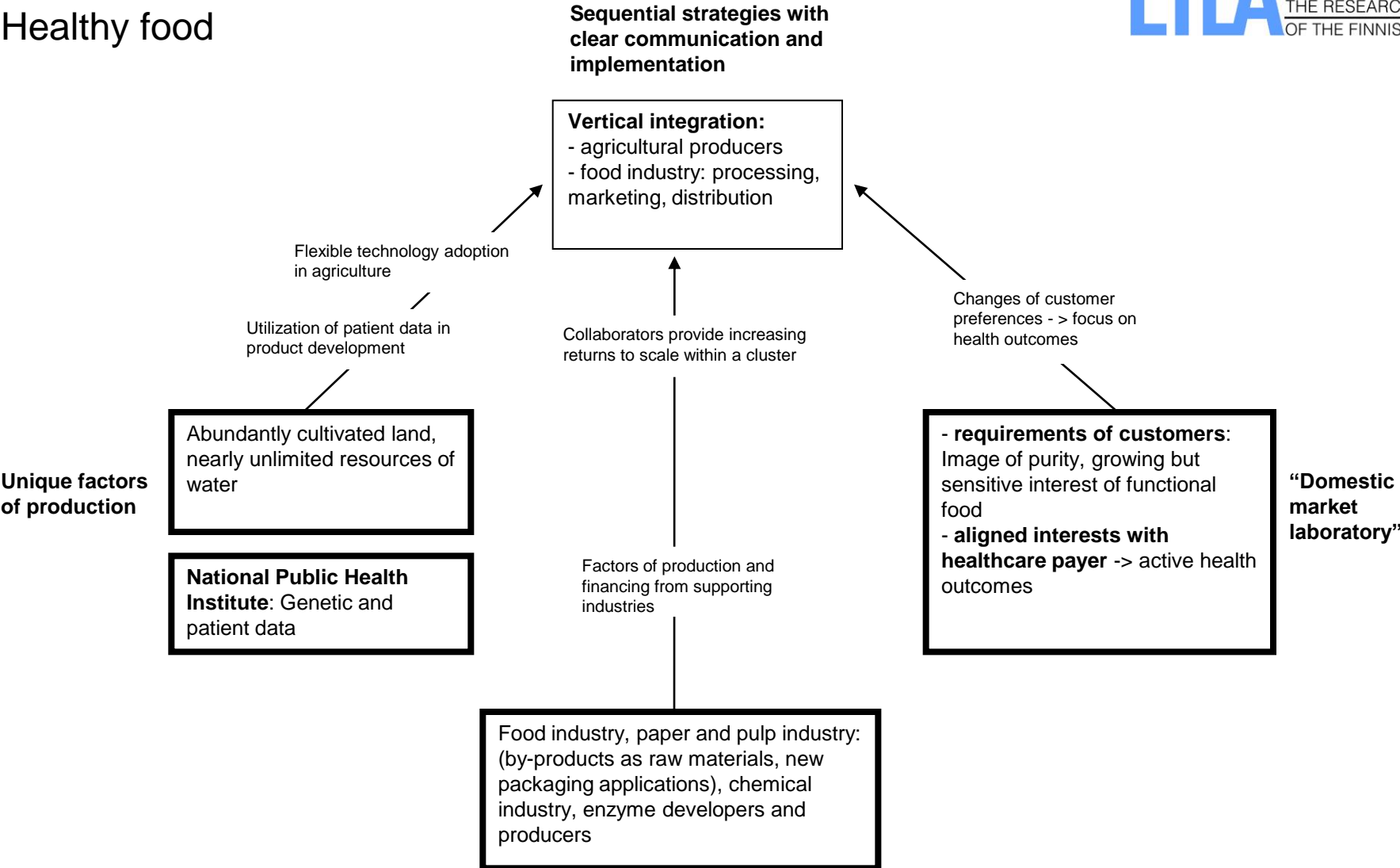
Sustainable Technology Development Platform



The Healthcare Cluster



Innovation cluster for Healthy food



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Innovation cluster for energy applications

Sequential strategies with clear communication and implementation

Vertical integration
 Close integration with
 - agricultural producers and
 - domestic oil industry (in refining, marketing, and distribution)

Unique factors of production
 Abundantly forests and cultivated land, nearly unlimited resources of water

Flexible technology adoption in agriculture

Collaborators provide increasing returns to scale

Technically demanding environment -> push toward innovations

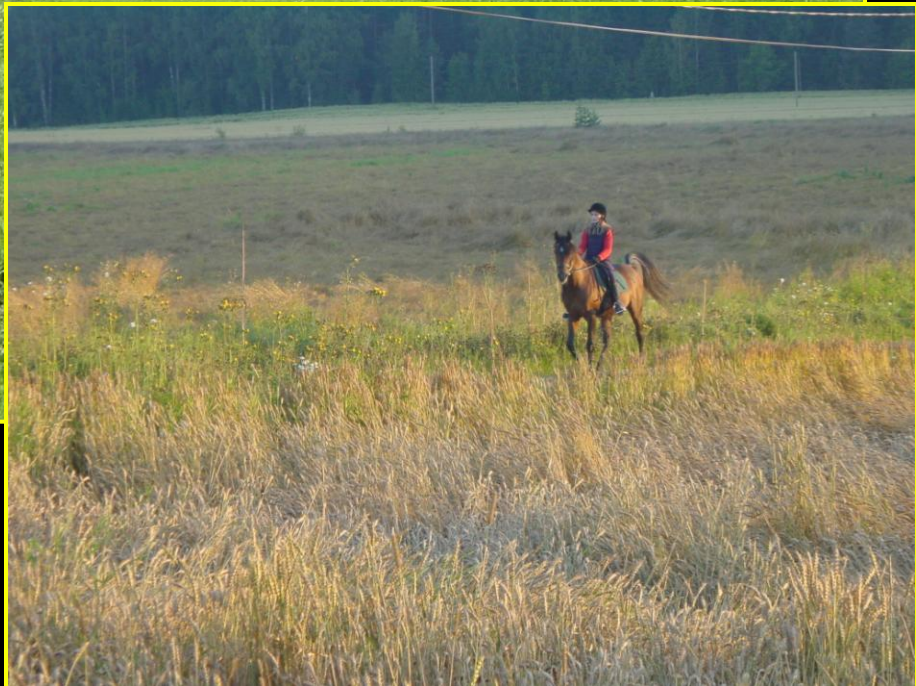
- **International treaties and regulation** → need for less-polluting bio-fuels
 - **Arctic conditions** → technically demanding markets and awared consumers

“Domestic market laboratory”

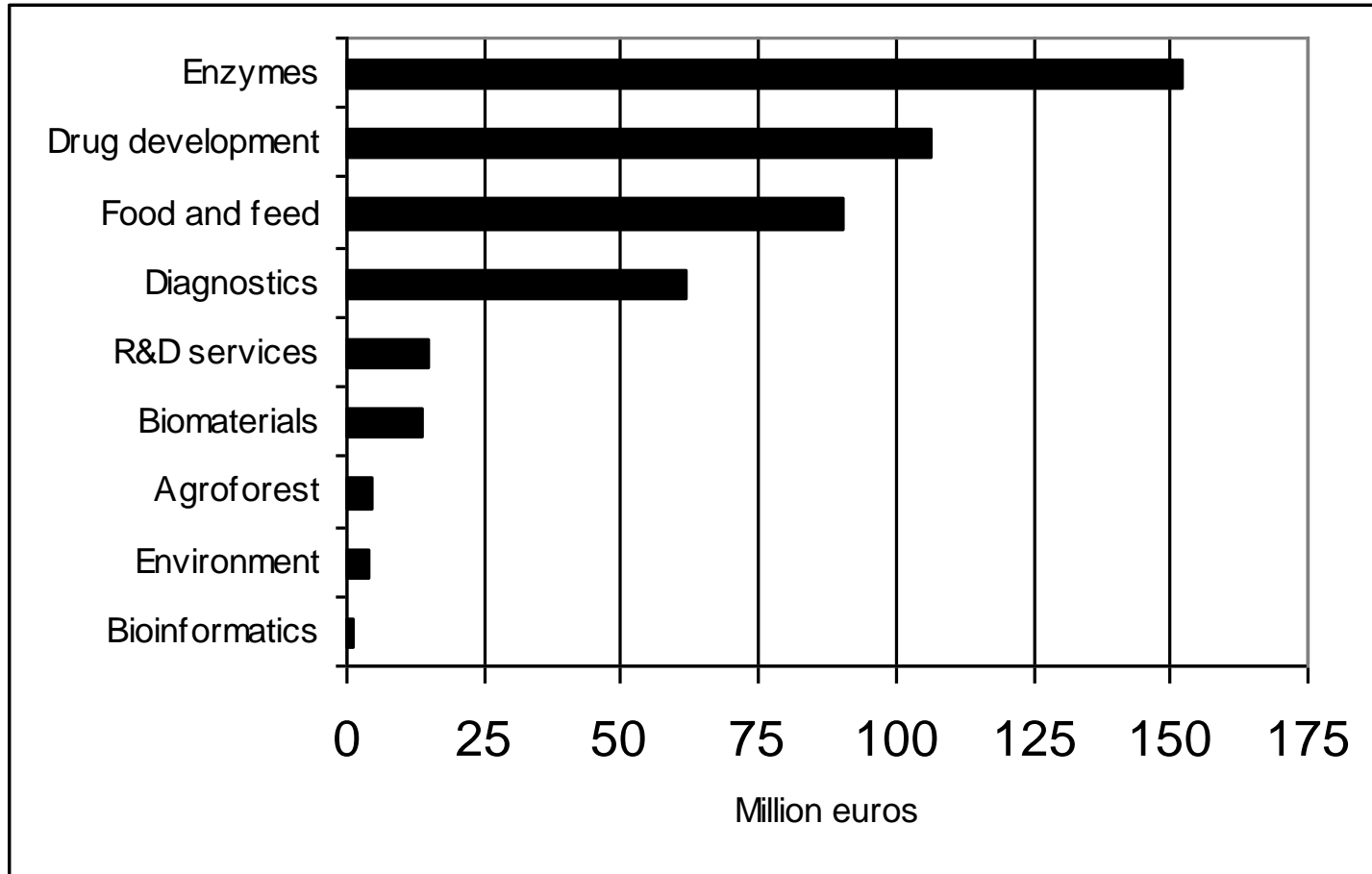
Factors of production and financing from supporting industries

Innovative refinery and energy industry, giant forest industry, related chemical industry

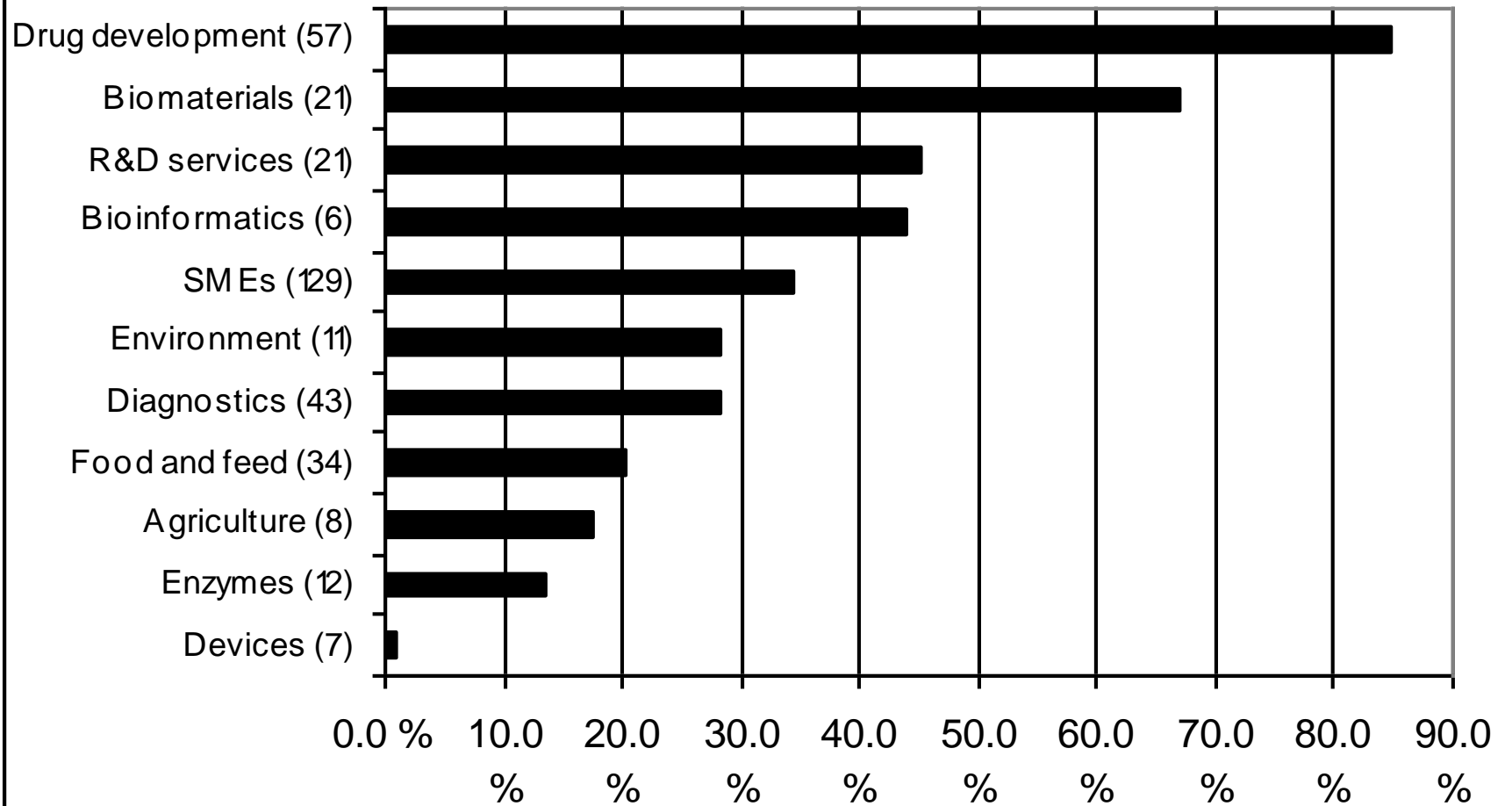
Internationally competitive supporting industries



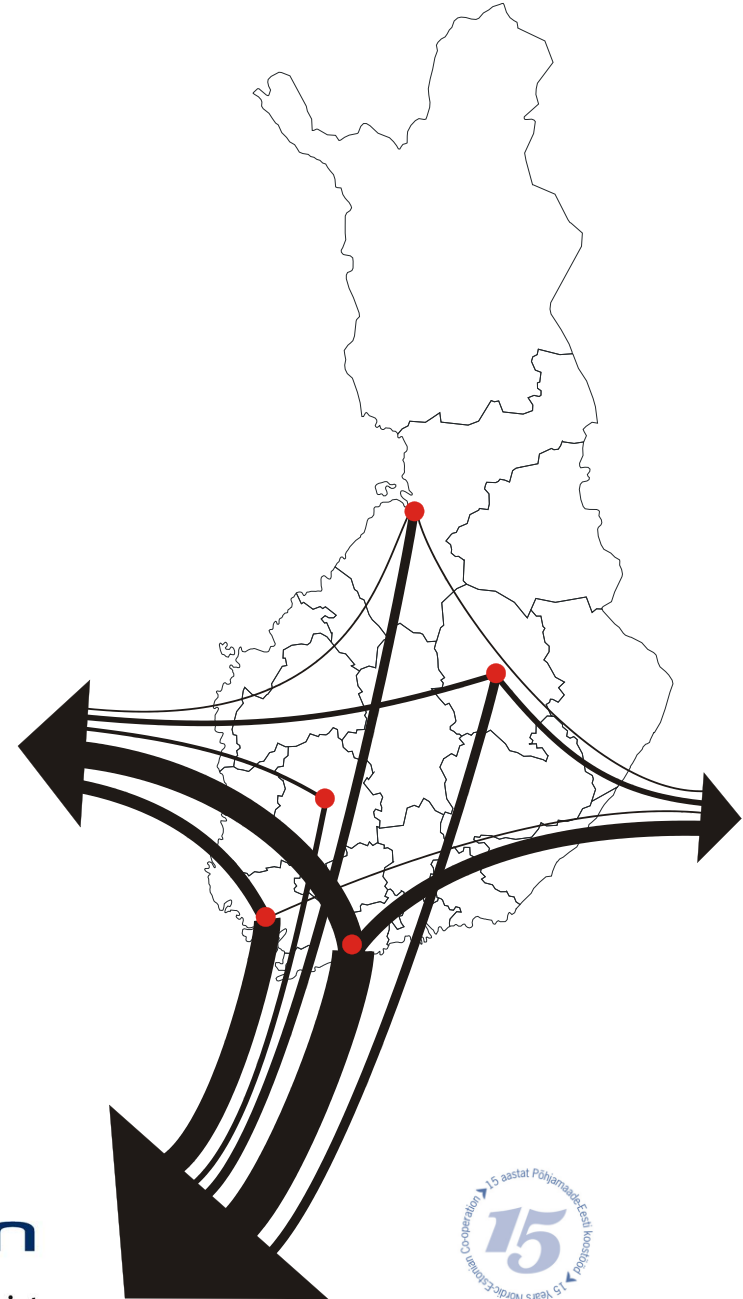
Sales by Application Areas



Anticipated annual growth of sales by product groups (years 2003-2008)



International Collaboration Networks of the Small and Medium-Sized Industry



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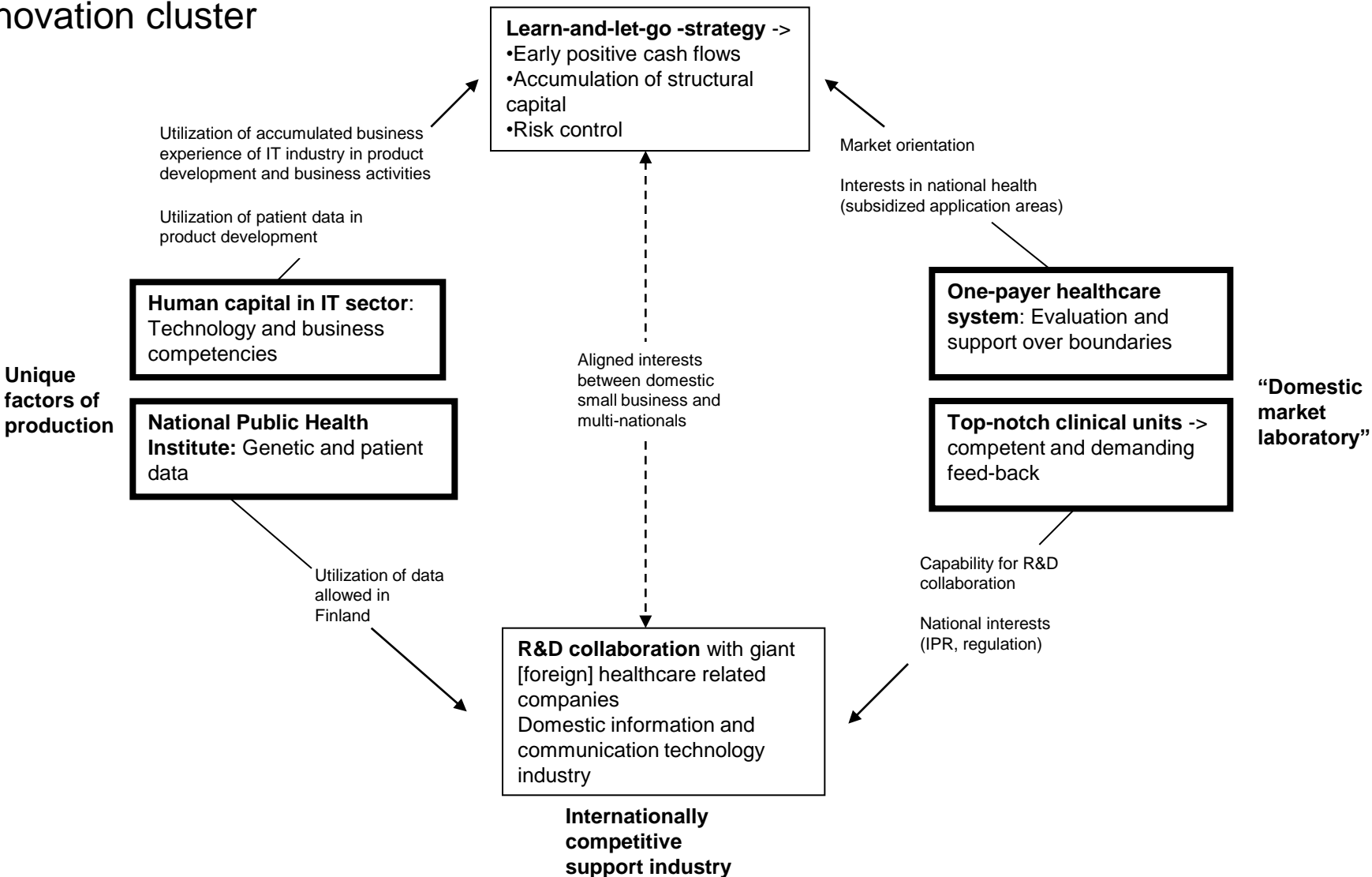
Regional R&D Expenditure and Sales

Vuosi 2003	R&D expenditure of Academia and Research Institutions	R&D Expenditure of SMEs	Sales of SMEs
Helsinki region	39.2 %	45.5 %	65.6 %
Turku region	18.0 %	30.9 %	7.0 %
Tampere region	10.8 %	7.0 %	2.8 %
Kuopio region	7.8 %	5.9 %	1.3 %
Oulu region	21.1 %	8.0 %	0.9 %
Other	3.0 %	2.6 %	22.4 %
Finland (total)	100 % 99 mEur	100 % 85 mEur	100 % 330 mEur



Bioinformatics based Healthcare innovation cluster

Sequential strategies with clear communication and implementation



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Policy Implications for each cluster

1. Promotion of research and business of bio-informatics
 - short run: skilled labor from related industries
 - long run: academic education and research
2. Public sector subsidizing infant industries (public sector as a customer):
 - economic benefits of the R&D project are to be communicated
 - the aims of the R&D project aligned with the strategy and needs of the customer (public sector)

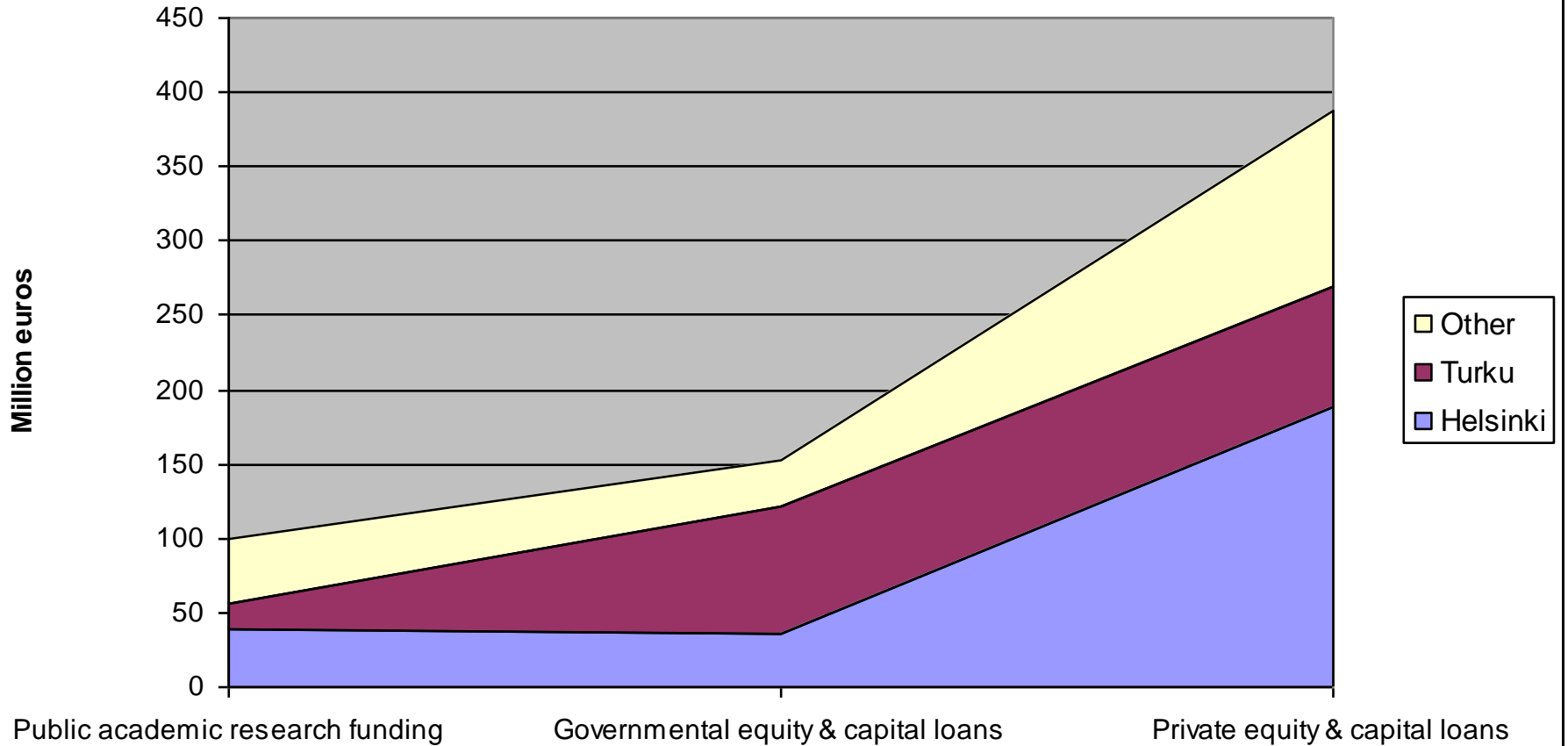


3. Public sector providing corporate financing (public sector as a venture capitalist):
 - the company communicates its strategy clearly and sets milestones
 - if milestones not achieved, R&D project is passed from entrepreneurs to another entity, ownership structure is changed and/or venture capitalist takes over the company

4. Active governance of asymmetric information between investors and entrepreneurs (special problem in biotechnology) →
 - macro level: acting as a part of a cluster of internationally significant companies
 - micro level: there is an entrepreneur in the company, who has invested remarkably in the project



Equity & capital loan funding by region



Specialization Index

Specialization index	Drug development	Diagnostics	Biomaterials	Bioinformatics	Enzymes	Food and feed	Agroforest	Environment	R&D services
Helsinki	3	5	0	2	2	1	2	0	1
Turku	4	4	3	5	0	0	0	4	4
Tampere	0	0	5	0	0	0	0	0	2
Kuopio	4	4	0	0	0	0	0	0	4
Oulu	0	0	2	0	0	0	4	0	5

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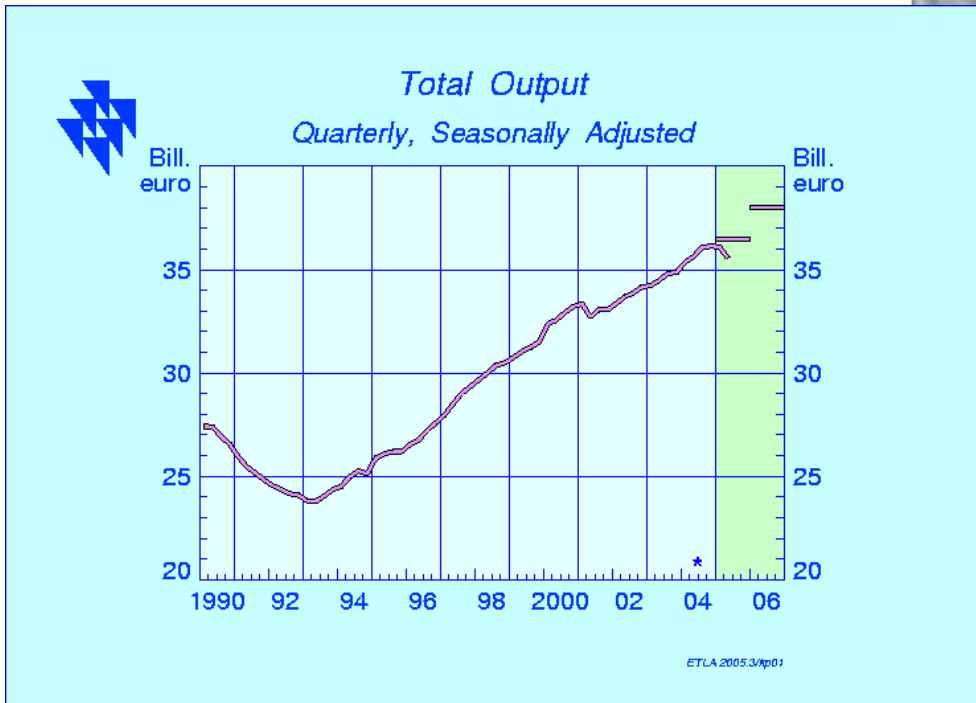
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