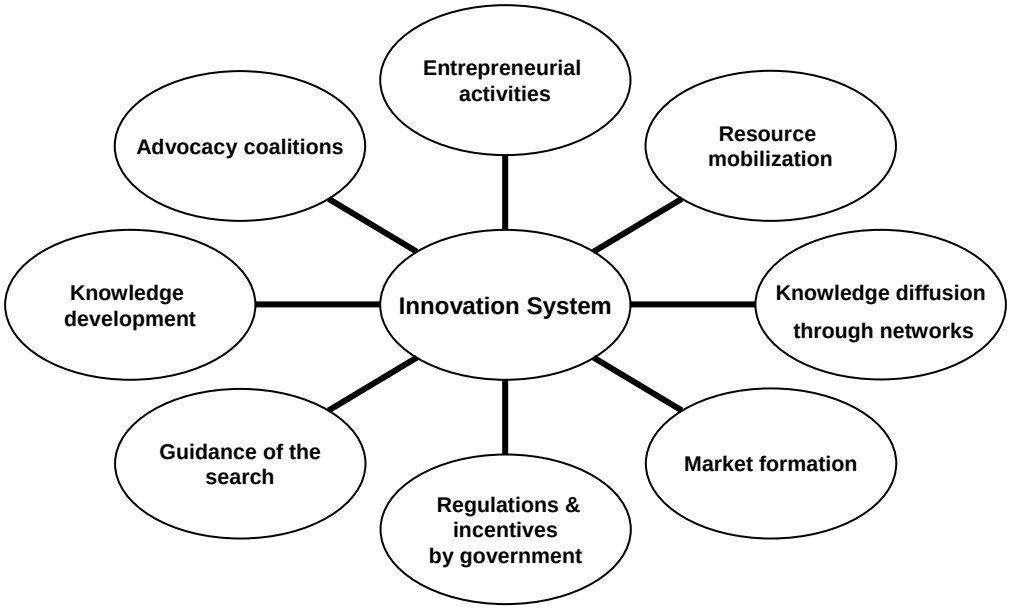
Regions, Strength and Innovation Systems



Shazad Khan / Karel Mulder

January 4, 2010

Regions, Strength and Innovation Systems

Why are economic activities not randomly distributed?

Geography

Resources

History

“Clustering”

- Companies are generally near their suppliers
- Reasons:
  - Informal relations
  - Trust
  - Labor market
  - etc

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Factors for site decisions

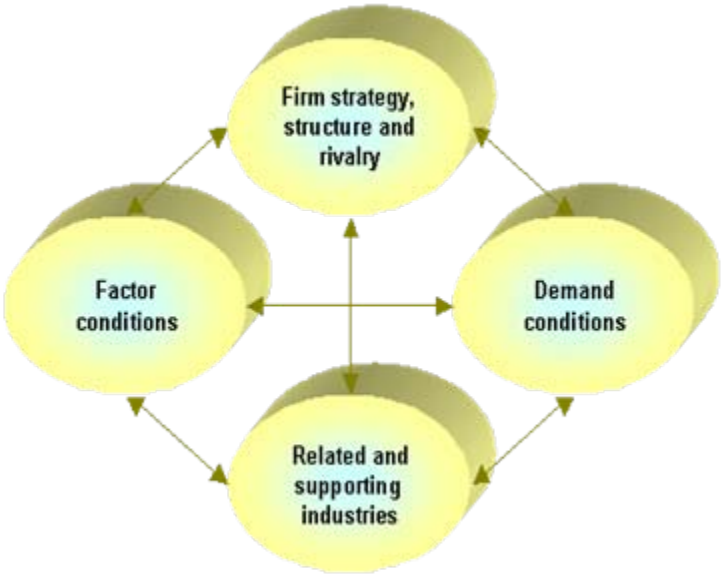
Porter: competitive advantage of nations

Firm Strategy, Structure and Rivalry: competition impels firms to work for innovation

Demand Conditions: The more demanding the customers, the greater the pressure for improvement.

Related Supporting Industries: facilitates the exchange of information and promotes exchange of ideas

Factor Conditions: not just labor and capital costs, but: skilled labor, know how, and infrastructure.



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Technology policy

How to stimulate economic activity with a high income?

- Local Demand conditions
- Supporting industries and innovation system
- Market structure and rivalry

Reinforce strong clusters or support the weak?

The importance of innovation systems for economic success

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What is Innovation?

"Carrying out of new combinations, such as the introduction of a new good, the introduction of a new methods of production, the opening of a new market, the opening of a new source of supply, or the re-organization of any industry."*

The process by which new products or new methods of production are introduced, including all the steps from invention to development to pilot production to marketing to production.

*J. Schumpeter, *The Theory of Economic Development,* 1934

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What is Innovation

The successful exploitation of new ideas. (Department of Trade and Industry, UK)

Technological product and process (TPP) innovations comprise implemented technologically new products and processes and significant technological improvements in products and processes... TPP innovations involve a series of scientific, technological, organizational, financial and commercial activities.

(OECD, 1995)

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The linear vs. interactive model describing innovation journey

Interactive Model

- Innovation is the outcome of an interactive process in which many actors from different levels are involved
- Innovation does not take place from left to the right (Nelson & Winter 1982)
- The starting point does not have to be the academia,
- No specific order of interaction amongst players
- Ideas generated at all stages and processes
- Basic research not the sole initiator

- Source: 2nd WG Meeting on Regional Innovation Systems, Vienna, Yannis Pierrakis, IRE Secretariat

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Innovation System

By definition- a system whose product is innovation or a system with a capability of producing and diffusing innovation

But how to grasp the idea, how to define system's boundaries, constituents, and dynamics

What is important and what is not?

How much control we have in capacity building?

Firms innovate but not in isolation, the firms are embedded in regional, national and international technological systems.

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National Innovation System

...the network of institutions in the private and public sectors whose activities and interactions initiate, modify and diffuse new technologies. (Freeman, 1987)

...the elements and relationships which interact in the production, diffusion and use of new, and economically useful knowledge...and are either located within or rooted inside the borders of a nation state. (Lundvall, 1992)

...a set of institutions whose interaction determines the innovative performance...of national firms. (Nelson, 1993)

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National Innovation System

Initiation Arguments

Economic improvement is largely a result of the application of knowledge in productive activities and the associated adjustments in social institutions

Innovation and technology are also needed to transform countries from reliance on the exploitation of natural resources to technological innovation as the basis for development.

(from Calestous Juma & Lee Yee-Cheong, "***Innovation: applying knowledge in development,"*** UN Millennium Project, Task Force on Science, Technology, and Innovation, 2005)

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National Innovation System

Focus:

Production and diffusion of new and economically useful knowledge i.e. Innovation.

Scope:

Institutions, organizations, firms, R&D institutes, universities and interactive networks within national boundaries.

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The Two Approaches

- The **“narrow” approach** concentrates on those institutions, which deliberately promote the acquisition and dissemination of knowledge and are the main sources of innovation.

- The **“broad” approach** recognizes that these “narrow” institutions are embedded in a much **wider socio-economic system** in which **political and cultural** influences as well as economic policies help to determine the scale, direction and relative **success of all innovative activities**. (pp-194)

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National Innovation System

Key Analytical Points/Arguments

- Knowledge resources and learning processes are fundamentals for innovation process.
- Firm is embedded in a system whose “innovative potential” decides that of the firm.
- Interactive networks are channels and sources of knowledge pile-up and of learning processes within system boundary.
- National technological, social, cultural, political and financial institutions and their interactions, comprise ‘system’, which influence firm’s innovative potential.

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National Innovation System

Key System Constituents

Actors: Knowledge producing bodies…

and Institutions: financial, political, cultural

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Other Innovation System

Regional Innovation System

Sectoral Innovation System

Technological-oriented Innovation System

Trans-national Innovation System

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Regional Innovation System

"The set of economic, political and institutional relationships occurring in a given geographic area which generates a collective learning process leading to the rapid diffusion of knowledge and best practice"

(Nauwelaers and Reid)

Source: Innovation System research network, ISRN, Toronto

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Regional Innovation System

Primary context for ‘firm’ is region

Proximity advantage, Recognition that spatial proximity facilitates the sharing of tacit knowledge and capacity for localized learning;

Cultural advantage, Firms clustered in a region share a common regional culture that facilitates learning;

‘Historical’ advantage, Localized learning is facilitated by a common set of regional institutions

Globalization, pushes to go for regional strengths, regional ‘poles’, i.e., silicon valley, route 128 etc

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Sectoral Innovation System

Deals with specific sector i.e., energy, automobile etc.

"System of firms active in developing and making a **sector's products** and in generating and **utilizing a sector's technologies**..."

Breschi and Malerba (1997)

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Innovation system oriented towards specific technology

"a network or networks of agents interacting in a **specific technology area** under a particular **institutional infrastructure to generate, diffuse, and utilize technology**."

Carlsson and Stanckiewicz (1997)

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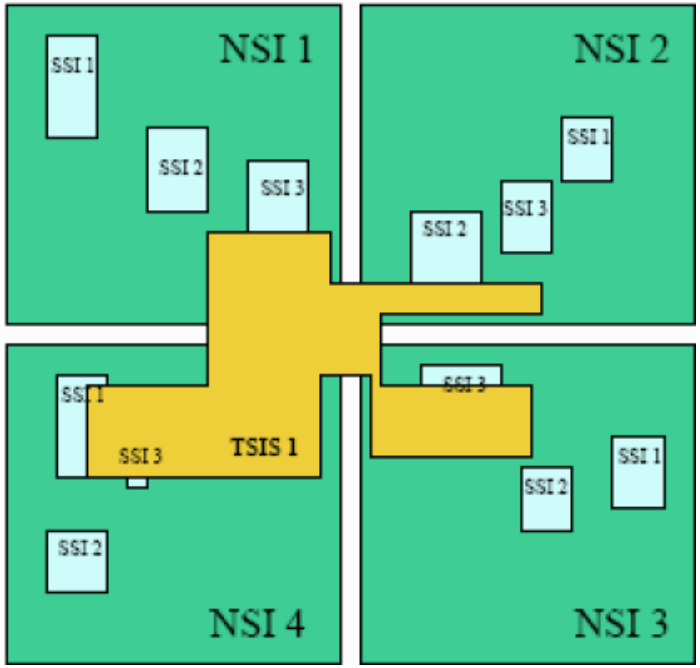
Sub-systems are embedded in national settings

- These sub-systems are embedded in national settings



Source: Functions of Innovation system: A new approach for analyzing socio-technical transformation, M.P. Hekkert, R. Suurs. , *technology forecasting and Social change.*

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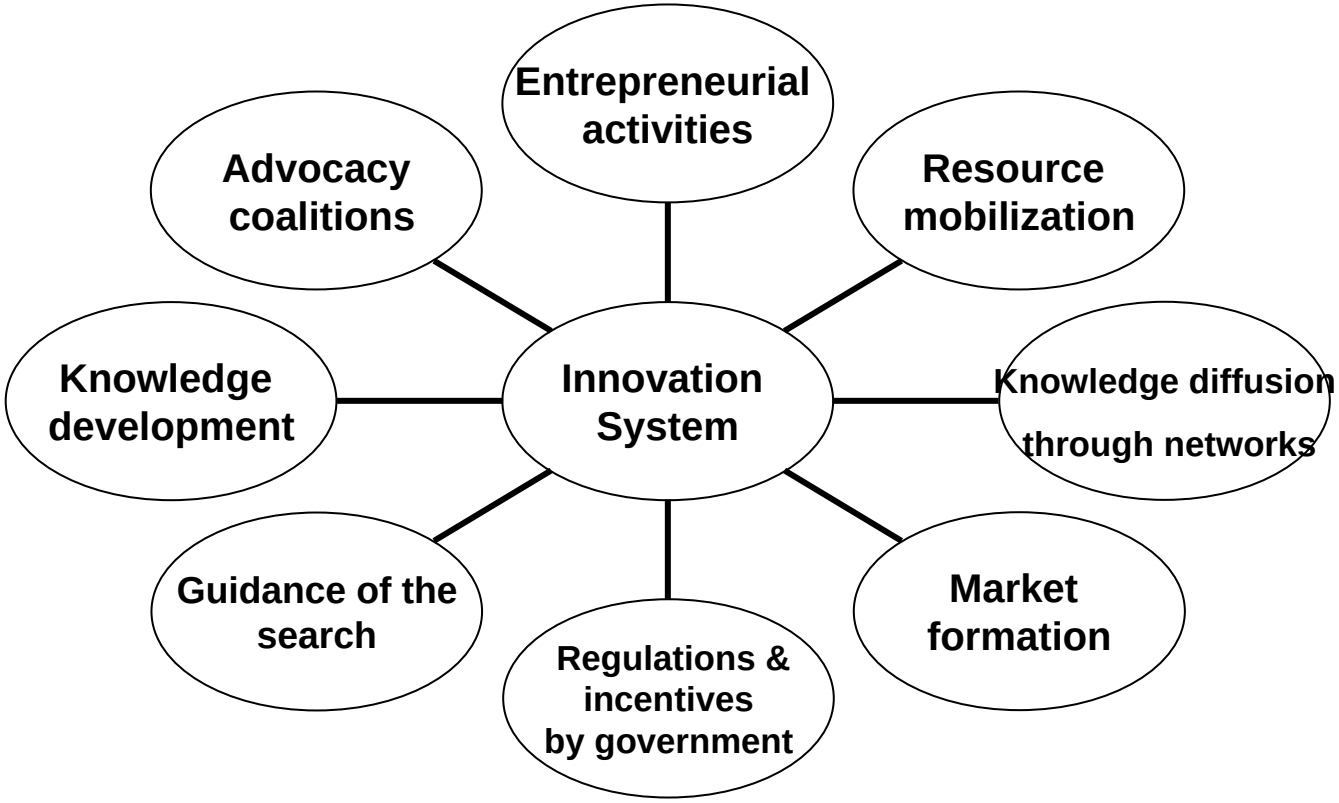
Functions of innovation system



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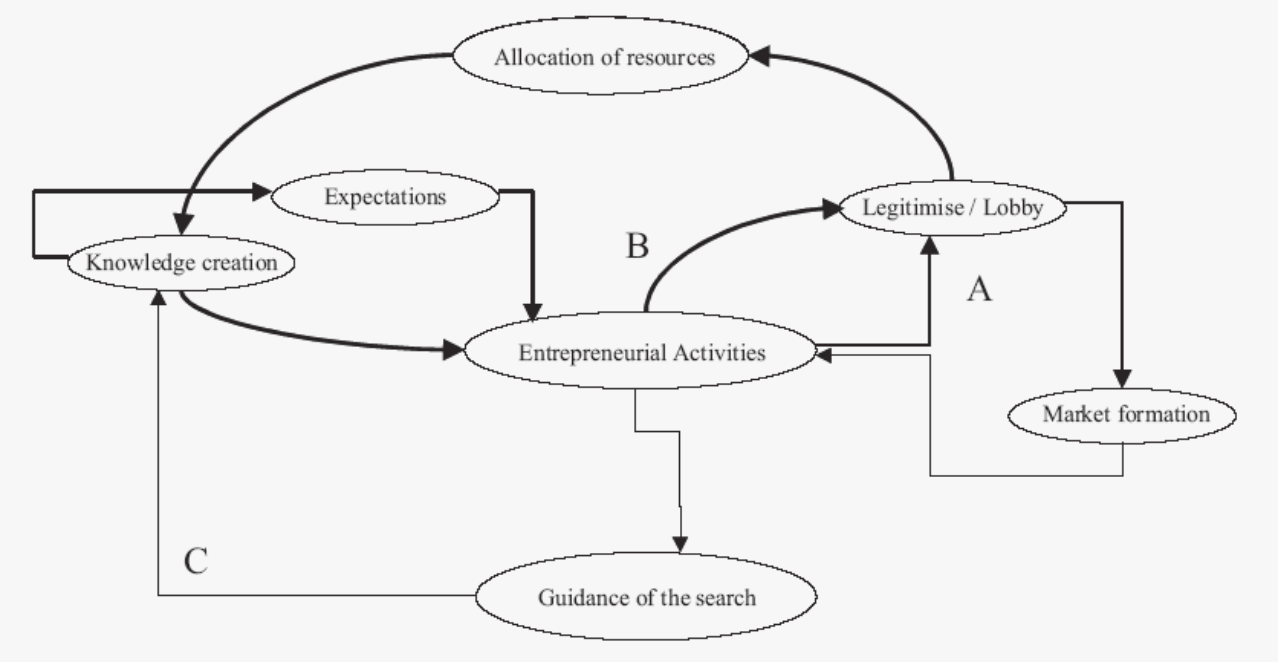
Functions of innovation system



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Functions of innovation system

Qualitative measurement

Quantitative measurement

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Innovation Scoreboard

TABLE 1: EIS 2006 INDICATORS

	INPUT – INNOVATION DRIVERS	
1.1	S&E graduates per 1000 population aged 20-29	EUROSTAT
1.2	Population with tertiary education per 100 population aged 25-64	EUROSTAT, OECD
1.3	Broadband penetration rate (number of broadband lines per 100 population)	EUROSTAT
1.4	Participation in life-long learning per 100 population aged 25-64	EUROSTAT
1.5	Youth education attainment level (% of population aged 20-24 having completed at least upper secondary education)	EUROSTAT
	INPUT – KNOWLEDGE CREATION	
2.1	Public R&D expenditures (% of GDP)	EUROSTAT, OECD
2.2	Business R&D expenditures (% of GDP)	EUROSTAT, OECD
2.3	Share of medium-high-tech and high-tech R&D (% of manufacturing R&D expenditures)	EUROSTAT, OECD
2.4	Share of enterprises receiving public funding for innovation	EUROSTAT (CIS4)
	INPUT – INNOVATION & ENTREPRENEURSHIP	
3.1	SMEs innovating in-house (% of all SMEs)	EUROSTAT (CIS3)[7]
3.2	Innovative SMEs co-operating with others (% of all SMEs)	EUROSTAT (CIS4)
3.3	Innovation expenditures (% of total turnover)	EUROSTAT (CIS4)
3.4	Early-stage venture capital (% of GDP)	EUROSTAT
3.5	ICT expenditures (% of GDP)	EUROSTAT
3.6	SMEs using organisational innovation (% of all SMEs)	EUROSTAT (CIS4)

Source: European Innovation Scoreboard 2006, Comparative analysis of innovation performance, INNO METRICS.

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Innovation Scoreboard

	OUTPUT – APPLICATIONS	
4.1	Employment in high-tech services (% of total workforce)	EUROSTAT
4.2	Exports of high technology products as a share of total exports	EUROSTAT
4.3	Sales of new-to-market products (% of total turnover)	EUROSTAT (CIS4)
4.4	Sales of new-to-firm products (% of total turnover)	EUROSTAT (CIS4)
4.5	Employment in medium-high and high-tech manufacturing (% of total workforce)	EUROSTAT
	OUTPUT – INTELLECTUAL PROPERTY	
5.1	EPO patents per million population	EUROSTAT
5.2	USPTO patents per million population	EUROSTAT, OECD
5.3	Triadic patent families per million population	EUROSTAT, OECD
5.4	New community trademarks per million population	OHIM[8]
5.5	New community designs per million population	OHIM[7]

Source: European Innovation Scoreboard 2006, Comparative analysis of innovation performance, INNO METRICS.

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Innovation Scoreboard

Functions	Indicators
Create and sustain technological knowledge	R&D investments Number of R&D projects Patents Cost reductions in production of technology Increase of technology performance
Exchange of information and knowledge in networks	Formal R&D networks University - industry collaboration Scientific congresses
Articulation of demand	Explicit targets regarding technology use Explicit targets regarding impact of technologies
Regulation and formation of markets	Favorable tax regimes Mininal technology use quota
Prioritizing of public and private resources	Division of resources over competing technologcial options (Policy) documents where technology choices are made
Development of advocacy coalitions for processes of change	Size of interest groups (Lobby) activities of interest groups Number of fora, workshops, platforms to inform about technology
Overall function: System performance	diffusion of technologies over time

Source: Functions of Innovation system: A new approach for analyzing socio-technical transformation, M.P. Hekkert, R. Suurs.

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Building blocks of innovation systems-

Actors

Networks

Institutions (complementarities and mismatches)

Resources

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Policy Steps in creation of innovation systems

- Platform (generic) technologies
- Improving infrastructure services as a foundation for technology
- Improving higher education
- Linking research institutes with private sector activities
- Breaking down compartmentalization of universities
- Promoting business activities in science, technology, and innovation
- Improving the policy environment for innovation (e.g. patent laws, IPR)
- Focusing on areas of under-funded research for development
- Focus on *technological learning* associated with *technological competence building*

(from: Juma / Yee-Cheong report)