Why Industry-Science Collaboration is a Key Driver of Innovation?

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European Alliance for Innovation

High-level meeting "Science, technology and innovation for sustainable development in SPECA countries"

and Sixth Session of the SPECA Project Working Group on Knowledge-Based Development

(Ashgabat, Turkmenistan, 11 June 2014)

Innovation in the modern economy: from ideas to innovation

- **Innovation**
  - Commercial exploitation of new ideas which are successfully brought to market by offering more effective alternatives to existing arrangements

- **Invention and innovation**
  - Innovation always target the market: “invention” alone is not “innovation”
  - Innovation = theoretical idea + technical invention + commercial exploitation

Innovation in the modern economy (contd.)

- Innovation is a broad concept and a complex phenomenon
- Requires a combination of different types of knowledge: pre-existing in companies; resulting from new R&D; generated through networking; supplied by markets or users; borrowed from competitors
- Involves the interactions of many “actors” (stakeholders): academic and R&D institutions, firms, public bodies, financiers, users, etc.
- Innovation is a process with highly uncertain outcomes: there is a need to commit resources to reduce uncertainty
- Collaboration among innovation actors/stakeholders is key for the success of the innovation process: the market uptake of the innovative idea

Typology of innovation

- Product innovation (new product or service)
- Process innovation (new production method)
- Organizational innovation (new organizational method)
- Management innovation (new management method)
- Production innovation (new production systems e.g. “just in time”)
- Commercial/marketing innovation (new methods of marketing or product promotion)

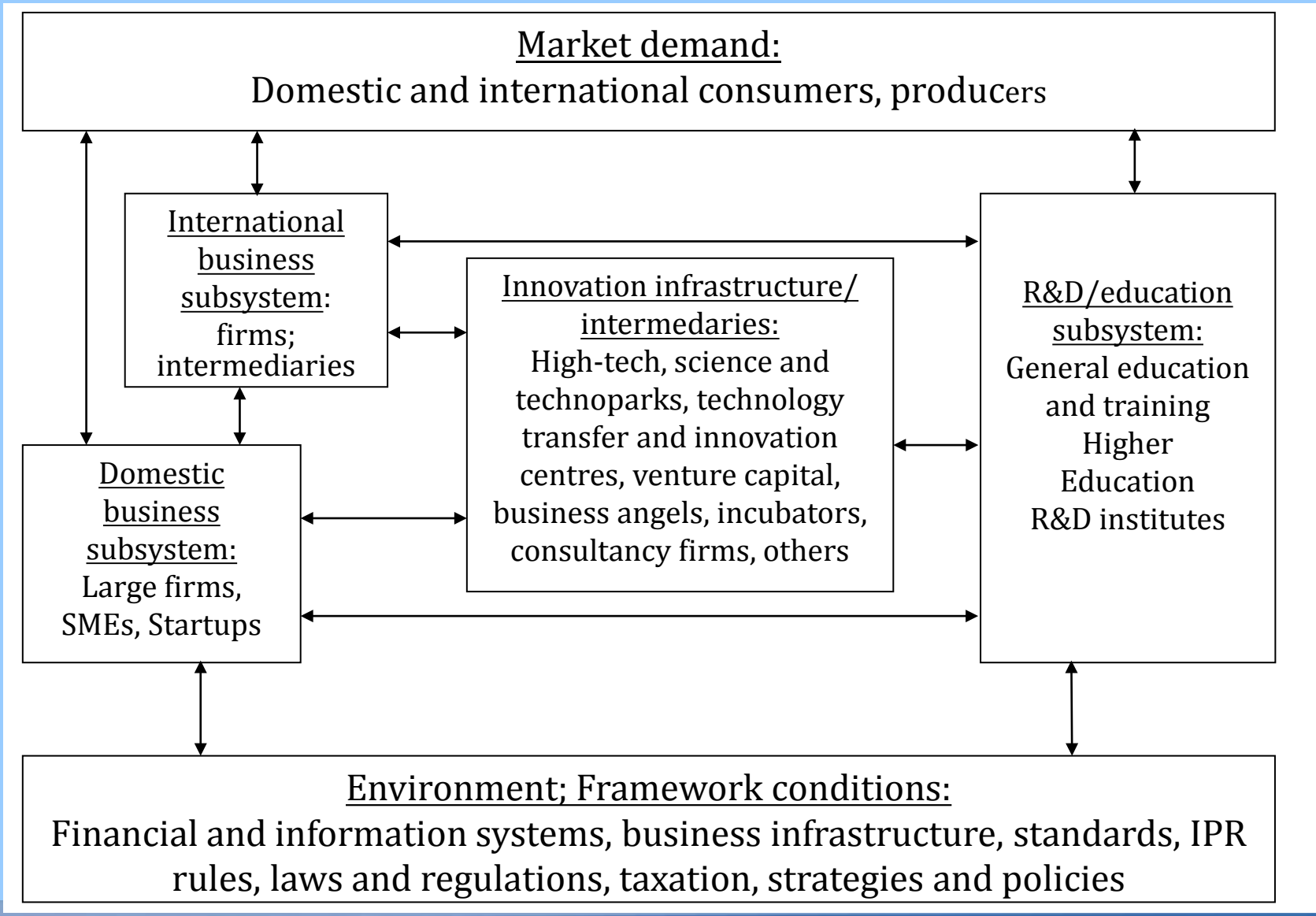
By the degree of novelty:

- Frontier innovation
- Products new to the local market

The National Innovation System (contd.)

- **NIS:** the network of institutions in the public and private sectors whose activities and interactions initiate and diffuse new technologies and products
- **NIS agents:** knowledge institutions (universities, research institutes, technology-providing firms), firms and government bodies
- The **interactions and linkages** between the elements of the NIS are also part of the system
- The **flows of ideas and knowledge**, as well as **the ability to learn** are also part of the NIS

The National Innovation System



Interactions in the NIS

- Provision of knowledge (R&D, consultancy services)
- Competence building (raising capabilities/capacity)
- Formation of new product markets, development of existing ones
- Creating and changing organizations and institutions
- Networking (improving connectivity; building relations)
- Incubation activities (breeding new innovative startups)
- Financing innovation activities
- Collaboration/cooperation among innovation stakeholders
- Intermediation between innovation stakeholders

Industry-Science Collaboration

- What is industry-science collaboration?
  - ✓ "Division of labour" in the innovation process in which each side contributes what it can do better than the other ("competitive advantage")
  - ✓ Needs to be a «fair game» in which each party gets a benefit matching its contribution
- Preconditions for efficient industry-science collaboration
  - ✓ Strong and well functioning linkages between NIS actors and innovation stakeholders
  - ✓ Good protection of property rights (in particular, intellectual property rights)
  - ✓ Well functioning judicial system which guarantees that contracts are honoured
  - ✓ Predictable business and regulatory environment
- Lack of industry-science collaboration is a «systemic failure»
  - ✓ Needs to be addressed by policy intervention

The rationale for policy intervention

- Market failures - the situation when the allocation of goods and services by a free market is not efficient; in this case, the failure of market forces alone to bring an innovative idea to the market
- Systemic failures (failures in the NIS):
  - Failures in social institutions (such as universities and research institutes, public regulatory and policy implementation offices, etc.)
  - Network failures, related to problems in interactions among different agents/stakeholders (e.g. due to poor interlinkages, low degree of trust, high perceived transaction costs, unsupportive market structure, etc.)
  - Capability failures in firms and other stakeholders, which prevent them from acting in their own best interests (e.g. due to poor managerial or technological skills deficits or inability to absorb externally generated technologies)
  - Framework failures, related to difficulties in the broad framework conditions (such as unsupportive regulations, dysfunctional regulatory bodies, poor business environment, etc.)

Traditional vs. contemporary/systemic innovation policy

Traditional (industrial) policy	Contemporary innovation policy
Support R&D institutions	Support specific R&D and innovation projects
Target the agents of R&D and innovation	Systemic coordination of the innovation process. Support linkages among innovation stakeholders. Policies to bridge sources and users of innovation. Promoting collaborative models.
Direct involvement of the state in "big science" and large-scale technological projects	Provide catalysts for the emergence of networks of stakeholders of large-scale projects
Intellectual property/knowledge spillover: Legal protection of IPRs	Policy differentiates between frontier innovation and imitation. Frontier innovation: a range of options to deal with IPR protection. Imitation: support the diffusion of innovation and internalization of knowledge/technology spillovers

Policy instruments to support industry-science collaboration

- Most of the financing is project-, not institution- based and project financing is allocated on a competitive principle

- Project financing is often contingent on systemic networking among the participants
  - requires that specific linkages be established for the project to start (e.g. between R&D institutions and industry)
  - the project outcome is the result of interactions and cooperation among these partners/stakeholders
  - these requirements are embodied in the policy instruments

- Apart from project financing, specific instruments involving a financing component have been developed exclusively to promote and support networking, linkages, partnerships, cooperation and connectivity among stakeholders;

Policy instruments supporting cooperation in high-risk innovative projects

- Most such instruments support start-up firms, not established and running businesses
- Public grant financing is especially instrumental in the pre-investment phase when the uncertainties are the highest
- The provision of funding is organized on a competitive principle
- Financial support is of one-off nature (to avoid a lock-in into unviable ventures)
- Most financing instruments contain market elements and incentive structure (to prepare the grantee for self-sustained entry to the market)
- Usually they also support connectivity with other stakeholders
- Instruments where the state acts as a coordinator, helping in bringing together private stakeholders and in pooling financial resources for projects of joint interest (joint fundraising)

Cooperation with the private sector

- Help in overcoming knowledge/information asymmetries and sharing risk among potential stakeholders -> help in engineering new projects that would not have been in place in the absence of such cooperation
- Need to distinguish between public-private partnerships (PPPs) and other forms of cooperation between the public and the private sector
- PPP is a long-term contractual arrangement between a public body and a private business targeting the design, construction, financing, running and servicing of public infrastructure units
- Apart from PPPs, there are numerous forms of public-private cooperation in running joint projects between the government and the private sector (industry-university cooperation; running business incubators and S&T parks; research consortia, etc.)

Examples of policy instruments supporting industry-science collaboration

- The most typical instrument is a grant conditional on industry-science collaboration targeting innovation
  - The grant is extended to a consortium involving academic entities and entities from industry
  - The grant does not prescribe who should collaborate with whom; this is left to the applicants to decide
  - The members of the consortium are required to sign among them an agreement specifying the collaboration framework
- Innovation "brokerage"
  - Public support to intermediaries who help establish industry-science collaboration
- Indirect policy instruments supporting the establishment of collaborative relations among stakeholders along the value chain or supplier-user chain
  - Public grants supporting networking between science and industry (stimulating the sharing of knowledge and best practices among its members, facilitates connectivity with other potential stakeholders)

Clusters for industry-science collaboration

- Clusters are geographic concentrations of interconnected firms and other stakeholders seeking to generate positive externalities to the participants in the cluster
  - The enhanced interconnectedness addresses systemic and network failures
  - Well developed networking facilities, exchange of market information and other knowledge
  - Partnerships around specific projects and mobility of human resources
- Public policy can facilitate clustering with policy instruments integrated across the territorial dimension
  - Governments can support the creation of common facilities to the participants and encourage connectivity among them

Clusters (contd.)

THANK YOU!

Thank you!

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