

On connection between innovations and science

Selected aspects

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Sofia, 21. 10. 2016

What will be discussed

- 1 What is science.
- 2 Some processes connected to science.
- 3 What is innovation
- 4 Some processes connected to innovations
- 5 Connection between systems of science and innovations
- 6 Why the connection between the systems of science and innovations is weak in Bulgaria

What is science

Science

Science is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe.

A classification of sciences

Contemporary science is typically subdivided into the natural sciences, which study the material universe; the social sciences, which study people and societies; and the formal sciences, such as mathematics. The formal sciences are often excluded as they do not depend on empirical observations. Disciplines which use science like engineering and medicine may also be considered to be applied sciences

Some processes connected to science

How to "dig" for new knowledge

- 1 **You need an orientation where the new knowledge is** (data bases, access to journals, etc.)
- 2 **You need tools and machines to "dig" for the knowledge** (computers, equipment for experiments, consumptives, etc.)
- 3 **You need qualified people** (very good educated and with many specializations)
- 4 **You need appropriate structure** (of the network of researchers and research groups)
- 5 **You need appropriate system (set of processes)** (effectiveness, efficiency)

etc.

What is innovation

One definition

Innovation is:

- 1 production or adoption, assimilation, and exploitation of a value-added novelty in economic and social spheres
- 2 renewal and enlargement of products, services, and markets
- 3 development of new methods of production; and establishment of new management systems.
- 4 **It is both a process and an outcome**

Stages of innovation process

How to make an innovation

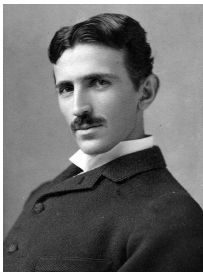
- 1 **You need to generate appropriate idea and to mobilize it** (qualification, need to move from idea to action)
- 2 **You need to advocate and screen your idea** (not all ideas are appropriate for implementation. The idea must be evaluated and potential benefits should be measured)
- 3 **You need experimentation** (the idea must be tested to proof the concept and to create prototype)
- 4 **You need commercialization** (to create market value connected to your ideas)
- 5 **You need diffusion and implementation** (presentation of innovation and application)

Some processes, connected to the innovation

What do you need

- 1 **You need enthusiastic and competent people** (small amount of such people are born, the others must be educated. These people generate the innovation ideas and mobilize them)
- 2 **You need supporting structures** (they must screen and advocate the innovation ideas)
- 3 **You need equipment and other material and financial conditions for experimentation** (to proof the concept and to make prototype - much time, money, and human energy)
- 4 **You need commercialization structures and system** (to create market value connected to you prototype)
- 5 **You need supporting structure that can put the result of innovation into production** (some business - industrial company, start-up, etc.)

What is the most important factor that influences and connects science and innovations ?



The (educated, qualified, and enthusiastic) people capable to transform scientific knowledge to innovations

Four important flows for keeping scientific and innovation systems alive

The inflows needed are (NOTE! - Inflows and not outflows !)

- ➊ **Inflow of (young people):** The researchers and innovators get aged or move abroad and have to be replaced
- ➋ **Inflow of money:** **Paying the people, infrastructure, building the prototypes, etc.** (i.e., calculate what is the probability that you will meet the sales target at some time in the future)
- ➌ **Inflow of materials:** **for running experiments, machines, etc.**
- ➍ **Inflow of information:** **the scientific and technical information becomes outdated relatively fast**

Bulgarian science and innovation systems and structures are not in good shape

- 1 **Structural problems**
- 2 **System problems**

Just 3 (of many !) structural problems

- 1 **No (or very weak) connection between science structures and innovation structures** (no development units, no analog of Fraunhofer Gesellschaft)

We live in an increasingly dynamic world. Technological cycles are getting ever shorter, lifestyles and requirement change dramatically. Needed are innovative solutions that add value for all stakeholders. Fraunhofer develops technologies and solutions to address these demands

Small version of the Fraunhofer Society can be created at the Bulgarian Academy of Sciences

- 2 **Not enough qualified scientists and innovators** (brain drain)
- 3 **Poisonous environment for scientific and innovation structures** (unfavorable laws, bureaucracy, corruption)

Just several system problems

Problems connected to the 4 needed inflows

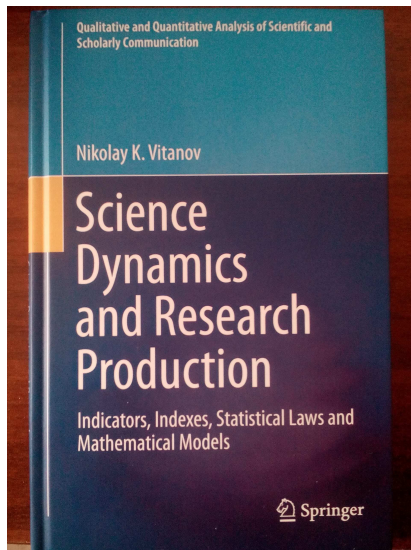
- ➊ **Inflow of (young people):** The young people run in direction WEST
- ➋ **Inflow of money:** Money make the world go round. But some "experts" and "managers" still think that Bulgarian science and innovation system will achieve great results without any money inflow
- ➌ **Inflow of materials:** No materials for experiments, no appropriate machines
- ➍ **Inflow of information:** No access to enough information
-uncompetitiveness

Can all this change ?

YES

- 1 **Repair the scientific and innovation structures** (Must be done by people who know how to do this and not by "experts")
- 2 **Reshape the system** (Must be done by people who know exactly how scientific and innovation systems work)

What to do (mode details)



THANK YOU FOR YOUR ATTENTION!



Even the smallest action is much better than thousands of words