PLENARY SESSIONS

Emergence of new branches of statistics (Science, technology and innovation statistics)

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Statistical information and their analysis are key factors of any kinds of decision-making process. Modern societies are demanding lot of information and developed various branches of statistics to provide detailed and timely information to decision-makers. One of the relatively young branches of statistics is the science, technology and innovation (STI) statistics.

When the importance of science policy as a new policy area was recognized (Bernal 1939, Bush, 194.) the need for R&D indicators for policy making came into the light. (Lundvall and Borrás 2005 p.)

The main difference between pre- and post-war S&T statistics was in conceptual framework, the covered issues of STI statistics and actors in producing statistics changed significantly around the war. The measurement concept for RDI became economic in character. The result is a collection of economic indicators that are compatible with other economic datasets. (Many dimensions of RDI activities remained out of measurable field.)

Demand for S&T statistics and involvement of stakeholders has changed. In early post war years S&T policy became immanent and independent part of the governmental policies.

In the development of this new branch of statistics the emergence of innovation in scientific work and as policy issue was another breakthrough in second half of 20 century. Beside science policy, technology policy and innovation policy also emerged in 1950s and 1960s and they also created new demand for statistics. RDI data has a complex background in the scientification of innovation. (Smith 2005 p. 150)

At the beginning of 21st century the complex economic and societal needs calls for more international and interdisciplinary R&D and globally open innovation. Many national programs promote stronger linkages between universities/public research organisations and industry as a means of strengthening their contribution to innovation and economic growth. Beside a wide range of governmental policies that are fostering university/non-university public research organisations (PRO) and industry collaborations, governments are also encouraging international collaborations. Governments can contribute to international collaboration directly through programmes and internationalised public procurement. Third generation of foreign direct investment (FDI) policy is also facilitating cross national public-private research collaborations.

Improving the design of the governmental programmes that can help enhance their effectiveness and increase value for money is making statistical information an inevitable element of policy-making. Evidence-based policymaking requires indicators for assessment and evaluation of research programs and STI policies. The quality of information depends on improving the availability of data and the development of indicators that reflect the complexity of STI process.
The available indicators shed so little light on the dimensions of university/PRO-industry relationships and their internationalisation.
Improving the measures on the internationalization of STI is critical to provide new tools for policy-making. This process requires additional internationally comparable databanks as well as better understanding of currently unmeasured factors in STI internationalization process.
One of the candidate measures is the *patent indicators*. 'Patents play several important roles in innovation systems to encourage innovation and investment in innovation, and to encourage dissemination (diffusion) of information about the principles and sources of innovation throughout the economy.' (Granstrand 2006, p. 280) It is not an objective to evaluate whether a patent system should exist. Rather the investigation works from the starting position that the system is there, and so the main things to coop with it.
As policies in many countries are attempting to stimulate university patenting and licensing activities put in the limelight these indicators.

Methodology
The patent indicators have some advantages and disadvantages. 'Compared to other indicators such as publications, patents are a more proper indicator of activities closer to technology development.' (OECD 2009, p.30.) The real advantage of the patent indicators is their international comparability and length of time series. Patent data can provide quite rich information about the technology and agents taking out the patent. Availability of international patent databank is back up the development of new patent indicators.
The disadvantage of patent indicators as general measures arises from the differences in the importance of patents by sectors. The patents play very different roles in various sectors and in some sectors they might be more relevant for judging performance than in others. In the evaluation process it is important to keep in mind this limit of the indicator.
The lecture deals with quantitative information and investigates how can develop better and more detailed quantitative information through exploiting international patent databases. The improvement in quantitative analysis is crucial.