NATIONAL INNOVATION SYSTEMS (NIS)

Innovations in countries differ. The one country is more successful in process innovations in the consumer goods, whereas other countries are better at product innovations in sectors of capital goods. The differences can be found at national, sector and regional level. In the economic literature on innovation the National Innovation System (NIS) approach focuses on differences at national level, which strongly influence the innovations that countries produce. Next to the demand in the country also the education system, the laws and regulation, the financial markets and institutions play a role. In this article we discuss the more traditional NIS approach in which is benchmarking between countries is central. Furthermore we present the outline of an alternative approach that allows for a more dynamic analysis of NIS.

The national innovation systems approach was introduced in the 1980s (Dosi et al., 1988) and further developed among others by Lundvall (1992) and Nelson (1993). The concept of the national innovation system (NIS) refers to a historically grown subsystem of the national economy, in which various organisations and institutions interact with each other in the carrying out of innovative capacity (Balzat and Hanusch, 2004). It is about a systemic approach to innovation, in which the interaction between institutions and organisation is central. The following elements are generally considered part of a NIS: 1. Education and training. Government is in general responsible for education at different levels, which is considered key in the production of sufficient human skills crucial for the production and diffusion of knowledge. 2. Science and technology capabilities. The resources invested in R&D, both public and private, differ between countries. It is generally hypothesised that the innovations correlate with the R&D expenses. 3. Industrial structure refers to the number of competitors in an industry, their size and their relationships. In general it is hypothesised that strong competition among large firms favours investments in R&D and imitation in particular products and processes. 4. Countries differ in degree of specialisation and intensity of R&D expenditures in specific areas. Often government plays an important role in creating a competitive advantage of a NIS in a specific area. 5. Interactions within the innovation system seems important for the level of R&D activities and diffusion of knowledge. Famous examples are the networks in ‘Italian districts’ and the Japanese ‘keiretsu’. 6. Next to the elements mentioned above also demand plays an important role in pulling innovation processes. Not only the level of demand, but more importantly the type of demand is important in that respect. (Porter 2001)

NIS and policy making

The contributions of the NIS literature had a large impact on policymakers. The NIS approach gradually replaced linear thinking about innovation by a more holistic system. That is to say: the idea that putting more R&D money in the system would automatically lead to more innovations was replaced by the conviction that innovation is the result of a complex interaction between different elements of a system. Only an approach that would address that interaction could be successful. Since the late 1990s the NIS approach serves as a dominant design for many comparative studies of national innovation systems In the EU and OECD countries this resulted in a ‘benchmark’ approach in which policy makers tried to copy the elements of the NIS of the most successful countries: best practice policies with the danger of an one-size-fits-all-approach.

An alternative view

The theoretical contributions to the NIS literature have outlined the importance of institutions. However, a more precise theoretical analysis of how these innovation systems actually function and how they evolve over time is lacking (Fagerberg 2003, Witt 2003). Following Nelson (2002) and Malerba (2002; 2005), more attention should be paid to the social and political institutions of NIS, as well as its dynamics. We suggest to conceptualise institutions first in hierarchical layers (Gilsing 2005) and then to analyse the interactions between them.

Hierarchy of institutions
The social and political institutions of NIS function as the institutional selection environment of innovation processes in a country (Nelson 2001). These processes result from the interaction between individual actors and their institutional environment. Figure 1 presents five layers (inspired by Williamson 1998, Nooteboom 2000, and Malerba 2005). The first three layers compose the ‘institutional environment’, which can be divided into layer 1 the ‘informal institutions’ (culture: values and norms) and the technology, into layer 2 with the political system and the formal ‘rules of the game’ (laws, regulations and policies) at layer 3. The institutional arrangements (public and private organisations, contracts and hybrids like networks) are located at layer 4, whereas creative, innovative learning that is embedded in habits and routines is found at layer 5, including strategic behaviour and the power base of actors, which can block innovative developments (see ceremonial encapsulation below). The layers are connected by arrows, which indicate that higher layers not only constrain the lower ones, but that lower layers within a certain range can influence higher ones.

Changes at different layers can reinforce each other, but can also be conflictual. These interdependencies are not universal, but specific to national systems. In contrast to the ‘benchmark’ approach, the hierarchical evolutionary approach considers policy making to be a continuing evolutionary process of designing and re-designing institutional structures. Consumer policies can play an important role at layer 2. The layers at the higher levels determine however the role of the consumer in the economy. Consumers are part of the institutional arrangement at layer 4. At layer 5, the individual consumer with its learning capabilities and its (changing) preferences can influence changes in the above layers. From that perspective existing structures should allow for learning and for possibilities to adapt behaviour based on lessons learned. For that reason variety and experimentation, should be part of innovation policies.

References