

Cooperative Institutions for a Sustainable Paradigm Shift within the Industrial Sector – The Example of the Chemical Industry

Industrial innovation processes are shaped and influenced by a multitude of factors. Typically the market and competition conditions, specific strategies of corporations, the statutory regulations, and the political and societal environment have to be taken into consideration. Thus, the direction of the innovations and their particular features are formed in a complex interaction of these factors. Hereby the state takes part in a multifaceted way, for example through technological policy, environmental policy or the provision of public infrastructure. In this process public measures have to take the particularities of the specific innovation systems into account in order to influence an innovation into the direction of a sustainable development.

For a successful accomplishment of a political steering goal it is also important to consider, that industrial innovation processes show a “historical” dimension. Consequently these processes are not open in their development in the medium term, but influenced by the past through the existing knowledge base, capital structure und given social values. In some cases the “paradigms” or “paths” of technological development which are derived from the past are not compatible with the expected long-term ecological restrictions. Moreover, most of these restrictions become more clearly only with increasing information. Therefore, the aspect of intergenerational precaution could make it necessary to develop new basic innovation paradigms to make a successive reorientation possible. Such a change normally does not happen without any conflicts, but will be formed through interaction of private, societal and political actors respectively through a negotiation of their interests.

The discussion about new technological paradigms in the past could be characterized as a strong confrontation of the involved actors. On the one hand the state tried to reach a restriction of the actors previous activities through direct regulation, and the industry tried to avoid financial burden and restrictions in their fields of business; on the other hand environmental associations acted against state and industry with blockade and protest actions. With regard to the stimulation of sustainable innovations this constellation has certainly not been most favourable. Within the actors conflict substantial change to sustainable development and long-term oriented policy was difficult, and the given framework for the industry has been insecure.

Recently the idea of cooperation between the economy and the state in environmental policy becomes more important. This means, that the classical form of public environmental regulation or the utilization of taxes were substituted or even in parts complemented by cooperative mechanisms. The cooperation principle has been realized in German environmental policy in different forms, in bargaining in procedures of permission granting, in workgroups and committees to define technical standards or in voluntary self commitments

of the industry. The cause of increasing cooperation lies in the fact, that the state on the one hand reached its limits with regard to the steering problem and on the other hand there was an urgent need for solutions. However, up to the present short term political objectives were the focus of interest; There has not been an attempt to reach a fundamental societal and technological change.

This research project will therefore examine the question, if and how it is possible to implement a long term cooperation strategy for a successful development of industrial innovation system which satisfy the criterion of sustainability. There are the following questions in particular:

- Is it possible to reach an agreement of different actors to an new innovation paradigm?
- Which institutional formations seem to be suitable for this task?
- Are there applicable mechanisms to master conflicts and bind the involved actors?
- Does a cooperative specification of the direction of the innovation process conform to juridical and economic principles?
- How does this fit into the innovation strategies of globalized enterprises?
- What are the limits of such a policy type?

These questions will be discussed both theoretically and empirically by analysing selected examples of innovation fields and institutional arrangements. In this project different academic disciplines (economics, jurisprudence and history) as well as an industrial enterprise are involved. Thereby it should be reached an academic analysis adequate to the problems complexity, an interdisciplinary exchange of thoughts and an orientation towards applicability in the affected chemical industry. The planned parts of the project can be divided into three basic work fields:

Within the *first work field* economists, economic historians and chemists altogether examine by a retrospective branch analysis what has caused the innovation paradigms of the chemical industry in the past. For significant cases of product and process innovations as well as organisational renewals it is important to work out the specific technological, market and business framework on the one hand and the societal and political influence on the other hand. So for example the effects of new guiding principles, public technological programs and a changing statutory framework on the genesis and diffusion of new innovation paths have to be examined. According to the basic question it has to be especially analysed, if and what kind of cooperation between private, public and societal actors took place.

The historical analysis of different kinds of influence of the innovation direction in the chemical industry can not be done comprehensively, but has to be restricted to selected case studies. The case selection, which will be done by the research team, should reflect adequately the diverse innovation processes of the industry and illustrate the typically existing influence constellations. Complementarily the orientation of public technological policy and its change in different periods will be worked out, with the intention of getting an additional empirical basis for the evaluation of the public role with regard to the genesis of new innovation directions.

Within a *second work field* there is planned an analysis of imaginable cooperative arrangements in the chemical sector to examine the implementation possibilities of these policy strategies for the realization of sustainable innovation paths theoretically. Fundamental part will be a typology of cooperative institutions, which will illustrate certain basic types. Based on this a theoretical analysis of the incentive structures and the strategic interaction of the involved actors will follow and the meaning of alternative rules of interaction will be examined. The aim of this analysis is to derive first hypotheses about the success factors and impediments of cooperative arrangements. Therefore there will be included new theoretical approaches from institutional economics, network theory, game theory and evolutionary economics and these will be further developed for the considered problems of cooperative innovation steering.

The outcomes of the theoretical analysis of the institutions will be scrutinized and specified by way of comparing them to existing cooperation types. For this purpose case studies are planned, which refer to the historical examination part, as well as to most recent examples. Furthermore the current functions of cooperative mechanisms within the existing institutional framework will be examined. Another point represents the possibility of linking the cooperatively accepted outcomes with traditional policy measures like tax incentives or technological policy. As a result hypotheses about the importance and the function mode of certain cooperation types in policy mixes could be derived, which enable environmental friendly paradigm shifts through interconnection of various instruments and institutional mechanisms.

Within a *third work field* there should be proofed the conformity of the derived strategies with basic principles of market economy and democratic constitutional state. Thereto is needed a discussion about the inevitably occurring trade off between direction targeting and competitive openness of the market process. There is to differentiate between a liberal perspective, which limits state activities to general role setting without any direction target, and an evolutionary perspective, which also includes the developing process of new roles and framework settings. Surely the trade off between a liberal market finding process and the tendency to solidification because of positive feedback is not solved in the latter perspective, neither. The crucial point is the following: Is it possible to develop cooperative policy

patterns, which even enforce the innovation competition and the developing dynamics of market enterprise?

Moreover it has to be examined the conformity of the derived policy strategy to the principles of national and international law. The basic question is if cooperative steering patterns conform to the principles of constitutional law, european law and world trade law which are not simply adjustable. Therefore it is important to work out the various principles in environmental law and other law fields, which in part stand in conflict to each other. In that respect it has to be discussed if the outcomes of cooperative mechanisms meet the constitutional requirements and in how far directly or indirectly limit the economical liberty. The juridical analysis should not remain on an abstract level, but develop a concrete requirement profile for alternative cooperative arrangements, which is applicable in practice.

Project Participants:

Research Institute for Public Finance – University of Cologne (project coordination):

Dr. Dieter Ewringmann

Lars Koch

Department of Economic and Social History – University of Cologne

Prof. Dr. Toni Pierenkemper

Melanie Monßen

Institute for public law - University of Osnabrück

Prof. Dr. Hans-Werner Rengeling

Enterprise: Bayer AG Leverkusen