Sustainability and innovation policy

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Innovation policy and the sustainability postulate

Innovations can make an important contribution to achieving the ambitious Sustainable Development Goals (SDGs).[19] The discussion on how this contribution can be maximized has led to the demand for policy guidelines for R&I policy. For example, R&I policy should take its orientation from the great societal challenges of our time and support sustainable development.[20] In the process of deciding the main topics of R&I policy, this demand has found expression in the so-called ‚new mission orientation': for Germany, for example, in the funding priorities of the High-Tech Strategy (HTS), at the European level in the Horizon 2020 framework research programme.

The German Advisory Council on Global Change (WBGU) recommends even more strongly „a reorientation of innovation to make it possible to develop economies and prosperity within the guard rails of the Earth system."[21] More specifically, the WBGU proposes aligning the HTS more closely to the objectives of sustainable development.[22] The High-Tech Forum also advocates gearing the research funding programmes to ecological, economic and social needs, and linking the Federal Government's sustainability and innovation strategies more closely to each other.[23] To ensure this, the government is requested to involve all societal groups in the process of shaping and/or aligning R&I policy.[24]

The Commission of Experts welcomes the orientation of R&I policy towards the great societal challenges. In particular, it regards the systematic involvement of different societal groups to identify or confirm important societal challenges for R&I policy guidelines as useful. That said, R&I policy should concentrate on funding research and innovation activities that are relevant to the great societal challenges, keeping the door open to all technologies.

Sustainability as a cross-cutting policy topic

The concept of sustainable development describes a development that meets the needs of today's generation without restricting the possibilities of future generations.[25] This general and vague definition is usually differentiated along three dimensions that must be reconciled for sustainable development: economic development, social justice and environmental compatibility. In its 2030 Agenda, the United Nations agreed in an integrated approach on 17 sustainability goals (SDGs) with a total of 169 sub-targets, to which the Federal Government has also committed itself in a reissue of its national sustainability strategy.[26]

Because the sustainability dimensions are highly complex and heterogeneous, different policy fields are responsible for specifying individual targets in greater detail, choosing instruments to achieve these targets, and monitoring progress. For example, social policy is responsible for poverty reduction, while improving water or air quality falls in the domain of environmental policy. In view of the scarcity of resources, there are significant conflicts of objectives here in political practice.

Impacts of innovation on sustainability targets are ambivalent

Innovations are important instruments for achieving the goals of sustainable development. Technological or social innovations can make the use of scarce resources more efficient, which not only boosts prosperity and eases the pressure on the natural environment, but also allows more scope for redistribution, as desired by social policy. Even so, innovation processes can have an ambivalent impact on the various dimensions of sustainability.

Technological or social innovations do not necessarily have only positive ecological effects, e.g. as in the use of toxic substances in photovoltaic modules.[27] Furthermore, they can cause unwanted social frictions, for example if a new or improved product leads to another one becoming obsolete as a result of ‚creative destruction', leading to employment and income losses at the individual level.

An ex-ante quantification of sustainability is also often speculative. Innovation processes are inherently uncertain. As a result, not only their direct impact but also their indirect – and in some cases unintended – effects on humans and the environment are unpredictable.[28] Undesirable concomitant effects of innovations sometimes do not become evident until much later, e.g. the use of CFCs as coolants and their impact on the ozone layer. The specific implementation and use of innovations also plays an important role.[29] For example, the carbon footprint of an electric car depends on the power sources used for charging it.[30]

Sustainability evaluation of innovation: a normative challenge

Operationalizing sustainability makes it necessary to measure, evaluate and compare sustainability goals. In the past, science has made an important contribution to defining sustainability goals more precisely and to creating suitable indicators for measuring the degree of individual target achievement. However, comprehensive sustainability evaluation remains a normative challenge, since it is not clear how conflicts of objectives should be handled when an integrative assessment of different indicators is required. The sustainability indices used in practice[31] (e.g. Ecological Footprint, Index of Sustainable Economic Welfare, Happy Planet Index) do not solve the problem. On the contrary, they are highly inconsistent and therefore involve a considerable risk of misinformation or disorientation.[32]

Economic cost-benefit analysis provides at least a theoretically consistent framework for analysing or handling conflicts of objectives.[33] Yet this does not solve the fundamental problem of evaluation either, because there are diverging views on ethical standards beyond methodological and technical quantification problems (e.g. the monetary valuation of biodiversity).[34]

Approaches to a sustainability orientation of R&I policy

Some sustainability researchers propose subjecting the effects of innovation to an ongoing prediction and reflection process with the involvement of various societal groups.[35] The aim here is to be able to anticipate and evaluate these effects as early as possible. In the meantime, this approach is being promoted at the EU level under the term ‚Responsible Research and Innovation' (RRI)[36] in the Horizon 2020 research framework programme and is also being applied already in several European countries.[37] In Germany, the BMBF is providing support – for example within the framework of the funding policy Innovation and Technology Analysis (ITA) – for research into different impacts of future developments.[38] One advantage of this participatory approach is that it does not exclude any innovation projects a priori. However, there is a risk that the scope of research might be restricted too much or too soon.

R&I policy should not be overloaded with sustainability demands

The primary objective of R&I policy is to overcome different types of market failure in the innovation process, which arise as a result of knowledge and adoption externalities. Further-reaching side-effects of innovations are not the primary responsibility of R&I policy. Rather, corresponding policy areas (e.g. social policy, environmental policy) should deal with them according to the principle of the division of labour.[39]

A strict division of labour might not always be feasible in political practice. For example, an increase in the R&D promotion of environmentally friendly innovations is often called for to offset negative environmental externalities.[40] However, innovation policy must not be overburdened by having to compensate for policy failure in other regulatory areas.

Recommendations

The Commission of Experts warns against overburdening R&I policy with the problems of a systematic sustainability evaluation. The problem of assessing – and dealing with – conflicts of objectives

among the many criteria for sustainable development remain an overarching socio-political challenge. Against this background, the Commission of Experts recommends the following:

- In addition to supporting basic research, R&I policy must be able to focus on funding R&I activities that are relevant to the great societal challenges, keeping the door open to all technologies.
- Innovations can lead to conflicts with specific sustainability goals – such as environmental quality or social justice. Such conflicts of objectives should be cushioned by coordinating with other policy areas such as environmental or social policy.
- The careful involvement of different societal groups to identify or confirm important societal challenges is a useful guideline for R&I policy. The Commission of Experts proposes a further examination of the theoretical principles and practical implementation possibilities of the Responsible Research and Innovation approach.