



Benefits of standardization and areas to be improved

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The Economic and Social Benefits of Standards

Standards fulfil various economic functions, which influence and improve the allocation of resources (This paper is based on Blind 2007). Therefore, the increased economic efficiency generated by the implementation of standards generates not only economic benefits for the supplying industry by increasing its profits, but also for the users, which have to pay lower prices or can implement goods and services of higher quality. In addition to these economic benefits, the implementation of standards generate social benefits for the consumers, the environment and the labour force by reducing possible damages and risks. Consequently, standards are able to improve both the welfare of the actors in the economy and the situation for the whole society by a better protection of the consumers, the labour force and the environment. In general, the higher economic benefits benefit both the supply and the demand side and are not in contradiction to the objective of achieving social goals. However in some constellations, standards may change the distribution of welfare between the actors in the economy and increase the social benefits for the whole society on the cost of lower profits for the supplying industry.

A classification of standards can be performed in several ways, not only depending on the respective scientific discipline, but also within the same discipline. David (1987) proposed a categorisation based on the economic effect of a standard. This is a useful approach in order to analyse both the economic driving forces for standardisation and the economic impact dimensions. It has been widely accepted and used (Nicolas, Repussard 1988; Swann 2000), though some researchers have extended the number of categories (Tassej 2000). In our classification we use the dimensions of compatibility, quality, variety-reducing and information standards. However, even if standards are developed just to serve one purpose they often fulfil multiple functions. Therefore, it is not likely that each standard will fall exactly and exclusively into a single category, but very often several economic aspects are touched by a single standard. However, a distinction is important for the theoretical discussion, because standards have different economic effects.

Table 1 summarises these four different purposes of standardisation and highlights their positive and negative effects. The usefulness of this distinction lies in what it contributes to our understanding of the variety of standard types and their sometimes ambivalent effects. Compatibility and interface standards are crucial for the development of network industries like the telecommunication and computer sectors, since they allow the communication between different users or the interplay between hard- and software. Minimum quality and safety standards prohibit that inferior and even risky goods and services are offered by suppliers, which increase the confidence of consumers in new innovative products and services. The concept of "regulatory capture" describes the problem that some producers may lobby so skilfully that they persuade the standardisation development organisations to define standards in the interest of the producers rather than in the interest of the customer (as originally intended). Since standards define very often a certain specification, they automatically exclude other options and reduce the variety, if the standard succeeds, but represent critical masses attracting new investors and companies

contributing to the development of new markets. Standards of information and product description are usually treated as a distinct category from the above, but for many purposes it is sufficient to treat these as a hybrid of the above three categories. A standardised product description has often the function of a quality standard, eases compatibility with other products and is an expression of product variety.

The likelihood of negative effects of standards can be reduced if the standardisation process follows the principles of openness, transparency and consensus, because the potential to misuse standards by specific stakeholders in the standardisation process can be reduced or even avoided.

Table 1: General Effects of Standards

Type of Standard	Positive Effects	Negative Effects
Compatibility Interface	<ul style="list-style-type: none"> • Network externalities • Avoiding lock-ins • Increased variety of systems products 	<ul style="list-style-type: none"> • Monopoly
Minimum Quality/Safety	<ul style="list-style-type: none"> • Correction for adverse selection • Reduced transaction costs • Correction for negative externalities 	<ul style="list-style-type: none"> • Regulatory capture "Raising rival's costs"
Variety Reduction	<ul style="list-style-type: none"> • Economies of scale • Building focus and critical mass 	<ul style="list-style-type: none"> • Reduced choice • Market concentration
Information	<ul style="list-style-type: none"> • Facilitates trade • Reduced transaction costs 	<ul style="list-style-type: none"> • Regulatory capture

Source: Blind (2004) modified after Swann (2000)

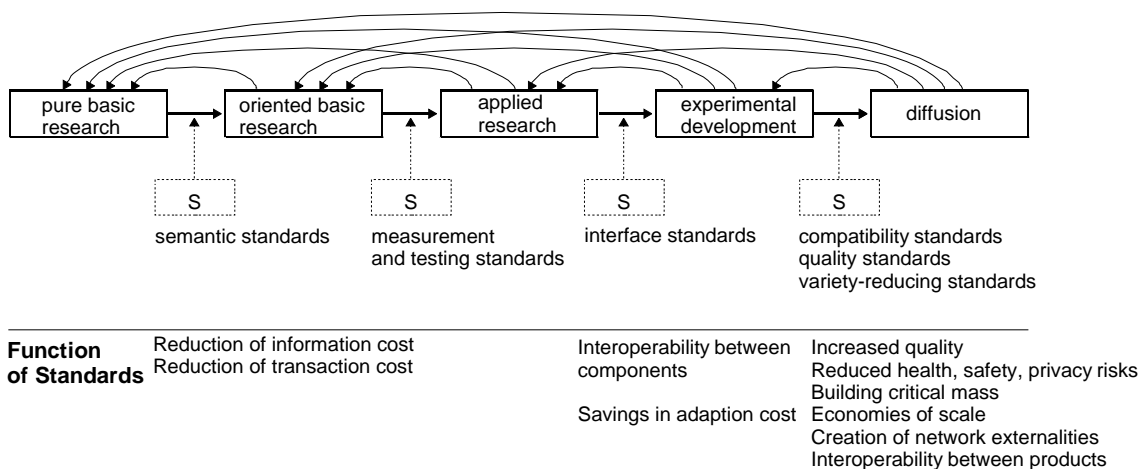
Besides taking into account the various functions of standards, we introduce a further dynamic dimension, which makes explicit that standards play a crucial role in the research and innovation process with its various feedback loops (see Figure 2). More specifically, we distinguish the various roles of different types of standards within and between the different phases of the whole innovation process. The approach provides a further differentiation of the already presented functions by David (1987), who discuss the general economic functions of standards especially in the market or between actors in the market, or the analysis of David and Greenstein (1990), who focus on the economic impacts of compatibility standards, which is applied to the telecommunication market by David and Steinmueller (1994). This concept was developed by Blind and Gauch (2008a) in the context of the analysis of standardisation in the emerging field of nanotechnology.

Terminology standards are already required in basic research investigating new technologies, like nanotechnology, in order to allow or facilitate efficient communication, but they play a crucial role in the transfer of knowledge from basic to oriented-basic and applied researchers. The transfer of knowledge from basic to applied research requires in addition measurement and testing standards, which allow progress towards first product-related developments. The gap between applied research and experimental development of new products and processes is facilitated by interface

standards, which allow the interoperability of components integrated into product or process technology. Finally, the transition of pilot products into mass markets requires, besides compatibility standards to ensure the interoperability between products or whole systems, above all quality standards which guarantee that the products comply with some minimum safety regulations.

Requirements such as quality and safety standards are either set by a regulator (Blind et al. 2004), who refers in his regulation to a set of specific standards, like in the New Approach in Europe, or are demanded by lead users and early adopters who are interested in the new products, but not willing to accept rather large risks by using these new, unknown products. Finally, the diffusion of new products is fostered by variety-reducing standards which allow the exploitation of economies of scale and by compatibility standards generating positive network externalities among users.

Figure 2: Various Roles of Different Types of Standards in the Innovation Process



Source: Blind and Gauch (2008a)

In general, the self regulation of the actors in the innovation system promotes existing trajectories of technologies, but is not an instrument to push radical innovations, i. e. completely new technologies. The involvement of all relevant stakeholder groups leads to a consensus of interests taking all preferences of the involved parties into account. This procedure has implications for the released specifications and consequently for the impacts on innovation. If we assume that besides the technology providers, i. e. the supply side, the users and consumers are adequately represented, but also representatives of environmental groups and other stakeholders in society, then we can expect standards, which promote incremental innovations balancing the interests of the involved stakeholders. This means that they promote also user-driven or customer-oriented solutions and take as well environmental concerns into account, which is different than simple technology-driven specifications. However, despite the openness of standardisation processes weak stakeholders like consumers, but also small and medium sized enterprises have problems to participate adequately in these processes, which is likely to lead to specifications biased to the preferences of large companies having different implications on innovation.

The empirical analysis of impacts of standards has to reflect both the various economic functions of standards, their sometimes ambivalent impacts and their changing role in the innovation or better technology and market cycle. Consequently, such ambitious research has been started only in the middle of the 1990ies. Swann et al. (1996) studied the impact of technical standards on trade flows followed by the analyses of Blind and Jungmittag (2005). The latter tried to assess also the impact of standards on economic growth (Blind, Jungmittag 2008). Based on first findings by Blind (2004), it became obvious that the output of research activities require or generate new standardisation activities, but also that standards promote the diffusion of new technologies and provide the platform for subsequent innovation activities. In network industries, like

telecommunication and software, the diffusion of new technologies and services is almost impossible without standards implemented. Existing standards may also present hurdles for new technologies and products, because they compete with existing technologies and products, which are more familiar to the users and in which additional human and physical capital has been invested. This example underlines the relevance, but also the ambivalence of standards for the development of technologies and industries. Consequently, the assessment of the impacts of standards is a challenge, which has not yet been tackled (Blind 2006b).

Future Challenges

The relevance of standards is even increasing both for the economy and the society and therefore policy makers. Companies face further globalisation leading to world-wide collaboration with other companies and customers and to a further differentiation of the value chains including new business models. Consequently, the number and complexity of interfaces between the involved organisational units increase further, which lead to an increased demand for standards, e. g. for world-wide procurement (Blind et al. 2007). Furthermore, the convergence of technologies challenges also standardisation, because different technologies, their particularities, but also the related scientific and industrial communities have to be coordinated in order to develop a sustainable and broadly accepted consensus (Gauch, Blind 2008). In front of these developments, but also the illustration of the multi-dimensional functions of standards, the challenges, but also the opportunities of standards and standardisation being used by policy makers increase. Standards and standardisation become an important instrument for research policy as currently seen in the context of nanotechnology (Blind, Gauch 2008a), standards are an important part of the regulatory framework and are able to push innovation (Blind 2008b) not only from the supply side, but also from the demand side, for example in public procurement (Blind 2008a). In addition, standards are still an important instrument to promote trade not only for goods but also services (Blind 2006a) in a globalised world, but even to integrate developing countries in the world trade and economic system (Blind 2005). Finally, formal standardisation processes are challenged by informal standardisation consortia, which became very relevant in the field of information and communication technology (Blind, Gauch 2008b). The major challenge is to coordinate the activities in the formal and informal standardisation areas in order to exploit the possible synergies and to avoid possible conflicts and fragmentations.

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