

Economic benefits of standardization

Summary of results

Final report and practical examples

Part A: Benefits for business

Part B: Benefits for the economy as a whole

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Foreword

In recent years, technical standardization has been the subject of numerous academic research projects. Although these projects did not ignore economic aspects, they lacked the theoretical background necessary for a detailed analysis. Industry has become increasingly interested in assessing its economic efficiency, and thus is more interested in the role of standardization.

Systematic and reliable results can only be attained on a common basis. Because there is greater pressure on industry to rationalize, the costs and benefits of standardization must be examined from both a microeconomic and a macroeconomic viewpoint. The Presidial Board of DIN therefore asked research institutes to initiate research into the economic efficiency of standardization, with the aim of making the costs and benefits of standardization transparent from both economic perspectives.

DIN, the German Institute for Standardization, contracted the Fraunhofer Institute for Systems and Innovation Research Karlsruhe (ISI Karlsruhe) and the Departments of Market-Oriented Business Management and of Political Economics and Economic Research at the Technical University Dresden to jointly carry out this research project in Germany, Austria and Switzerland.

This final report on "The economic benefits of standardization" presents the conclusions of the research carried out in these three nations, with the following conclusions:

As expected, company standards have the greatest positive effect on businesses, for they help improve processes. When it comes to the relationship with suppliers and customers, however, industry-wide standards are the main instruments used to lower transaction costs and assert market power over suppliers and customers. In fact, industry-wide standards play a vital role in our increasingly globalized world. 84% of the companies surveyed¹ use European and International Standards as part of their export strategy, in order to conform to foreign standards.

From a macroeconomic perspective, it is significant that standards make a greater contribution to economic growth than patents or licences, that export-oriented sectors of industry make use of standards as a strategy in opening up new markets, and that standards help technological change.

This research project shows that industry-wide standards not only have a positive effect on the economy as a whole, but also provide benefits for individual businesses who use them as strategic market instruments.

We would like to express our gratitude to the following companies and institutions for their financial support and willingness to provide a forum for discussion during the research project:

- the German Federal Ministry of Economics and Technology (BMWi),
- DaimlerChrysler AG,
- the German Electrotechnical Commission of DIN and VDE,

¹ In the company survey carried out by the TU Dresden and presented in Part A of this document.

- Hans L. Merkle-Stiftung im Stifterverband für die Deutsche Wissenschaft (Bosch),
- Siemens AG,
- ThyssenKrupp AG,
- the Austrian Standards Institute (ON),
- the Swiss Association for Standardization (SNV).

In addition to the present summary of research results, the Beuth Verlag has published the full reports of the participating institutes².

Dr.-Ing. Torsten Bahke
Director of DIN

² Gesamtwirtschaftlicher Nutzen der Normung, **Unternehmerischer Nutzen 1**, Wirkungen von Normen: Ergebnisse der Unternehmensbefragung und der Experteninterviews (in German)

Gesamtwirtschaftlicher Nutzen der Normung, **Unternehmerischer Nutzen 2**, Statistisches Material und Auswertung (in German)

Gesamtwirtschaftlicher Nutzen der Normung, **Volkswirtschaftlicher Nutzen**, Zusammenhang zwischen Normung und technischem Wandel, ihr Einfluss auf die Gesamtwirtschaft und den Außenhandel der Bundesrepublik Deutschland (in German)

Preface

The development of standards and technical rules by institutions given authority to do so by both the private and public sectors is an essential element of the technological and economic infrastructure of a nation, and greatly influences its competitive ability and the strategies of companies. Increasing globalization has dramatically changed the international business environment. This fact, together with the changing role of standardization within the European and international contexts, make it necessary to examine both the form and content of standardization procedures in order to identify the economic implications of standards and technical rules.

The joint research project "Economic benefits of standardization" was carried out simultaneously in Germany, Austria and Switzerland, having been initiated by DIN, the German Institute for Standardization. DIN contracted the Department of Market-Oriented Business Management and the Department of Political Economics and Economic Research at the TU Dresden and the Fraunhofer Institute for Systems and Innovation Research, Karlsruhe to carry out the project. Part A, "The effects of standardization: Results of the company survey and interviews with experts" was carried out by the TU Dresden, and Part B, "Standardization and technological change, the effects of standardization on the German economy and foreign trade" was researched by the Fraunhofer Institute. Due to technical and organizational limitations, the study only dealt with selected aspects of the economic implications of standardization.

This analysis of the economic benefits of standardization takes as its starting point the four main partners in standardization: businesses, private households, the state and the standards body; the latter acts as an intermediary between the other three. These three are affected by standardization in different ways. Their reactions and their motivation to become involved in standardization work form the basis of the research by the TU Dresden. In contrast, the Fraunhofer Institute adopted a macroeconomic approach, concentrating on the link between standardization and technological change, and the relationships between standardization, economic growth and exports. Together, the two parts of this study provide an interdependent analysis of the microeconomic and macroeconomic effects of standardization.

The research undertaken by the TU Dresden aimed to identify the economic effects of standardization. Starting with a theoretical framework, the effects of standards on individual businesses, particular sectors, and the economy as a whole were examined. Of particular interest were the sources of motivation for participating in the standardization process. The hypothetical framework was tested in a company survey carried out in Germany, Austria and Switzerland. In addition, interviews were held with German and Austrian experts who represent the interests of private households and the state.

The Fraunhofer Institute concentrated its research on the link between standardization and technological change. The question here was to find out whether the form and content of standards have a positive influence on technological change in Germany, and whether the standardization process responds to this change enough to give Germany an advantageous position in the global market. In conclusion, the implications of these factors for economic growth and export are assessed, and the results compared with the responses to the company survey.

Dresden and Karlsruhe, April 2000

The Authors

Part A: Benefits for business

The effects of standardization: Results of the company survey and interviews with experts

The four partners in the standardization process are linked in a number of ways. A framework of hypotheses was established on the basis of the literature and the principles of industrial economics. A company survey was then carried out in Germany, Austria and Switzerland to check the validity of these hypotheses. Module 4,³ which includes the results of the company survey, examines in detail whether there were any fundamental differences between the responses from the three countries.

In close cooperation with the national standards bodies, ten sectors of industry were selected, in eight of which standardization activity is particularly intense. For control purposes, two sectors in which there is less activity were also selected. Over 4,000 companies were selected at random and sent a printed questionnaire. The response rate was over 17%, giving 707 completed questionnaires for evaluation. The questionnaire contained 49 questions covering more than 340 details.

The other partners in standardization, private households and the state, were represented in interviews carried out with ten experts each in Germany and Austria.

The present summary presents the most significant empirical results of the company survey and the expert interviews, which are compared with the above-mentioned hypotheses. A more extensive discussion of these results is presented in module 5.

Hypotheses were checked for validity in a company survey and interviews with experts

A survey of over 4,000 companies in Germany, Austria and Switzerland was carried out

Response rate over 17%

Expert interviews were held with representatives of public interest groups, private households and the state

³ The results of this study are divided into five modules. Module 3 contains theoretical details, module 4 presents empirical results, and module 5 presents the fusion of theory and practice. (These modules are published as a series of reports, see page 5, footnote 2.)

This study focuses on the effects of standards on a company, as well as on that company's interaction with its immediate business environment. These effects have a direct influence on company strategy. In particular, the study concentrates on the effects of standards on costs in general, on research and development, and safety. The effects on the company's own business sector include potential competitive advantages over other companies, and the formation of strategic alliances. Finally, the relationship between the company and its national standards body was examined.

1. Strategic significance of standardization

In a situation analysis initiated by DaimlerChrysler AG, experts from business, research, industrial organizations and standards institutes established that the relevance of standards could be demonstrated in "numerous arguments, illustrations and examples"⁴. However, although this information is well-known to standardizers, decision-makers within companies seem hardly aware of it. This inadequate information means that the strategic potential of standards is not fully appreciated, and the decision to participate in the standardization process is made only on the basis of how time-consuming and costly this will be.

The company survey revealed that even though some companies are not sufficiently well-informed, they are at least partly aware of the strategic potential of standardization and can benefit from it.

An example of this can be seen in the fact that 75% of the businesses surveyed confirmed that they are involved in activities at the German Institute for Standardization (DIN), the Austrian Standards Institute (ON) or the Swiss Association for Standardization (SNV). Because these companies want to have an influence on international standardization, 60% of their national involvement is at the European or international level.

A three-part report:

- **Effects of standardization within a company**
- **Effects of standardization on the company and its business environment**
- **Relationship between the company and its national standards body**

Companies are generally unaware of the strategic significance of standards

National involvement in standardization in order to influence European and International Standards

Example	Page
– ISOfix system	31
– Geometric product specification	31
– Digital field protection	31

⁴ Cf. the lecture by Dr. Ing. Ghiladi: Strategic uses of standardization for businesses. Report on the 31st conference on standards in practice: Using knowledge to shape the future, Essen 1999.

The survey showed further that businesses which are actively involved in standards work more frequently reap short- and long-term benefits with regard to costs and competitive status than those which do not participate. Participating companies have more of a say in the adoption of a national standard as a European or International Standard. In this case, the company gains a competitive edge because it will not need to make extensive modifications in order to conform with a European or International Standard.

When a legislative body requires a technical rule, it will frequently turn to standards. If a company has been actively involved in developing these standards, it can adopt the standard before it becomes law, avoiding costs which would otherwise be incurred at a later stage. 25% of the businesses surveyed had already chosen such a strategy at least once. Of these, 36% had been able to make large to very large savings (on a rating scale of five ranging from very little to very large).

2. Potential competitive advantage through standards

The businesses surveyed rated the positive effect of company standards on competitive status as slightly greater than that of industry-wide standards (+10.4 over +8.1 on a scale from -50 = very negative to +50 = very positive). The variance among these evaluations is large enough to be statistically significant⁵. This suggests that company standards are seen to have a more positive effect on competitive status than industry-wide standards (e.g. DIN Standards) and private industry standards (e.g. IBM standards, rated +8.2 on the scale).

Where national standards are adopted as European and International Standards, participation in standards work more frequently results in advantages regarding costs and competitive status

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– ISO fix system	31
– Geometric product specification	31
– Digital field protection	31

Involvement in standardization in order to anticipate new legislation and so avoid costs

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– Construction products	32

Competitive advantage more through company standards than through industry-wide or private industry standards

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– Repair costs	32
– Standardized VW components	32
– Standardized DASA components 1	33
– Standardized DASA components 2	33

⁵ Statistically significant: There is a lower than 5% probability that the results of a statistical investigation contradict a particular hypothesis, although it is correct.

A major motivation for those businesses which participate in the standardization process (52 % of those surveyed) is their edge over non-participating companies in terms of insider knowledge. Early access to information is considered to be more important than the time advantage (60 over 55.5 on a scale from 0 = extremely unimportant to 100 = very important). For those companies which improve their competitive status through participating, the advantages of insider knowledge are significantly more important than those of time.

The survey shows that companies are able to assert their interests in the standardization process. More than 50 % are able to exert a great to very great influence on the substance of standards, 46 % are able to prevent undesired contents being included, and 48 % are able to get desired contents included.

Thus, having an influence on the content of a standard is an important factor in gaining competitive advantage.

3. Standards in global markets

Companies are confronted by different standards in foreign markets. 84 %⁶ of the businesses surveyed use European and International Standards in order to conform to other national standards. A third of all businesses surveyed achieve their position in the export market with products that conform to their own national standards, and 27 % of them adapt their products and services to foreign standards.

Asked about the costs incurred by adapting production to conform to foreign standards⁷, 80 % of those surveyed could provide no figures. 10 % of correspondents knew the costs involved, but did not want to divulge the figures for security reasons. Those who did provide figures gave the costs of adapting to foreign standards as averaging DM 350,000 per

The advantage of insider knowledge

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– Insider knowledge	33
– Geometric product specification	31

Insider knowledge more important than time advantage

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– Valves	33

Competitive advantage through influencing contents of standards

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– Valves	33
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– Food technology	34

Export strategy of businesses: Conforming to European and International Standards

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– Construction products	32

80 % of the businesses surveyed do not know the exact cost of adapting to foreign standards (figures given ranged from DM 2,500 to DM 6 million)

⁶ More than one response possible.

⁷ By "foreign standards" we mean all standards which do not correspond to European or International Standards, but which differ from national standards.

year. The figures given ranged from DM 2,500 to over DM 6 million.

Harmonized European and International Standards result in businesses reducing their trading costs. 62 %⁸ of the businesses surveyed stated that European and International Standards simplified contractual agreements. 54 % of the businesses surveyed stated that European and International Standards had lowered trade barriers in their sector. National standards can be used as non-tariff trade barriers against economic regions with different standards. With the globalization of the marketplace, there are increasing demands for a worldwide system of standards (ISO/IEC Standards). At a European level, this demand is met by European Standards.

61%⁹ of the businesses surveyed stated that there are costs involved in conforming with European and International Standards. In 37 % of the companies these costs are incurred because staff involved in standardization work have an increased workload through travel, using foreign languages, etc. 37% of the businesses surveyed feel increased pressure from their rivals because of the existence of European and International Standards. 46 % of them were able to save money because they did not need to adapt their products for export markets. 39 % of the businesses surveyed saw improved opportunities for cooperation, and 36 % benefited from a greater choice of suppliers.

The businesses surveyed claimed to have saved a total of DM 31 million per year as a result of European and international standardization. However, only 9.3 % of them provided actual figures, giving average savings of DM 466,000 per year. The figures given costs of range from DM 4 million to cost savings of DM 13 million.

Advantages of harmonized European and International Standards

- **Lower trading costs**
- **Simplification of contractual agreements**
- **Lowering trade barriers**

<u>Example</u>	<u>Page</u>
– Laser pointers	35
– Manufacturer's declaration	35

Costs and savings due to the application of European and International Standards

<u>Examples</u>	<u>Page</u>
– Laser pointers	35

Only 9 % of the businesses surveyed were prepared to give actual figures for costs and savings

⁸ More than one response possible.

⁹ More than one response possible.

4. Cost reduction through standardization

Standardization can lead to lower transaction costs¹⁰ in the economy as a whole, as well as to savings for individual businesses.

The results of the survey reflect this. The businesses surveyed rate the effects of standardization on transaction costs as positive (mean value of +21.8 on a scale of –50 = very negative to +50 = very positive), indicating that transaction costs drop considerably as a result of standards, for they make information available and are accessible to all interested parties. They are therefore a factor in reducing transaction costs.

The interviews with experts, which were carried out with representatives of major firms as well as of small- and medium-sized enterprises, revealed that the costs of developing company standards and industry-wide standards are not easily quantified. The company survey took account of this by asking about the effects of company standardization and industry-wide standardization on production costs and on the amount of communication necessary between departments. The businesses surveyed rated the reduction in production costs through company standards as considerable, i.e. as statistically significant, and greater than that through industry-wide standards (+17.2 over +3.9 on a scale of –50 = very negative to +50 = very positive).

The effect on interdepartmental communication is rated considerably higher for both company standards and industry-wide standards (+23 over +14.5). For both types of standard, the positive effect on interdepartmental communication is rated significantly higher than the effect on production costs.

Reducing transaction costs through standards

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– Waste water engineering	35
– The International System of units	35
– Lasers	34
– Maintenance costs	35

Costs of developing company standards and industry-wide standards are not easily quantified

Company standards help lower production costs more than do industry-wide standards

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– Repair costs	32
– Standardized VW components	32
– Corrosion protection	36
– Standardized DASA components 1	33
– Standardized DASA components 2	33

Positive effect of company and industry-wide standards on interdepartmental communication

Example	Page
– Efficiency	36

¹⁰ In a market context, transaction costs include the cost of gathering information, negotiating, market positioning, etc.

5. Effects of standards on the supplier-client relationship

The survey revealed that standardization was rated positively in its effect on buying power over suppliers (+13,8 on a scale of -50= very negative to +50= very positive). The application of standards and participation in standards work relevant to the supplier market can therefore enable a company to exert market pressure on their suppliers. Thus, we may conclude: The dependence of a business on a single supplier can be reduced by standardization.

Standards can help businesses avoid dependence on a single supplier because the availability of standards opens up the market. The result is a broader choice for businesses and increased competition among suppliers. Companies will also have increased confidence in the quality and reliability of suppliers who use standards.

Standards are also used by businesses to exert market pressure on companies further down the value added chain, i.e. their clients. Those surveyed rated the effect of these standards in this context as slightly positive (mean value +11.6). Businesses are thus able to use standards to broaden their potential markets. However, this also exposes them to more competition.

The effect of standardization on the market influence on suppliers is considerably - that is, statistically significantly - higher than that on clients.

6. Standards and the formation of strategic alliances

Industry-wide standards form a collection of harmonized technical rules. This "coding" of knowledge can help businesses cooperate and create strategic alliances. In the company survey, respondents rated the effect of standardization on cooperation with competitors as rather positive (+14.2 on a scale from -50 = very negative to +50 = very positive). Standardization therefore encourages cooperation between

Standards have a positive effect on the buying power of companies

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- Masonry units	34
- High tech door locks	36

Standards offer a wider choice of suppliers with the same degree of quality

Examples	Page
- Masonry units	34
- Food technology	34

Standards are used to exert market pressure on clients

Standards effect relationship with suppliers more than that with clients

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- High tech door locks	36

Industry-wide standards have a positive effect on cooperation between businesses

businesses at the same stage in the value chain.

The surveyed companies rated the effect of private industry standardization on cooperation with competitors as positive (+13.4). Private industry standards are characteristically developed by businesses with a common goal, without consensus or public participation, but with the involvement of other interested parties. For this reason we expected the rating to be clearly higher than that for industry-wide standards. Respondents rated industry-wide standardization (+14.2) slightly more positively than private industry standards, but the difference is not statistically significant. There is no great difference between the effect of private industry standards and industry-wide standards on forming strategic alliances with businesses at the same valued added level.

In any case, it is clear that cooperation between companies in matters of standardization is advantageous, for the resulting synergy can help reduce costs and increase profits. There may, however also be negative economic effects. For instance, overly close cooperation can lead to a monopolistic structure, with all the resulting disadvantages for the consumer. It should be noted, however, that this study only compared businesses which are at the same stage in the value added chain, and it cannot be used to assess the effects on businesses which are not immediate competitors.

7. Standards and research and development

The results of the company survey show that industry-wide standards present less of a hindrance to innovative projects than do other factors (34.8 where standards are available, 32.9 where they are not available, on a scale from 0=no hindrance to 100=great hindrance). In comparison, long administrative and bureaucratic procedures were rated at 61.2 and the economic risk of innovative projects was rated at 61.1 on the same scale.

Similar use of private industry standards and industry-wide standards when forming strategic alliances

Cooperation between businesses can result in cost reduction but also in monopolization

Standards are not a great factor in hindering innovative projects

Businesses can reduce the economic risk of their R&D activities by participating in standardization. Those businesses which do participate rated the risk of investing in non-competitive technology as low (mean value 29.8 on a scale from 0=very low to 100=very high). When a company can influence the content of standards to its advantage, the risk is lower.

Reducing R&D risk by participating in standards work

Businesses not only reduce the economic risk of their R&D activities by participating in standardization, but can also lower their own R&D costs. The businesses surveyed responded that these costs increase at a considerably slower rate when they participate in standardization than if they do not (mean value +0.7 as opposed to +3.4, on a scale of -50=fall greatly to +50=increase greatly). The expense of R&D can be reduced when the participants in standards work make their results generally available, and research need not be duplicated.

Reducing R&D costs by participating in standards work

8. Reaction time of standardization

Since it takes an average of five years to complete an industry-wide standard, such standards are particularly relevant in markets where product lifespans are longer than five years. This was confirmed statistically by the responses to the company survey. Where the product lifespan is longer than five years, businesses rate the relevance of industry-wide standardization considerably higher than where it is two to five years, or less than two years (mean value +74.5 with +60.1 and +45.8, on a scale of 0 = irrelevant to 100 = very important).

Relevance of both industry-wide standards and private industry standards increases with product lifespans

Both private industry standards and industry-wide standards were rated similarly here, with industry standards being most relevant for product lives of over five years (+70.5), statistically significantly less for product lives of two to five years (+59.5) and lowest for product lives of less than two years (+47.5).

Industry-wide standards work is open to all interested parties, whereas private industry standards are created by business alliances formed to gain a competitive advantage. We therefore assumed that in-

Where product lifespans are short, there is little difference in the significance of

dustry standards would be more popular where products have short life cycles. However, the survey did not confirm this. The rating for product lifespans of less than two years was higher for private industry standards than for industry-wide standards (+47.5 over +45.8), but this difference is not statistically significant. With product lifespans over five years, industry-wide standards become much more important than private industry standards.

9. Product safety and liability

The results of the interviews revealed that standards contribute to lower accident rates. Accident insurers, such as the Allgemeine Unfallsversicherungsanstalt, see standards primarily as a factor in accident prevention. However, all of the interview partners only gave standards partial credit for lower accident rates. In Germany, for instance, the accident prevention regulations of the employers' liability insurance associations have also contributed to improved safety records. Even where it is possible to determine the actual contribution of standards to lowering accident rates, our interview partners could not evaluate this in monetary terms.

Representatives of consumer organizations generally participate in the standardization process when there are questions of product safety. They see their involvement as having increased industry's awareness of the importance of product safety, and safety requirements are now more likely to be included in standards.

10. Public interest

Because standards reflect the current state of technology, they can help businesses reduce their liability risk. In questions of liability, legislators often fall back on a general clause which specifies that technical products are to be designed to recognized technical rules, such as standards.

private industry standards and industry-wide standards

Where product lifespans are long, industry-wide standards are more significant than private industry standards

Lower accident rates are partly due to standards

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– Dust explosions	37
– Street lighting	37
– Laser pointers	35

Participation in the standardization process increases awareness of product safety

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– The Internet	37

Reducing liability risk through standards

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– Salmonella	37
– Biotechnology	38
– Construction products	32

Current legislation refers to approximately 20 % of the DIN standards collection. Because they are formulated by experts, standards are of great use to the state in drawing up legislation, for it can refer to them. If the state feels that the requirements set out in a standard are not sufficiently stringent, modifications can be made.

11. Standards work

The company survey showed that approximately 70 % of respondents support a system of majority decisions, and 66% of them want the standardization process to be shorter. 40% of the respondents prefer majority voting with veto rights for their own interest group, i.e. for companies, experts and industrial organizations. We expected that participants in the standardization process would be more in favour of decisions by consensus than non-participants, and so we examined the difference between their responses. However, no differences emerged between the two groups, majority decision-making being supported equally by both.

Seen in the context of all possible changes to the standardization process, a switch from consensus to majority voting plays a minor role. 28 % of those participating in standards work supported the idea, and 15 % of the non-participants.

When companies were asked about which changes to the standardization process they would welcome, majority decision-making emerged as an even less important factor. For the companies who participate in standardization, the use of electronic media and improved project management were of primary concern. Non-participating companies would be motivated to participate if they received more information on relevant standards projects.

A majority of the interviewees supported the idea of consensus rather than majority votes. According to them, anything other than the consensus principle would mean that minority interest groups would have only limited influence and could be ultimately overruled by majority votes.

Standards assist the state

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– Laser pointers	35
– Bathing water	38
– Sound insulation	38
– Biotechnology	38
– Wood preservatives	39
– Military equipment	39

Companies prefer majority voting

A switch to majority voting is less important than other desired changes to the standardization process

Possible changes to the standardization process

- more project management
- more information for non-participants
- increased use of electronic media

Representatives of minority interest groups, such as consumers, are largely in favour of consensus

The most frequently given reason for supporting consensus was that standardization depends on knowledgeable discussion and should a political vote.

12. Standards bodies

DIN, ON and SNV – the German, Austrian and Swiss national standards bodies, respectively – are often seen as being bureaucratic. The companies surveyed agreed with this viewpoint (mean value 58.6 on a scale from 0 = not at all to 100 = in complete agreement). They also agreed that DIN, ON and SNV are overly expensive in relation to the services they provide (59.8). However, they do not consider the standards institutes to be superfluous (16.8), but rather as necessary instruments in creating technical rules (79.5).

80 % of the companies believed they would face additional costs, estimated at about DM 540,000 per company per year, if DIN, ON and SNV ceased to exist. 30 % of the companies thought they would save about DM 150,000 per year without the standards bodies

The interviews produced similar results. Organizations such as the Stiftung Warentest (which represents German consumer interests) would face additional annual costs of around DM 1.2 million without DIN because in-house standardizers would have to work alone without input from other participants in standards work. Stiftung Warentest estimates that four to five times as much work would be required to complete standards work independently.

Industrial employers' liability insurance associations could produce their own safety regulations without the help of DIN, but they would then be at a disadvantage at the European and international levels, for the accident insurers would have insufficient influence. An accident insurer's representative said in the interview that "cooperation with DIN is the only feasible approach to standardization at the European level".¹¹

DIN, ON and SNV are necessary, but too bureaucratic and too expensive

All partners in standardization would incur more costs without the help of DIN, ON and SNV

Even in sectors where national regulations are valid, cooperation with DIN is necessary to have an impact on European and international standards work

¹¹ See the interview with the industrial employers' liability insurance association.

Part B: Benefits for the economy as a whole

Standardization and technological change, the effects of standardization on the German economy and foreign trade

1. Approaches and objectives

The potential for innovation is an important factor in maintaining competitiveness and economic growth in a high tech economy. However, innovation is only a necessity and not in itself sufficient for an economy to remain competitive in a global context in the face of high labour costs. New products and improved methods of production must quickly assert themselves as broadly as possible for a positive economic development. This means that national policy should not only stimulate innovation, but must also ensure its efficient diffusion. In addition to private sector marketing strategies, state legislation and public procurement programmes, standardization by non-government standards bodies, such as DIN, is a suitable instrument for disseminating new ideas, products and technologies.

This part of the study presents the first economic analysis of the interaction between technological change and standardization, and the implications for the German economy and foreign trade.

2. Results of the analysis of the connection between standardization and technological change

Technological change was assessed using as indicators the number of registered patents and the level of R&D spending, while standardization was assessed by the number of published standards and technical rules listed in PERINORM, the Beuth Verlag database. A first step was to examine the connection between innovation in Germany and its dissemination by means of standardization. Using the ICS

Innovation potential alone is not sufficient to maintain competitiveness

An efficient dissemination of innovation via standards is a precondition for economic growth

subject classification of standards as a basis of study, we found a significant correlation between the numbers of patent registrations and existing technical rules. This confirms that more new standards are published in innovative sectors than in those which are less so. A similar correlation was found using R&D expenditure as an alternative indicator.

New standards are more numerous in innovative sectors

While the cross-section analysis did not permit any conclusions to be drawn regarding causal relationships, a time series analysis was carried out to examine whether changes in the degree of innovation are reflected in standards work, and whether the standards collection has an effect on technological change. Because the simple cross-correlation analysis provides evidence of such a connection, we examined the extent to which the degree of technological change – measured by the annual number of patent registrations and by R&D expenditure – has an effect on the rate of standardization and the size of the standards collection. Both variables were shown to have a significantly positive influence on the number of standards, and at least at the greatly aggregated macroeconomic level, the assumption seems to hold that German standards work responds adequately to technological change. This conclusion is supported by the results of an analysis of the longevity of standards, which showed that in most subject groups the lifetime of standards was shorter where there was a higher degree of technological change.

German standardization responds adequately to technological change

The lifetime of standards is shorter where there is greater technological change

On the other hand, the question emerges as to how far new standards and increasing numbers of standards have a positive, or possibly a negative, effect on innovation in Germany.

Standards as a positive stimulus for innovation

It is difficult to use statistical methods to answer this question, since innovation, when measured by the number of patent registrations, is greatly influenced by other factors, such as R&D expenditure. However, a positive influence is evident, in that the size of the standards collection – which in most subject groups is growing – has a positive influence on Germany's innovation potential.

Positive influence of standards on innovation

Because of the close link between innovation and its diffusion by means of standards, the selection of subjects for standardization must be more closely guided by technological change and the current state of science and technology.

In sectors characterized by very short product lives and development cycles, standardizers should systematically withdraw, and not replace, standards which have outlived their scientific and technical significance (this procedure is laid down in DIN 820-4). In general, the standards collection should focus on sectors which are important to the economy and society.

Because standardization is a form of technology transfer, it is particularly important to get businesses that are leaders in their sectors involved in new standards projects. Further, all participating businesses must be convinced that the benefits of sharing the R&D results of other companies are greater than the risk involved in revealing their own results.

3. Significance of standardization for the economy as a whole

Another step in the analysis was to examine the effects of standardization on the economy as a whole. In a macroeconomic analysis covering the period 1960 to 1996, we examined the business sector using the conventional production factors, capital and labour, as well as three output indicators of technical progress: the number of registered patents, German expenditure on licences for foreign patents, and the number of standards and technical rules. The contribution of each production factor to overall economic growth was derived from a regression analysis. When the three factors were compared, it became evident that standards were at least as important for technical innovation as patents. This makes it clear that innovation potential is not the only deciding factor in economic development, but that it must also be broadly disseminated by means of standards and technical rules.

Standards should be withdrawn as soon as they are technically outdated

Leaders in technology should become more involved in standardization

The effects of standardization on the economy as a whole

Indicators for technological progress

- **Patents**
- **Expenditure on export licences**
- **Number of standards**

Standards are as important for economic growth as patents. Diffusion of innovation through standards is a decisive factor

4. Significance of standards for foreign trade

While in the past, political and economic discussions focussed on trade barriers such as duties, after GATT and WTO agreements, discussions concentrated on non-tariff trade barriers. Standards and technical rules were often misused as such. In the 1970s and 1980s, a confrontation arose from the difference between the metric and the American systems of measurement for screws. This made it evident that differing national standards can be used wittingly or unwittingly as an instrument in foreign trade policy, thus having a generally negative effect on the economies of the trade partners, although there may be a certain advantage at the national level.

Despite the existence of contradictory national standards, the very fact that the standards exist is positive because they make the characteristics of domestic investments and consumer goods more transparent, in particular for foreign producers and consumers. This means that optimum investment decisions can be made, and products can be purchased and consumed to suit individual preferences. National standards and technical rules are, like patents, indicators of the technological potential of a nation. Not only the generation of innovation, but also its broad dissemination by means of standards has an effect on the economy as a whole, brings such benefits as at least short-term competitive advantages in the international marketplace. When a domestic business that participates in the standardization process immediately applies standards, it gains a competitive edge with regard to costs and quality. Money can be saved as well if foreign suppliers also adopt the standards, because then primary and intermediate products can be imported at a lower cost.

The aim of our analysis of the link between standards and foreign trade was to find out to what extent standards have a positive or negative effect on foreign trade in Germany and whether particular sectors are affected in a certain way. We have differentiated between national and international or harmonized European standards to examine their different effects

In the past, standards were misused as non-tariff trade barriers

The very existence of standards is positive for trade

Cost and quality advantages for businesses who use standards

on the major trade partnerships in Germany.

A theoretical analysis revealed that it is not possible to differentiate the effects of purely national and those of adopted European and International Standards. However, considering the high reputation and quality of German standards and assuming that standards are in general an indicator for innovative technological competitiveness, we can expect them to have a considerable influence on exports.

Economic theory supports the view that international standards have a positive influence on export and cannot be misused as non-tariff trade barriers.

We initially carried out a cross-section analysis of the major bilateral trade relations. While the technological portfolio of a nation provides a reliable explanation for its foreign trade surplus, the number of standards and technical rules is only a significant positive factor in one-third of the bilateral relationships examined. It was not possible to identify any systematic difference between the significance of national and that of international standards.

Taking into account the different functions and structures of standards in different sectors of the economy and technology, we then performed a detailed analysis of 36 bilateral trade relations for the year 1995.

In a majority of sectors, the positive (negative) differences in national innovative potential can explain an export surplus (or import surplus). With regard to our hypotheses on the number of standards, the results are clearer. In spite of ambivalent theoretical considerations, the estimates for approximately one-third of subject areas confirm that there is an export surplus where there is a large number of standards. However, for the majority of subject areas there are no significant results, reflecting the ambivalence of the theoretical approaches. There are also a few subject groups in which a greater specialization of standards actually stimulates import rather than export. No general differences could be established between the collections of purely national standards and international standards. Overall, the analysis

Positive effects of standards on foreign trade

Standards are an indicator of innovative technological competitiveness

A cross-section analysis of the most important bilateral trade relations was carried out

The number of existing standards cannot explain in all cases structures in bilateral trade relations

An analysis by economic and technology sectors was undertaken

In one-third of technological sectors, standards play a positive role in creating export surpluses

showed that standards do not have a negative, but rather a positive significance for national competitiveness as a precondition for exports, depending on the technology in question.

In addition to checking the hypotheses which were derived from the theory of competitive advantage and trade distortions, we carried out a separate examination of the hypothesis that compatibility and quality standards generate trade, while the standards which reduce variety limit trade. This latter hypothesis was derived from the principles of intra-industry trade within a product group. Our study on the basis of ICS subject groups confirmed the hypothesis that international standards promote intra-industry trade more than national standards do.

In addition to the cross-section analysis, a time series analysis was carried out for the period between 1981 and 1995 to ascertain whether there is a statistically significant causal relationship between the size of the standards collection and export and import levels.

A first model was used to examine the influence the size of the standards collection and technological specialization have on German exports world wide and on German imports. Further, bilateral trade between Germany and the UK and Germany and France was examined.

The increasing importance of technological competition means that German exports do particularly well in sectors in which Germany holds a large share of patents. As opposed to other macroeconomic indicators, the development of the standards collection has no significant influence on Germany's total exports. However, if we distinguish between national and international standards, it becomes evident that the former actually have a rather unfavourable influence on German exports, because they tend to be overly oriented to national needs.

Germany imports more in product groups in which the country has a technological advantage, bringing in intermediary products for further processing.

Standards have a generally positive effect on exports

International standards encourage intra-industrial trade more than national standards

Time series analysis

Development of the national standards collection has no significant influence on total German exports

National German standards are not trade barriers

Neither the standards collection nor the subcollection of national standards provide a significant explanation for the total import flow into Germany. Only the development of the number of international standards has a significantly negative effect on this flow. This means that German national standards do not present non-tariff trade barriers, and therefore do not lead to trade distortions. However, the result of the analysis emphasizes the fact that the German collection of international standards gives domestic producers an edge over their foreign competitors.

International standards improve the competitive chances of domestic producers

The export surplus, defined as the difference between imports and exports, is not significantly affected by the relative number of German patents. However, the national standards do have a negative effect, and international standards have a positive influence on net trade figures. This would appear to support the hypothesis of a competitive disadvantage through national standards. On the other hand, the German export surplus benefits from international standards. This confirms the assumption that domestic producers gain a competitive advantage by adopting international standards.

The results of the cross-section analysis empirically confirm the positive role of international standards. Exports are basically determined by the technological portfolio of a nation, but international standards in particular can act as a catalyst in rapidly diffusing new technical knowledge and thus securing advantages in the international technology race, strengthening the national innovation system.

Overall, there is empirical support for the theory that international standards lead to international competitiveness

5. Comparison of the results of the macroeconomic analyses with those of the company survey

As a final step, the results of the sectoral and macroeconomic analyses on the basis of official statistics were compared with the responses to the company survey. The responses to the survey corresponded in the main with the analyses based on economic statistics. There are only minor differences in matters of detail, which can however be explained by the insufficient comparability of the questions put in the survey and the statistical analyses.

Checking consistency: Generally, the results of our analyses and those of the company survey tally

The macroeconomic analyses revealed that standards have a positive effect on technological change and innovation. It was also shown that the standards collection adapts to the rate of technological change. The companies surveyed did not regard the standards collection to be out-of-date, but as being too large in some sectors.

As opposed to our analytical results, the results of the survey show that the effect of standards on research and development is contradictory, and even negative in some sectors. Nevertheless, most businesses benefit from participating in standards work, because they gain access to the research results of other businesses. The responses given by the companies surveyed do not provide an answer to the question of how this advantage weighs against the disadvantage of revealing their own R&D results in standardization processes.

However, it was shown that non-involvement in standards work generally increases the costs of R&D. It is also evident that neither industry-wide standards nor private industry standards, when seen in the context of other barriers to innovation, are significant hurdles.

The contradictory effects of technical standards on exports, predicted by both economic foreign trade theory and the analyses carried out on the basis of that theory are only partly corroborated by the results of the company survey.

Standards affect competitiveness in two ways: On the one hand, their high international reputation leads to greater competitiveness when they are used. On the other hand, they also benefit foreign suppliers, because they make technical specifications more transparent. For this reason, more than one-third of the companies surveyed faced increased competition because of European and International Standards.

A German standards collection which has European and International standards as its basis has a positive effect on exports and imports. Most businesses in the survey make use of European and International Standards because of their positive effect on exports.

Businesses do not regard standards as out-dated

Contradictory effects of standards on R&D

Most businesses benefit from participating in standards work

Standards do not hinder innovation

Standards are internationally respected

Standards make technical specifications more transparent

The majority of businesses use European and international standards because of their positive effect on exports

In consequence, an increase in the number of these standards leads to an increase in export and import volumes. This corresponds to the positive link between intra-industry trade and technical rules which are identical to European and International Standards. A large majority of the surveyed companies identified positive effects as including a simplification of contractual affairs and a lowering of trade barriers.

From the macroeconomic analyses and the company survey we can conclude that International and European Standards have a much more positive effect on exports than German national standards do. Companies should therefore be encouraged to take an even more active role in European and international standards work. Furthermore, European and International Standards should be quickly incorporated into the national standards collections. A prerequisite for international involvement is active participation in standards work at a national level, and businesses must be convinced of the benefits of this as an effective export strategy.

International as well as national standards can provide support for technology transfer from technological leaders to developing nations. Although this is conducive to development policy, these nations may present a threat to our own competitiveness, because standards enable them to imitate our products and production processes. Technology transfer also reveals the preferences of domestic consumers, making them transparent to competitors worldwide. These threats should be countered by concentrating standards work in those sectors in which national innovation potential is greater than elsewhere in the world. Further, the interested parties should decide whether a well thought-out standards proposal should be presented at the international level in order to improve the chances of establishing an advantage for their own technology.

The results of our macroeconomic analyses basically confirm those of previous analyses using other methods. Our study shows the economic benefits of standardization as being about 1% of the gross national product (1998: DM 31.5 bn). However, the assessment by an earlier study that the benefits of

International standards encourage trade

International and European Standards are more significant for German exports than are national standards

Increased participation in European and international standards work is necessary

Standards encourage technology transfer

Standards make it easier for foreign competitors to imitate products and processes

Standards should be concentrated in sectors in which there is the greatest national innovation potential

Results of the macroeconomic analysis show the economic benefits of standardization to be approximately 1% of the gross national product

standardization were 1 % of business sales must be corrected downwards. The positive macroeconomic effects, which far exceed the sum of individual benefits for the economy, and the relief of the state through technical standards, justify public financial support for standards work and give standardization a firm place in economic policy and research and innovation policies. In particular, the latter should take a more integral approach, taking full account of the relationship between innovation and its diffusion by means of standards.

Macroeconomic benefits of standardization are greater than the sum of individual advantages

Innovation policies should support standardization

Conclusion by the participating research institutes

With its broad-based dual approach, this study produced numerous new insights into the economic effects of standardization, giving results which are unique in the international context. However, despite the fact that we gained a clearer understanding of the significance of standardization, a number of questions remain unanswered. Because of restrictions in time and funding, it was not possible to examine specific branches in the necessary detail. Although the comparisons with Austria and Switzerland added a European dimension to our study, further research outside Central Europe would be an important extension of the work begun here. To summarize, this study has made considerable progress in a fundamental analysis of the economic significance of standardization, while at the same time opening the door for future research.

Our results can be used as the basis for a strategic discussion regarding the future of standards work. All those who are directly or indirectly affected by standards now have access to information which can help them define their future standardization strategies. First, DIN and other standards bodies can use our results to identify areas which could be improved in order to respond to current developments, and those areas with which their customers are satisfied. Furthermore, the interested parties now have a broad overview of the different effects of standardization, and can use this knowledge to shape their strategies. Overall, the study can act as long-term motivation for a strategic discussion of the future of standardization.

Practical examples

The German carmaker Volkswagen developed a system for securing child car seats that fulfilled modern traffic safety requirements. Their system served as a model for other companies, and formed the basis of the International Standard ISO 13216-1. The system is now known on the market as the "ISOfix system".

(Source: "Gut in Norm", VOLKSWAGEN magazin 1/2000, pp. 82–85)

German experts have been greatly involved in ISO work on geometric product specification (GPS) (e.g. DIN EN ISO 3274, DIN EN ISO 4287, DIN EN ISO 4288...). German standardization in this area had already reached an advanced stage, and could be adopted by the corresponding ISO committees without major changes. This meant that the costs for adapting production processes to conform with International Standards could be kept to a minimum in Germany.

(Source: "Quality Engineering", 10/99, pp. 58 – 60)

An example of good timing for standardization can be seen in the cooperation between VDEW and ZVEI from 1990 to 1993 in working on a technical recommendation for an integrated substation control system, particularly for interfaces with digital protection equipment. This German recommendation, which was submitted as a proposal to IEC Technical Committee 57, set out the following aims:

- to establish a standardized framework for developments in substation control systems;
- to achieve compatibility of products at the highest possible level;
- to enable small- and medium-sized businesses to have easier access to this technology;
- to promote competition;
- to encourage innovation;
- to ensure the rapid diffusion and application of substation control technology.

ISOfix system

Geometric product specification

Digital field protection

These goals have now been realized and this achievement is a prime example of active business participation in standardization.

(Source: VIK-Mitt. 4-1995, pp. 74–80, H.-W. Riemer, "Normung als Instrument der Unternehmensführung")

Construction products can be placed on the market only if they conform to the European Council's Construction Products Directive (i.e. by applying harmonized European standards), for instance by obtaining a "European Technical Approval" (ETA). ETAs, however, are only awarded for one product and one manufacturer at a time, which means additional expenses in the range of DM 5,000 to DM 30,000 (where harmonized standards exist), and DM 10,000 to DM 70,000 (where there are no harmonized standards). It is therefore evident that manufacturers of construction products for which no harmonized standards exist face considerably higher costs before approval.

(Source: Building and Civil Engineering Standards Committee)

Construction products

Volkswagen AG developed a design standard for "Maintenance oriented design". By considerably reducing the repair costs of accident damage, this standard has contributed to a reduction in insurance premiums. Almost all VW models were rated best in their insurance class after the standard was applied.

(Source: "Gut in Norm", VOLKSWAGEN magazin 1/2000, pp. 82–85)

Repair costs

The basic model of a VW Golf is made up of 4,786 different parts, with a total of 16,897 individual parts for one car. 4,219, almost a quarter of these, are standardized components. Standardized components are 20% to 60% cheaper than customized components, and this contributes greatly to reducing the cost of the product. Standard parts are systematically documented and maintained in the company's standards department. Standards ensure that complex technical systems function correctly and that legal requirements are fulfilled.

(Source: "Gut in Norm", VOLKSWAGEN magazin 1/2000, pp. 82–85)

Standardized VW components

DASA-Airbus estimated the price ratio between customized and standardized components as being 15:1, with half of the customized components being suitable for standardization. By switching to standardized components the company could reduce its purchases by 10%.

(Source: DIN Aerospace Standards Committee)

Standardized DASA components 1

The new Airbus A330/A340 models require considerably fewer different parts than the older A300/A310 models, because Airbus now uses European standards in place of the company standards of its suppliers. Result: DM 18 million savings, due to less required storage space.

(Source: DIN Aerospace Standards Committee)

Standardized DASA components 2

Standards work will influence future development, enabling significant tendencies and market opportunities to be recognized early enough to be taken into consideration at the product development stage. Participation in standards committees provides access to valuable information, and can be used to foster useful business contacts. The heterogeneous character of the committees provide an ideal forum for identifying and discussing tomorrow's trends and markets.

(Source: ZVEI-Schrift, Rüschi, 1999)

Insider knowledge

In the case of valves, European standardizers are currently (Spring 2000) negotiating the standardization of calculation methods. If this results in major changes to the current German methods, German manufacturers will be forced to undertake expensive changes in production. A strong German presence in the committees concerned can avoid excessive expenses.

(Source: DIN Valves Standards Committee)

Valves

International standards now cover procedures for the compressed transmission and storage of digital images and videos. This means that innovative methods of digital image and video processing, storage and transmission can be developed. The groundwork has been done for new applications, services and markets.

(Source: DIN Information Technology Standards Committee)

Digital image compression

Intensive standards work at the national, European and international levels has resulted in a collection of International Standards on laser technology. These standards are indispensable for calculating and characterizing laser beams and laser optics, for determining beam propagation, for designing systems, for quality management (documentation) and benchmarking, and for marketing purposes.

The new market for laser technology is defined by these technical parameters. Without this information, market comparisons would not be possible.

(Source: DIN Commission on Laser Technology)

Lasers

The optics company Zeiss Augenoptik was able to use its expertise to ensure that tolerances for spectacle lenses were set internationally at ± 0.12 diopters, values which have been proven in practice. There was an ISO proposal to reduce the tolerance to ± 0.08 diopters, which would have increased annual production costs for Zeiss by approximately DM 5 million.

(Source: DIN Optics and Precision Mechanics Standards Committee)

Spectacle lenses

Lubricants are used in the food, pharmaceutical and cosmetic industries in machines so that products are not contaminated with dangerous substances. Once the DIN standards project on this subject has been adopted, as is expected, as an ISO standard, it will ensure the export and safe operation of machines worldwide.

(Source: DIN Foodstuffs and Agricultural Products Standards Committee)

Food technology

The Ancient Egyptians manufactured clay bricks with very similar dimensions to modern bricks. The dimensions of bricks are of major importance, but other aspects must also be standardized, such as their properties (e.g. strength, durability, dimensional accuracy), as must test methods, rationalization of the production process, rationalization of planning and processing (e.g. structural analysis, fire protection, ensuring strength and stability). Non-standardized procedures would lead to additional costs.

(Source: DIN Building and Civil Engineering Standards Committee)

Masonry units

Laser pointers with a maximum power output of 1 mW and designated as "class 2 lasers" as in DIN EN 60825-1 may be placed on the market, and customers can assume that they are safe when used as intended.

(Source: DIN Commission for Laser Technology)

European standardization has improved the export opportunities for German businesses because harmonized standards ensure that no modifications have to be made to products for export to other European countries. In most cases, a manufacturer's declaration suffices for the approval of products and conformity assessment.

(Source: BDI, Dr. Scheel, Interview 20.03.2000, TU Dresden)

The entire waste water engineering sector could not function without standardization. The range of standardized subjects extends from kitchen sinks, hand basins, drain pipes, road gullies, waste water pump stations to sewage works and waste water laboratory analysis. Of course, all DIN standards on these subjects conform with the German Water Management Act.

(Source: DIN-Mitteilungen, January 2000, p. 76)

Scientists and engineers share a common language of physical, chemical, mathematical and technical units. Without the standards in the DIN 1301 series, which covers the International System of Units (SI), it would not be possible for them to communicate effectively in an international and intercultural environment. Diagrams and graphic presentations using the system of coordinates would be difficult or impossible to read without DIN 461.

(Source: DIN Fundamentals in Technology Standards Committee)

The buyers of a 100 year old house were warned not to undertake repairs using modern plaster, which is not chemically compatible with the original plaster. An analysis of the original plaster would be necessary (at a cost of approximately DM 4,000). A historical standard was able to solve the problem by providing details of the composition of plaster at the time in question.

(Source: DIN)

Laser pointers

Manufacturer's declaration

Waste water engineering

The International System of Units

Maintenance costs

According to British and American research, the damage caused by corrosion costs 3.5% to 4.2% of the gross national product in the industrialized nations. In the case of Germany, this would have been DM 100 bn in 1997. Experts believe 70 % to 80 % of this damage to be preventable. The Materials Testing Standards Committee and the corresponding European committees are responsible for 110 standards covering corrosion protection. The potential savings could be as high as several billions, not only affecting the economy as a whole, but also helping business to reduce maintenance and compensation costs.

(Source: DIN Materials Testing Standards Committee)

Corrosion protection

The efficient production of goods requires the accessibility of technical knowledge. A manufacturer must adapt a product to suit the requirements of the market. This product must meet the expectations of the customer with regard to durability, suitability for the intended purpose, compatibility with other products, and environmental requirements. It must also fulfil legal requirements and keep the risk of legal liability at a minimum. Finally, production must be cost-effective, as must storage, distribution and disposal. Standards are an instrument which makes the necessary technical knowledge available for all these aspects.

(Source: Dissertation Scheel, 1998)

Efficiency

At one of the large German automobile manufacturers, production was stopped for three days – 8,000 workers had to stay at home, and 10,000 cars could not be built – because the company was dependent on a single supplier for "high tech" door locks. A compatibility standard or a Publicly Available Specification could have prevented this situation from occurring, because such documents would have opened up the market and abolished dependencies.

(Source: J. Steinhoff, Stern, 43/15.10.1998, p. 276)

High-tech door locks

Work on a national technical rule titled "Dust fires and dust explosions – Hazards, assessment, protective measures" cost a total of DM 20 million. Experts believe that the risks in this sector have been considerably reduced. If we balance this total cost against the costs of a single avoidable accident (e.g. a flour dust explosion in the Bremen Rolandmühle on 6.2.1979, which caused 14 deaths with 17 injured, and damages of about DM 130 million), the cost-benefit ratio is convincing.

(Source: DIN Commission on Air Quality)

Dust explosions

By implementing standards for street lighting and traffic signals, the building and traffic authorities at both the regional and the national level have been able to reduce the risks of road use by creating good visibility and clear signals. Standards have helped reduce the number of accidents with serious consequences for the individuals involved, and lower the resulting costs for the economy. Traffic routing and flow control by means of signal systems can prevent traffic jams and detours. Less energy is required for street lighting systems designed in accordance with these standards.

(Source: DIN Lighting Technology Standards Committee)

Street lighting

Standards for IT security provide the prerequisites for confidential transactions to be carried out on the Internet (e.g. ISO/IEC 14888-1-3 on digital signatures). Internet services such as e-commerce, teleworking and telebanking are supported by such standards, creating new sectors and job markets.

(Source: DIN Information Technology Standards Committee)

The Internet

Salmonella is a daily concern of the food industry, and can be the cause of call-back campaigns, which occur again and again. They involve the following costs: Public call-back: DM 5 million; internal call-back: DM 500,000; reimbursing customers: DM 50,000. In addition to the traditional time-consuming test, a new, faster test has been standardized in DIN 10135. The test uses a polymerase chain reaction during the actual production process as an indicator.

(Source: DIN Foodstuffs and Agricultural Produce Standards Committee)

Salmonella

Biotechnology laboratories require safety cabinets which provide protection from pathogens and prevent contamination within the laboratory. DIN EN 12469 sets out the requirements for this equipment, preventing cross-contamination and disease, reducing liability risks and improving export opportunities for manufacturers of safety cabinets.

(Source: DIN Foodstuffs and Agricultural Produce Standards Committee)

Biotechnology

The DIN EN ISO/IEC 9241 series of standards sets out the requirements for the ergonomic design of computer workplaces. These standards serve to provide workplaces which will not generate health problems and which encourage efficiency and creativity at work.

(Source: DIN Information Technology Standards Committee)

Computer workplaces

Paragraph 11 of the German Communicable Diseases Act states that the operator of a public bathing pool must provide guests with water that will not damage their health, particularly not through pathogens.

Public bathing pools are subject to inspection by the health authorities. The DIN 19643 series of standards comply with the above-mentioned Act as well as the German Regulation on Pool Water.

(Source: DIN Water Practice Standards Committee)

Bathing water

Noise can cause considerable damage to health. Appropriate measures should be taken to reduce or prevent this, such as fitting sound-insulating windows and doors. Standard test methods which produce comparable results are used to assess building components for their sound insulating properties. Effective insulation also reduces the costs for the health authorities.

(Source: DIN Materials Testing Standards Committee)

Sound insulation

Standards work on testing wood preservatives has been well-received at both the European and the national level. These standards, which are regularly applied throughout Europe, ensure repeatability and reproducibility of data. They have thus proven to be invaluable for the development of wood preservatives and for the conservation and use of wood.

(Source: DIN Materials Testing Standards Committee)

Wood preservatives

Following a fire on the destroyer Mölders, a new safety system for military vessels was tested and introduced, increasing savings by a factor of 3. The substance of these military standards has now been adopted by DIN and ISO, making the same safety technology available for civilian purposes.

(Source: DIN Shipbuilding and Marine Technology Standards Committee)

Military equipment