



GERMAN STANDARDIZATION PANEL (DNP)

Standardization Research,
Policy and Promotion

Indicator Report 2019

SUPPORTED BY DIN AND DKE

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GERMAN STANDARDIZATION PANEL 2019

**INDICATOR REPORT
FOR THE IMPORTANCE
OF STANDARDS AND
STANDARDIZATION
ACTIVITIES OF GERMAN
COMPANIES**

SUMMARY

Based on representative data of German companies engaged in standardization and, increasingly, companies that only apply standards, this 2019 indicator report of the German Standardization Panel (German: Deutsches Normungspanel, acronym “DNP”) provides information on several aspects of standardization. The contribution of innovations to the competitiveness of businesses, as well as to other entrepreneurial dimensions, is undisputed. However, the benefits of standardization and the application of standards have not yet been fully recognized as a significant influencing factor – not least due to a lack of empirical investigations in this area.

For this reason, the German Standardization Panel was set up in autumn 2011 by the German Society for the Promotion of Research on Standardization (FNS). The FNS helped to promote research on topics and questions related to standardization in order to make qualitative assessments of aspects regarding standardization policy. Since 2019, the project is directly financed and supported by DIN and DKE. For the DNP, annual surveys are carried out to collect data on standardization activities and the application of standards by companies, which is then used to examine the impact of standardization and standards on various economic and social dimensions.

Such a systematic analysis requires reliable, detailed data which is collected through surveys carried out among the same economic players (persons or companies) on the same topic and over time. So-called panel data is particularly crucial for the exploration of the complex effects of standardization processes and the application of formal and informal standards on business success. This year, DNP data from six survey waves were combined to establish a panel data set. Based on this unique data, insights were gained on changes in standardization activities and the application of formal and informal standards from 2013 to 2018. Due to a low number of observations, data from the pilot study in 2012 was excluded from the panel data set.

The here presented analyses validate last years' results and confirm initial trends. In addition, new insights into the trend towards standardization could be gained. The following core results were derived:

- 1 Formal standards, specifications and other technical rules developed by standardization organizations are by far the most important types of documents to the companies interviewed, as they promote legal certainty and facilitate market access for companies. Over time, a slight reduction of the importance of standards on national and EU-level can be noted, while consortia standards gain importance, especially on international, but also on EU-level.
- 2 Internal company standards are the third most important type of document and considered more relevant than informal consortia or de-facto standards. Internal company standards are applied by the majority of businesses surveyed, but particularly by large and innovative companies. They serve primarily to promote quality and productivity improvements. Over the last few years, internal company standards have gained in importance, specifically among medium-sized companies. Smaller companies use these standards to improve bargaining positions vis-à-vis suppliers and customers.
- 3 Informal consortia and de-facto standards are primarily relevant for the realization of technical interoperability. Participation in consortia is mainly motivated by the high speed of processes, while the type and number of users, as well as the possible influence on government regulation is perceived as an advantage in formal standardization.
- 4 ISO 9001 (quality) and ISO 14001 (environmental) certifications are already widespread among survey participants and first certifications in this field are rare. In contrast, ISO 50001 (energy efficiency) and ISO/IEC 27001 (IT-security) certifications are on the rise. First signs of saturation for ISO 50001 will have to be monitored in the next surveys.
- 5 Harmonized (European) standards are of high importance for participating companies. A vast majority perceives corresponding compliance as not really voluntary. In many cases, compliance to harmonized standards is rather assessed to be absolutely necessary. Companies see an increased opportunity to contribute to such very relevant rules through participation in formal standardization, which is predominantly perceived as transparent, open, and impartial.

CREATING AN EMPIRICAL BASIS FOR THE EXPLORATION OF THE GERMAN STANDARDIZATION LANDSCAPE

Introduction

Innovation is commonly regarded as a source of growth and prosperity. Many factors contribute to the transformation of ideas into successful market solutions. Standardization is considered one of these factors, which is also underlined by the fact that in 2018 it was included as such in the OECD's Oslo Manual¹ for the first time. Panel data, i.e. data that is gathered on a regular basis, facilitates causal inference and is therefore necessary for the scientific analysis of the effects of standards. For example, the 2012 survey revealed that companies active in standardization invest more in innovations and realize their innovations with higher success.² This correlation, however, does not necessarily imply that participation in standardization positively affects the innovativeness of companies. Rather, innovative companies could be more likely to become active in standardization. In order to define directions and sizes of effects, companies' activities have to be observed over a longer period of time.

Inspired by the innovation survey carried out among EU Members by the European Commission which started in the early 1990s,³ the DNP generates a comprehensive collection of empirical data containing a large amount of information on businesses, which can be used for the exploration of central issues in standardization research.

Goals

The data generated by the DNP forms a basis for scientific research on the standardization activities of companies, the implementation of standards, and the effects of standards on entrepreneurial success. The survey results can also be used to develop strategies for the involvement in European and international standardization, as well as to articulate national business interests, among others, towards the European Commission.

An additional goal of the German Standardization Panel is to address current standardization policy issues and to evaluate measures taken. The last survey waves addressed the role that standards and standardization play in the trade with the United States and China, as well as the consequences of digitalization and digital networking on formal and informal standardization. In addition to that, the data allows for the identification of new trends.

Finally, the panel raises awareness of the importance of standardization for busines-

¹ OECD and Statistical Office of the European Communities (2018): "Oslo Manual. Guidelines for Collecting and Interpreting Innovation Data, 4th Edition", <https://www.oecd.org/science/oslo-manual-2018-9789264304604-en.htm>

² Blind, K. and Rauber, J. (2013): Normung als attraktive Plattform für innovative Unternehmen. In: DIN-Mitteilungen December 2013, pages 26 – 29, a positive correlation between innovation and standardization is shown based on the German Community Innovation Survey.

³ This is a reference to the panel based on the EU's Community Innovation Surveys (CIS), which repeatedly interviews the same companies about their innovation activities, successes and problems.

ses which have not yet used formal standards or have not yet been active in standardization, thus motivating and encouraging increased participation. This requires a wide dissemination of the survey results via reports such as this one. The DNP is designed to help achieve these goals of standardization research, policy, and promotion.

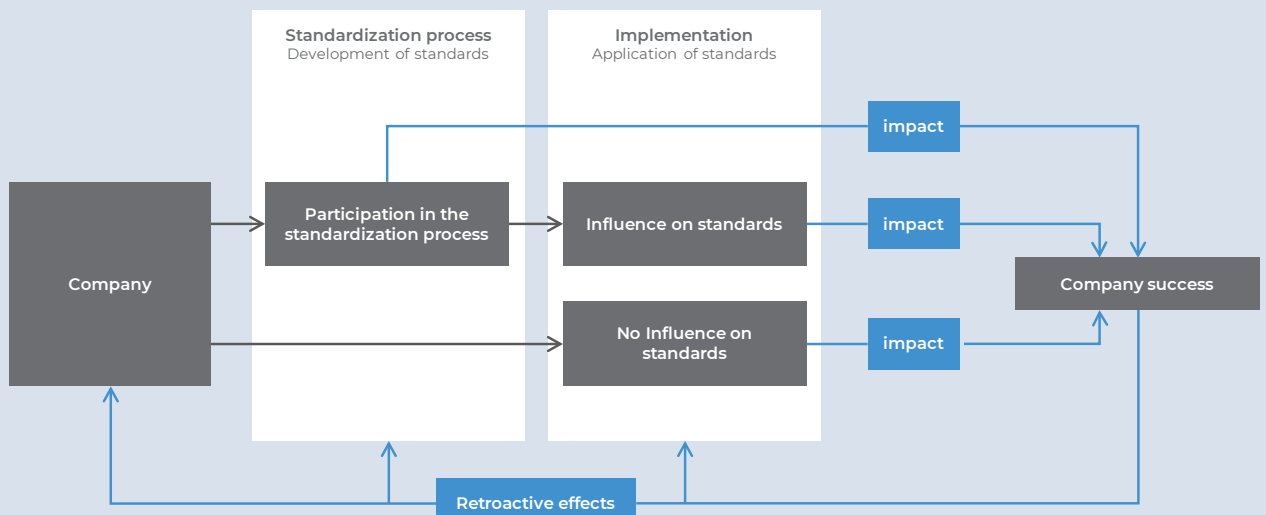
Heuristic model

Questions asked in the annual survey fall into two categories: core questions and questions related to a specific subject. The core questions are conceptually based on a heuristic model (see figure 1). This model is comprehensive, allowing for the integration of a broad array of topics and questions. It illustrates the multidimensional links between participation in the standardization process, the implementation of formal standards and corporate success.

The survey measures standardization activities in dimensions that describe their nature and scope, e.g. time required, necessary human resources, participation in standards committees, etc. The implementation of standards is reflected in dimensions of cost and benefit. Apart from this, the DNP’s long term goal is to assess the impact of standardization, as well as the application of standards on business success.

A number of questions can be asked in this context: Does participation in the standardization process increase the success that is achieved through the implementation of formal standards? Does standardization have a direct impact on corporate success or is the impact indirect, e.g. through networking opportunities? Which dimensions of success are influenced by standardization? Do insights gained by participating in standardization mainly apply to those self-developed standards, or is there a more general learning process? What does this learning process look like? How do company-specific characteristics influence company success through standardization work? Does the impact of standardization work vary depending on industry or company size?

Figure 1 Heuristic model of the German Standardization Panel



The waves of the surveys from 2013–2015 provided initial evidence to answer the last two questions, the more complex questions, e.g. regarding learning effects, however, can only be answered through an analysis over a period of time, which includes a measure for business development.

Realization

The seventh survey wave of the Germany Standardization Panel was launched on October 14, 2018, World Standards Day. The DNP is a project that is conducted by the Chair of Innovation Economics at Technical University Berlin and financed and supported by DIN and DKE. In 2018, the Federal Ministry of Economic Affairs and Energy (Bundesministerium für Wirtschaft und Energie, BMWi) has again thankfully accepted the patronage for the DNP. By doing so, the BMWi is emphasizing the significance of standards not only for companies but for the economy as a whole.

Of more than 20,000 experts contacted, around 9 % took part in this year's survey. Approximately 900 questionnaires could be included in the analysis, which means that the response rate of 4.5 % reached the rates of previous years. While the rate of responses to the core questions remained at the previous year's levels, the relative number of responses to the special section increased slightly. This can be attributed to the simplified questionnaire design on the one hand, which was improved with the help of breakoff analyses from previous years, and, on the other hand, a noticeably high level of interest shown by the target population.

In total, information of roughly 280 companies that had already participated in the 2013 survey was collected. Contributions to all five surveys from 2013 to 2018 were registered for 100 companies. Using these data, a balanced panel data set was formed, making it possible to analyze 5-year trends since the first comparable survey in 2013. In order to obtain a detailed overview of the development of various indicators over the entire survey period, results of the individual samples of the respective years were compared as well. In order to allow for robust comparison and an adequate level of representativeness, answers of companies were weighted according to their size and sector. The target distribution was an estimate of the distribution of company sizes and sectors of companies active in standardization at DIN, compiled using a database that contained more than 10,000 companies. On the basis of this unique data set, it is possible to gain insights about changes in standardization behavior and the application of standards by companies over time.

Composition of the sample in 2018

In this short report, the industry sector, company size and research and innovation activities are the main differentiation criteria used to structure the results and highlight individual characteristics. The composition of the companies participating in the survey in 2018 is roughly the same as in previous years, so that the structures of the sample of experts and companies participating in the DNP have been confirmed.

The almost 900 answers used in the evaluation represent 75 % of companies or groups of companies. 25 % of the answers are from the point of view of experts representing a representative company in their sector. For smaller companies with up to 50 employees, in most cases a representative of the management responded. In larger companies, the participants were usually located in research and develop-

ment departments. Participants most often reported having a specialized standardization background in companies with more than 1,000 employees. Overall, 23 % of the participants came from management, 20 % from research and development departments, 11 % from quality management backgrounds and 10 % from dedicated standardization departments.

Location & size

As in previous years, the main focus of the survey was on German companies. Thus, companies headquartered in Germany represented the largest group of participants with almost 80 %. Most foreign participants were located in Europe (13 %), followed by the USA (5 %) in third place. The size distribution of the participating companies has remained relatively stable since 2013. Each group that was formed according to company size (classification: <50, 50 - 249, 250 - 999, 1,000+ employees) contains about a quarter of all participants. Thus it was also possible to represent the perspective of small and medium-sized enterprises (SMEs, <250 employees), which make up 50 % of the sample. While the proportion of smaller companies was highest in the service sector (> 50%), responses from groups of companies with 1,000+ employees came mainly from industry, in particular automotive engineering, chemical and pharmaceutical industries or electrical engineering.

Industries

The composition based on sectors⁴ is mostly similar to previous years. With 17 %, most participating companies are active in plant construction and mechanical engineering, followed by 14% in electrical engineering, 11% in services and just under 7% in chemicals, pharmaceuticals, rubber, plastics, glass and ceramics (hereinafter referred to as "chemicals and pharmaceuticals industry"). Compared to the 2017 survey, the proportion of participants from the service sector was slightly lower. In contrast, slightly more companies from the electrical engineering and information and communication sectors took part.

R&I, export

The innovation activities of companies decreased slightly compared to the previous year's survey. 71% of the 842 respondents stated that they had introduced product or process innovations in the previous year, whereas this figure was 82% in the 2017 survey (n=708). A comparison of the weighted samples also confirmed a slight decline. Research and innovation activities were much more widespread among larger enterprises than among smaller ones. The proportion of enterprises that carried out innovations, conducted research or entered into research and innovation cooperations was almost 30 % higher for enterprises with more than 1,000 employees than for enterprises with less than 50 employees. The average export share of the responding companies was again just under 50 % in 2018. The sectors with the highest export shares are mechanical and plant construction (54 %) and automotive engineering (50 %). As expected, the least exported sectors are services, energy, water, oil and ICT.

⁴ Industries according to the classification by the Federal Statistical Office of Germany, 2008 edition. *Klassifikation der Wirtschaftszweige, Ausgabe 2008 (WZ 2008)*, Statistisches Bundesamt.

THE IMPORTANCE OF STANDARDS AND SPECIFICATIONS

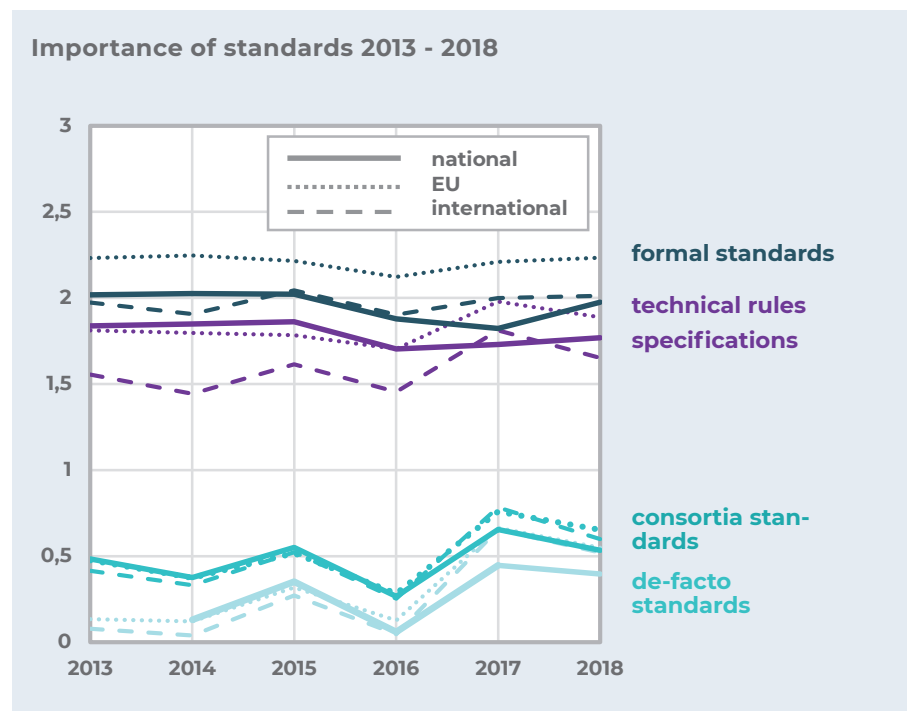
International standards and consortia standards are gaining in importance, formal standards continue to be the most important

The first core section of this year's survey addresses the general relevance of standards for companies of different industries. The survey distinguishes between six types of standards on different regional levels, namely formal standards, technical rules or specifications, informal consortia standards, de-facto standards as well as internal and external company standards.

As in previous years, the results from 2018 show that formal standards and technical rules or specifications are the most important types of standard for experts active in standardization (see figure 2). While this observation is independent of the industry or the innovation and research activities, the importance of formal standards increases with company size. Company standards follow in third place. These are particularly important for companies active in automotive engineering, metal

Figure 2

Development of the average assessment of the importance of standards on regional levels (weighted samples, 2013 to 2018, total N=3,270). Rating scale from -3 (very unimportant) to +3 (very important).

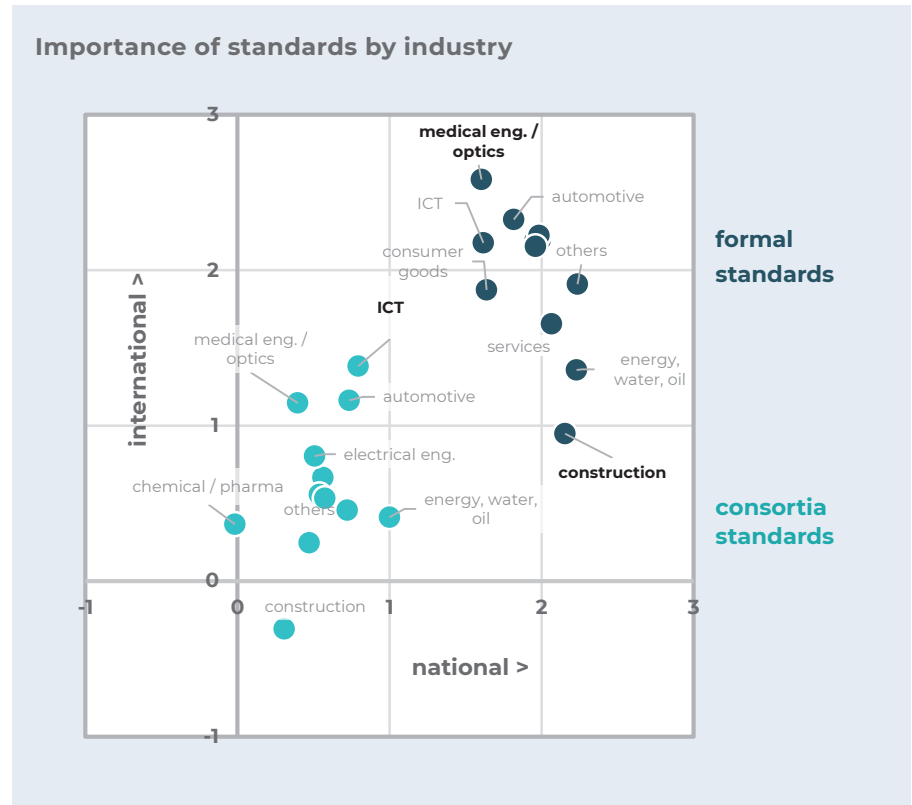


production and in the chemical and pharmaceutical industries, especially for increases in quality and productivity, as well as for the positioning vis-a-vis suppliers and customers. Companies with more than 1,000 employees and companies that claimed to have introduced process innovations and conducted internal research rated internal company standards significantly more important. In comparison, de-facto

standards and informal consortia standards are rated less important on average. They especially play a role in achieving technical interoperability for large, innovative companies that are part of multinational enterprises.

Figure 3

Importance of national and international standards and consortia standards by industry. -3 (very unimportant) to +3 (very important). Total N=833, each industry N = 34 to 144.



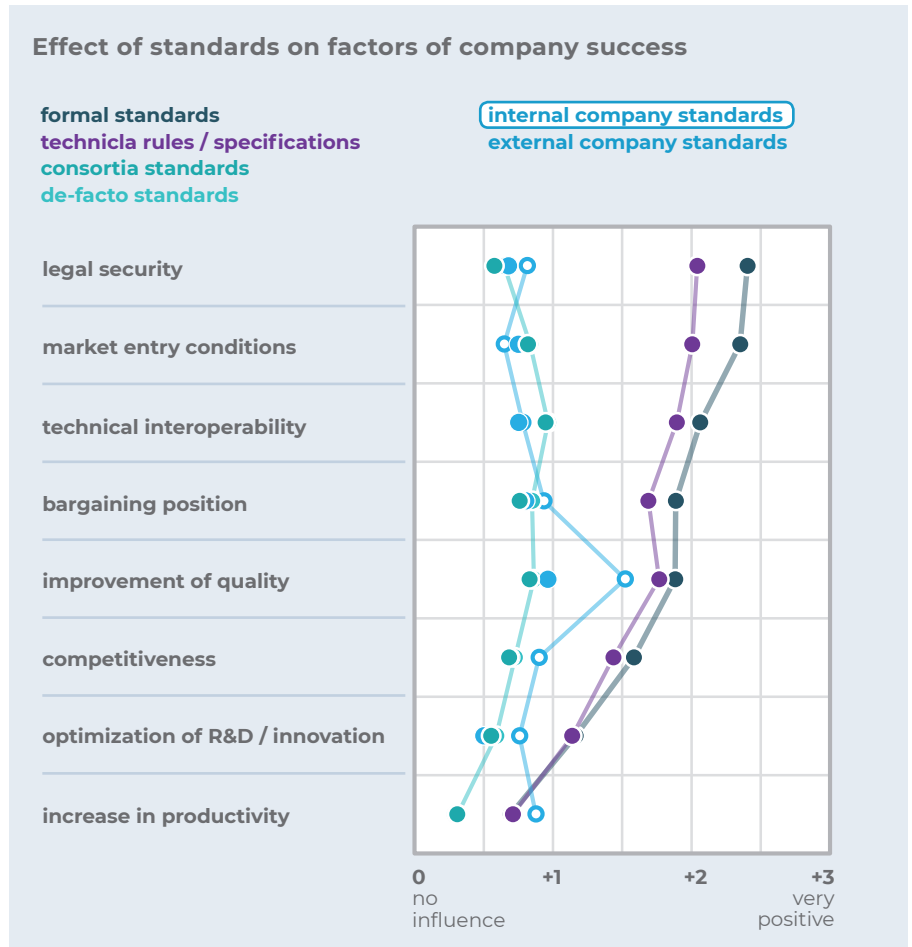
On average, participants attribute the greatest importance to formal European standards and generally European standards of all kinds. This assessment differs between individual industries. In contrast to most other industries, formal national standards play a greater role for the construction industry than formal international standards (figure 3). The most clearly internationally oriented sectors are optics and medical engineering. In addition to formal international standards (ISO), international consortia standards also play an important role for these sectors. This also applies to companies from the automotive industry and in particular to the ICT industry. Consortia standards are considered unimportant only by the construction industry.

Compared to 2013, especially *international* standards are gaining in importance, as shown by comparison based on a balanced sample of 274 companies that took part in the surveys in both years. In particular international *de-facto* and *consortia* standards were considered more important in 2018 than five years earlier. The average importance of international *de-facto* standards on the scale from -3 (very unimportant) to +3 (very important) rose by almost 7 % and slightly exceeded the "neutral" limit (0, cf. figure 2). The importance of international consortia standards and technical rules and specifications rose by almost 3 %, while the importance of formal standards rose by almost 1% at a high level. At the national level, all types of standards lost some of their importance, especially formal standards (-4 %).

Overall, the assessment of previous studies can be confirmed, stating that formal standards have a much stronger influence on (company) success factors than con-

Figure 4

Average estimate of the impact of different types of standards on success factors. Base N=800, -3 (very negative) to +3 (very positive).



sortia or de-facto standards. Companies see more advantages in aspects that affect transaction costs through participation in and access to the market. For example, formal standards and technical rules and specifications are considered to have a much greater influence than other standard types in terms of ensuring legal security, meeting formal and informal market entry conditions, achieving technical interoperability and strengthening bargaining positions with suppliers and customers (see figure 4). Considering factors that affect the improvement of internal company processes - above all increases in quality and productivity, but also the optimization of research, development and innovation activities - company standards play an almost equally important role. This divided assessment is consistent with the results of an earlier survey on the macroeconomic benefits of standardization⁵, which also came to the conclusion that internal company standards are important for the success of internal company processes, while formal standards are important, above all, for successful operation in markets.

⁵ DIN Deutsches Institut für Normung e. V. (2000): „Gesamtwirtschaftlicher Nutzen der Normung: Zusammenfassung der Ergebnisse. Wissenschaftlicher Endbericht mit praktischen Beispielen“, Berlin, Wien, Zürich: Beuth Verlag.

STANDARDIZATION ACTIVITIES

Participation is increasing above all on international level

The second core section of the DNP survey deals with the external and internal standardization activities of companies. A total of 842 company and industry representatives provided information on participation in standards setting organizations (SSOs) at various regional levels (e.g. DIN and DKE at national level, CEN and CE-NELEC at European level and ISO and IEC at international level). The proportion of enterprises that declared that they were active in formal standardization at either national, European or international level was slightly lower than in previous years, at just under 89%. While almost all (99 %) very large companies with more than 1,000 employees were represented in at least one SSO committee, this share was 84 % and 87 % for very small (<10 employees) and large companies (250 - 999 employees) respectively.

While most of the surveyed companies participate in the standardization processes of national standards bodies, participation in European and international SSOs is lower. To a certain extent, this can be attributed to the system of delegation from national standards bodies to European and international mirror bodies. Nearly 32 % of respondents - less than in the previous year's sample - are active in committees on national, EU and international level. Mostly very large companies from the automotive engineering, electrical engineering, chemical and pharmaceutical industries are active at all levels. For these, the proportion of such companies with a strong presence in standardization was just under 50%.

Perceived advantage of formal standardization over consortia remains, decreases slightly

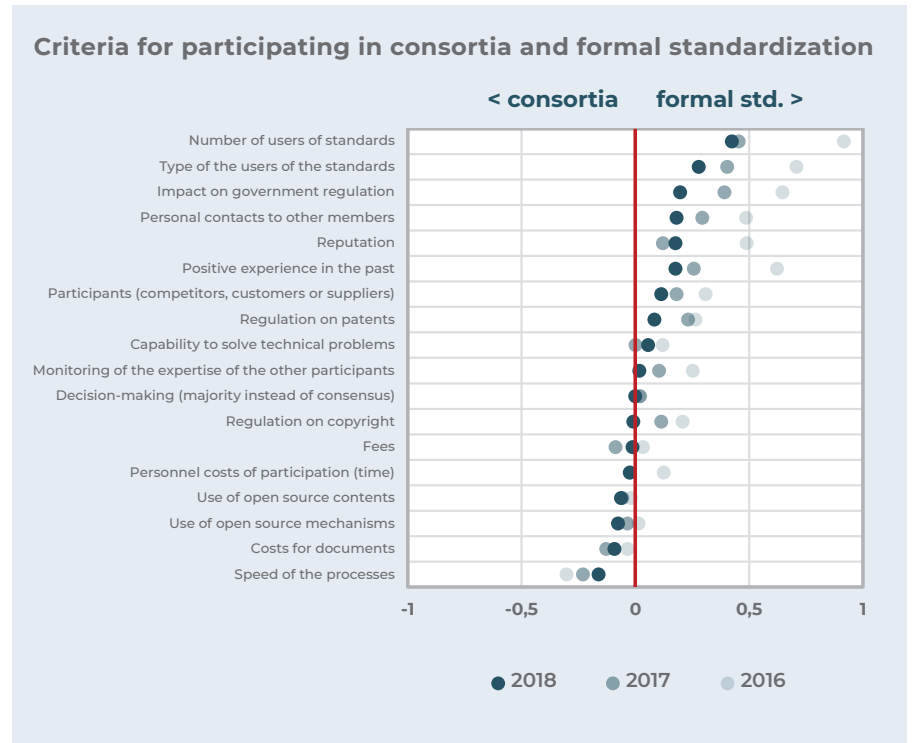
For the third time since 2016, standardization experts were asked to assess the extent to which certain criteria influence the decision to participate in formal standardization in SSOs compared to consortia. As in the previous year, the most important criteria in favor of formal standardization were the number of users, the impact on government regulation and contact with other participants (competitors, customers, suppliers) in standard setting organizations (see figure 5). The high reputation of SSOs and positive experiences in the past were also clear motives for their activity. In contrast, the speed of processes, costs of documents and the use of open source content and mechanisms led to participation in consortia, the latter in particular in the fields of ICT and electrical engineering. Overall, there was no clear preference for the design of decision-making processes (majority or consensus). The preference regarding the monitoring of other participants' know-how as well as the assessment of respective personnel costs for participating in either SSOs or consortia was equally balanced. While the participation criteria for fees last year were more in favor for consortia than SSOs, no difference could be discerned this year.

The slight decline in the more positive assessment of formal standardization compared to consortia observed last year mainly continued this year. Especially the factors "user type" and "impact on government regulation" were less strong arguments for

formal standardization in comparison to consortia. Similarly, preferences towards consortia and standardization bodies became less distinguishable regarding personal contacts and copyright rules. In absolute terms, however, more than half of

Figure 5

Assessment of the extent to which different criteria influence participation in consortia and standardization bodies. -3 (more consortia) to +3 (more standardization). Mean values of targeted samples.
 N(2016)=243 N(2017)=476
 N(2018)=398



the categories continued to be perceived as in favor of formal standardization, with differences being more pronounced and the proportion of undecided participants smaller. Overall, companies' assessments of the benefits of consortia versus formal standardization seem to converge. The main criteria in favor of consortia, such as the speed of processes, and those in favor of formal standardization, such as reputation and influence on state regulation, have become increasingly balanced since 2016.

CERTIFICATION OF MANAGEMENT SYSTEMS

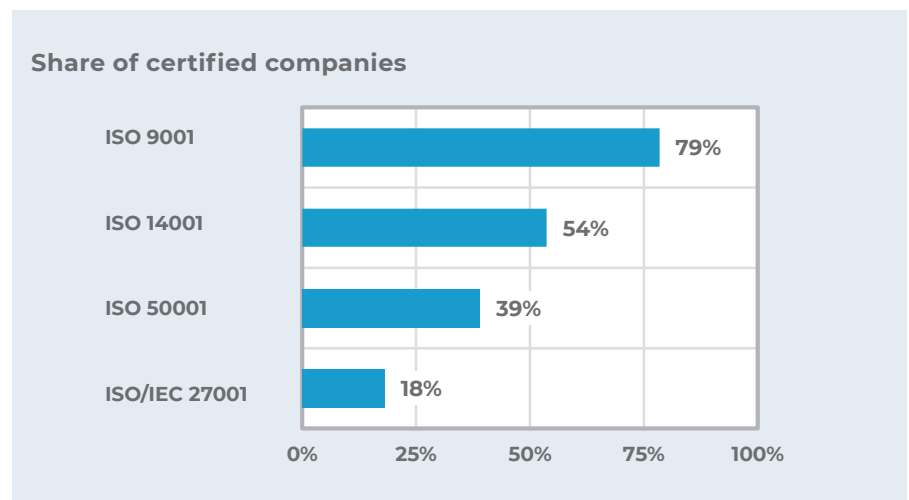
Trend towards certification of energy management systems continues

As in the last surveys, participants again provided information on whether they had received certification according to certain formal standards in the year previous to that of the survey (2017). If this was the case, they were also asked to indicate in which year the initial certification took place. A total of 721 companies provided information on these questions.

As in previous studies, in 2017 a majority of companies stated to have been certified according to at least one of the major quality, environmental, energy or IT-security standards (see figure 6). With 79 % certified companies, the ISO 9001 quality management system standard remained the most widespread. In addition, more than half (54 %) of all companies stated that their environmental management was certified according to ISO 14001.

Figure 6

Share of companies certified according to various standards in 2017 (yes/no, N>480).



Certification of energy management systems according to ISO 50001, which has grown fastest in recent years, was stated by 39%. As expected, larger companies had a significantly higher proportion of certifications. The biggest difference was in IT-security management. Of companies that were certified according to ISO/IEC 27001, only 15% had less than 250 employees. Such smaller companies were however more strongly represented in ISO 9001 certifications, where the share of small and medium-sized enterprises was 39% (1 - 249 employees). Innovative companies were also more frequently certified - particularly according to ISO/IEC 27001.

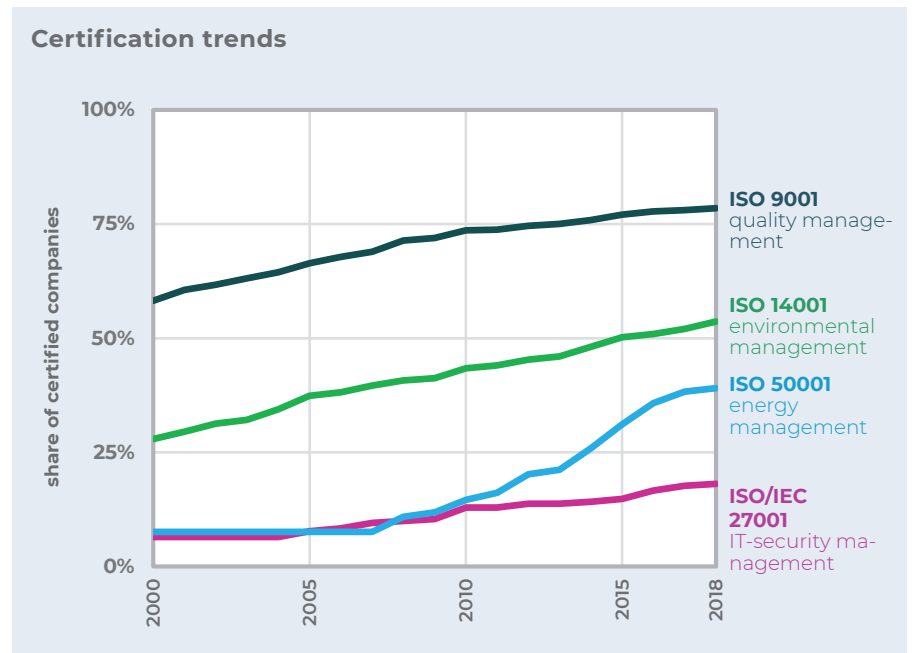
Particularly companies from the chemical, pharmaceutical, etc., electrical engineering, mechanical engineering, automotive engineering and metal production industries certified themselves, while this was least reported among service companies. The certification of an information security management system could be observed above all in the information & communication sector and in automotive engineering. Almost 400 companies provided information on certification and accreditation according to other standards. The largest proportion (n=100) were testing and ca-

libration laboratories and certification or inspection bodies which were accredited according to ISO/IEC 17025, ISO/IEC 17065 or ISO/IEC 17020 or had demonstrated compliance in other forms. On the other hand, industry-specific quality management systems played an important role, especially in the area of medical devices (ISO 13485, n=47) and in the automotive industry (ISO/TS 16949, n=32) as well as in the certification of occupational health and safety management systems according to OHSAS 18001 (n=27).

Figure 7

Share of companies that were certified according to the respective management system standards (estimate based on cumulative initial certifications, company data collected in 2018.)

ISO 9001: N=443, ISO 14001: N=244, ISO 50001: N=162, ISO/IEC 27001: N=56



The trend towards certification of energy management systems diagnosed in the previous year is reflected in the course of the initial certifications carried out this year. Figure 7 shows a significantly higher increase in initial certifications according to ISO 50001 than ISO 9001, ISO 14001 and ISO/IEC 27001. Overall, however, the number of initial certifications in 2017 fell to its lowest level since 2006. Whether this is a continuing trend can only be examined with the help of surveys over the next years.

STANDARDS AND PUBLIC LAW

The special section of the 2018 survey investigated the role of standards in public law. Formal standards are developed by a group of experts at standard setting organizations, e.g. at DIN in Germany or at CEN/CENELEC on European level. From a legal point of view, their application is in general voluntary. Standards are often used by legislators to enrich abstract legal rules with more precise definitions and technical requirements. In this way, industry expertise and state-of-the-art practices and knowledge can be integrated into laws. This is on the one hand done on national level, e.g. in the German Product Safety Act, which expressly refers to the relevant standards for technical requirements for the safety of special products.

On the other hand, this is also common practice at European level. Here, the "New Approach" and the "New Legislative Framework" regulate that European directives and regulations, similar to German laws, can refer to standards. Compliance with such European "harmonized standards" is voluntary. However, their implementation brings advantages for companies. For example, companies wishing to offer products on the European single market must prove that they comply with relevant EU directives. If a relevant product is manufactured in compliance with the harmonized standards referenced in such a directive, a "presumption of conformity" automatically applies. It is then (in most cases) assumed that all essential legal requirements are met, without this having to be separately shown in a special documentation by the manufacturers or distributors.

European harmonized standards are created either by declaring existing national or international standards as such or by developing a new standard at one of the European standardization bodies (CEN, CENELEC, ETSI). This is done on behalf of the European Commission and with the participation of companies and stakeholders, who are involved in the development and decision-making processes through delegations of the national standards organizations (e.g. DIN). This integration into legislation is generally regarded as a form of co-regulation or public-private partnership.

Little controversial, and fundamental motivation of this model, are the advantages it offers. By outsourcing the definition of concrete technical requirements, bureaucratic effort and over-regulation are avoided. Rather, law-makers make use of the existing knowledge of those organizations for who particular laws are most relevant, and for who generally accepted technical rules and standards often already exist. The principles of the standardization organizations, such as openness towards the participation of all interested parties, consensus-based decisions and transparent processes, as well as broad support in the industry, make them predestined partners.

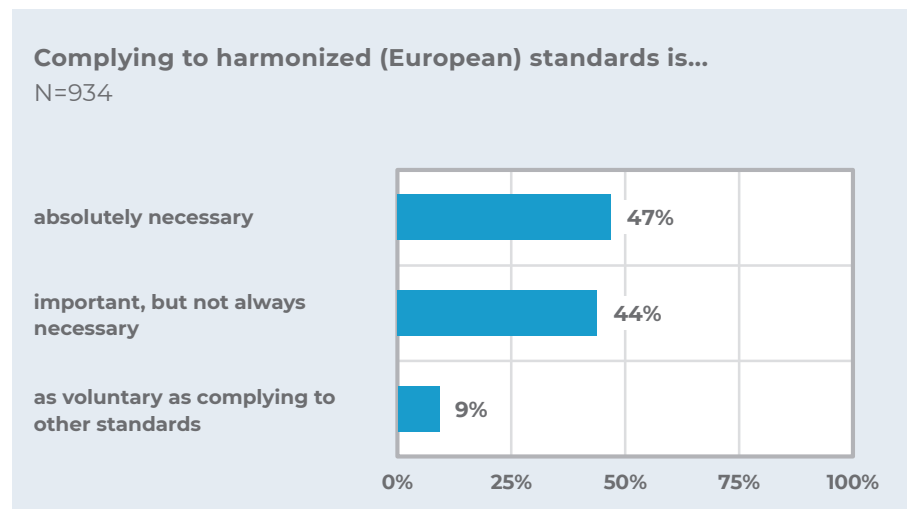
While the standpoint that the application of harmonized standards is voluntary is rather clear from a legal perspective, the way in which such standards are created, as well as their specific reference by the legislator, may give the impression of a certain proximity to laws. There are positions, for example, which assume that companies commonly perceive that compliance with harmonized standards is almost

mandatory, especially assuming that the use of alternative options in conformity assessment is often infeasible for reasons of time and cost. The aim of this year's special section was therefore to investigate this perception of the relationship between standards and laws and to enable an assessment based on empirical results.

Harmonized standards are highly relevant for companies. In many cases, their application is considered absolutely necessary

The results of the special section that are based on data of almost 900 companies indeed show that harmonized standards play a very important role. More than 90 % stated that compliance with harmonized standards was less voluntary than compliance with other standards. For 47 % of the companies, complying was even perceived as *absolutely necessary* (see figure 8). Overall, the highest importance was attributed to such standards, that are referenced by laws. The biggest difference was found between harmonized and non-harmonized European standards (EN, see figure 9). But also at the national level, references by laws were the crucial factor for the extent of importance of standards. Especially companies active in plant construction often rated compliance with harmonized standards as absolutely necessary (59 %), followed by manufacturers of consumer goods (57 %), companies in the metal production industry (57 %) and the construction industry (57 %). This view was least pronounced for service providers (22 %), information and communication companies (37 %) and those who offered freelance and scientific services (38 %).

Figure 8



Particularly companies that are active in medical engineering, plant construction and electrical engineering frequently used harmonized standards to demonstrate compliance with relevant legal regulations. About 90 % of these companies stated that they often or always made use of the presumption of conformity, while only about 60 % used other options (such as custom technical documentations) just as frequently in the context of a conformity assessment. Overall, the use of harmonized standards outweighed the use of other options in all sectors (see figure 10). The only exceptions were providers of professional and scientific services (consultancies), who chose both options with roughly the same frequency. It was found that harmonized standards were frequently used in product presentations in the context of the manufacturer's declaration by companies, as well as in conformity assessments by third parties.

Companies can contribute to relevant rules through standardization committees and perceive standardization as transparent and open

Companies saw the possibility of contributing to rules that affect them primarily through participation in standardization. On average, the possibilities of influencing various phases of standardization (see table 1) at both national and European level were perceived as significantly higher than those of legislation. Nearly 40 % of all companies stated that they had a medium or even high to very high influence on standardization, while only just under 11 % (national level) and 8 % (EU level) saw

Figure 9

Importance of conforming to different types of standards

Share "very important" or "extremely important". N=883

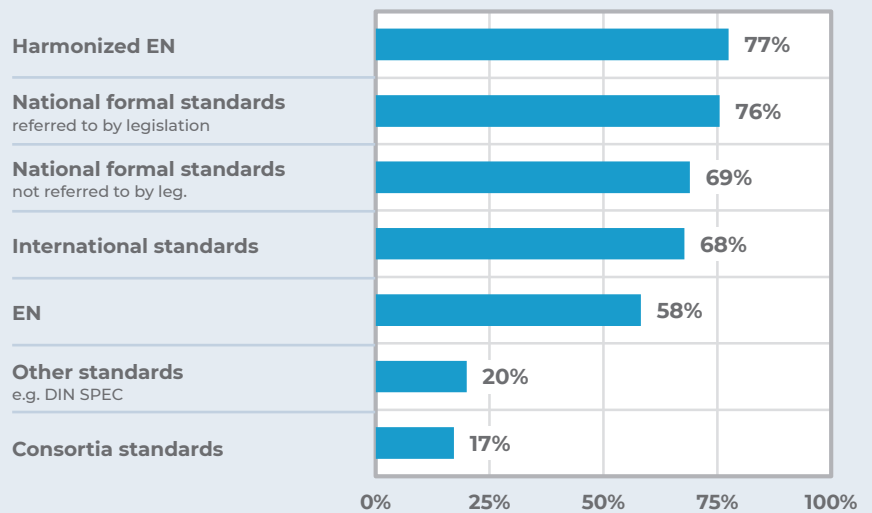
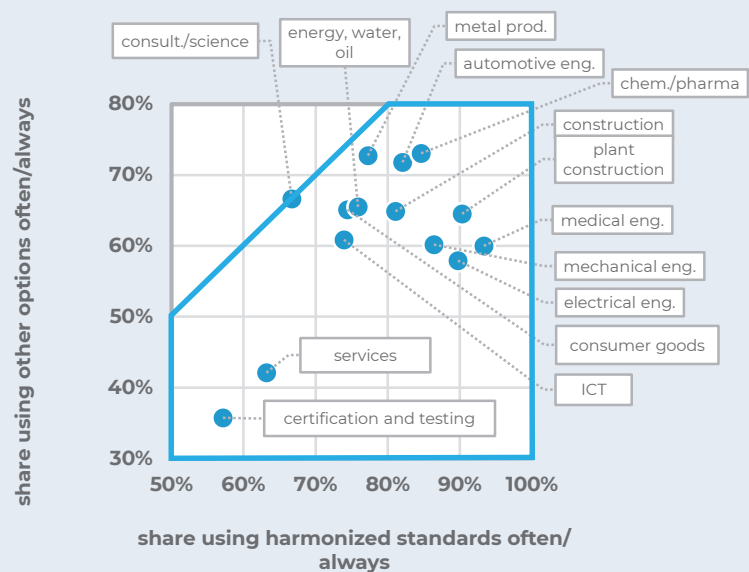


Figure 10

Usage of harmonized standards to demonstrate compliance with relevant legislation

N=710, industries with n<20 omitted



a correspondingly high influence on legislation. Both large companies and SMEs saw national standardization as giving them increased opportunities for contribution.

Companies from the automotive, chemical and pharmaceutical industries, as well as from the energy, water and oil sectors, on average stated that they had a greater influence on national and European standardization. Companies from the tertiary sector, with the exception of providers of certification and testing services, felt that their influence was significantly lower. Compared to other companies in the primary and secondary sectors, the construction industry assessed its influence on standardization at the European level as lower, while at the national level it was in the mid-field. The mechanical engineering industry display surprising perceptions. On average, these companies rated their influence on national standardization significantly lower than companies from other industries. An analysis showed that this could not be explained by size or turnover of the sampled enterprises alone. The next step will be to examine other possible explanations using additional data, such as particularly strong "standardization competition" in mechanical engineering or a possibly overwhelming standards landscape for individual ME companies.

A similar picture emerged from the assessment of standardization and legislation according to legitimizing criteria, such as those agreed upon by the World Trade Organization as a benchmark for the correct introduction of technical specifications and standards in the Agreement on Technical Barriers to Trade⁶. In this context, standardization was viewed much more positively than legislation, particularly with regard to its transparency, openness and coherence. This also applied to the criteria of efficiency, effectiveness and impartiality (see figure 13). Overall, national standardization scored best.

⁶ WTO TBT Agreement, <https://www.wto.org/tbt>

For most companies, the relationship between standards and laws was clear. Approximately 60 % assumed that laws initiate standards and then reference them. A reverse relationship, i.e. the initiation of laws through standards, was only agreed to by about a quarter. Contradictions between standards and laws were noticed in only a few industries, most notably in the construction industry (13 % of companies). Overall, the vast majority (more than 90 %) perceived standards and laws as a coherent regulatory system.

Table 1	Phases of standardization and legislative processes	
	standardization	legislation
initiation	identification of need for standardization, submission of standardization applications	perception and addressing of problems
development and consultation	commenting on standardization applications, formulation of draft standards, commenting on draft standards	policy-forming (consultations and discussions), development of draft laws, proposal of amendments
decision	consultation of draft standards	parliamentary debate and voting
implementation	implementation of standards in company / products	implementation of legal requirements in company / products
monitoring	sancation of noncompliance by other market players	sanctions (negotiation of fines etc.)
adaption	updating or withdrawal of standards	adapting existing laws

Figure 11

How high is the influence of your company on the <phase> of standardization or legislation? N=836, mean values

Phases:

A initiation

B development, consult.

C decision

D implementation

E monitoring

F adaption

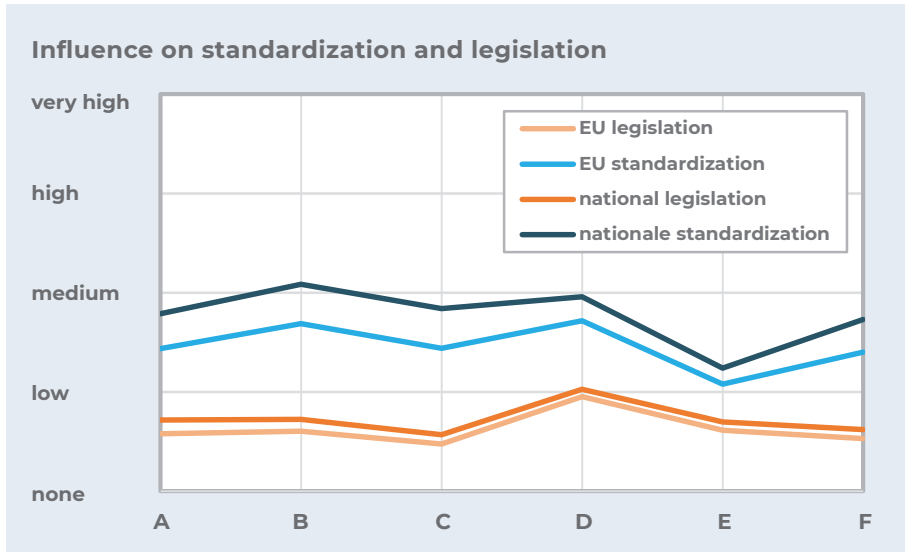
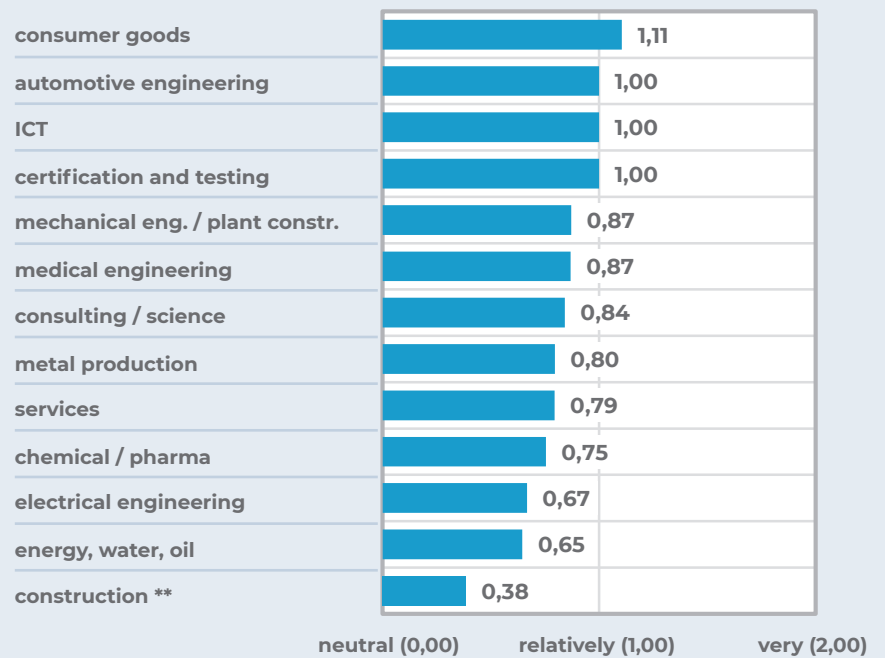


Figure 12

How consistent are formal standards and laws?

N=844, sectors with n<20 omitted. 5-item scale.

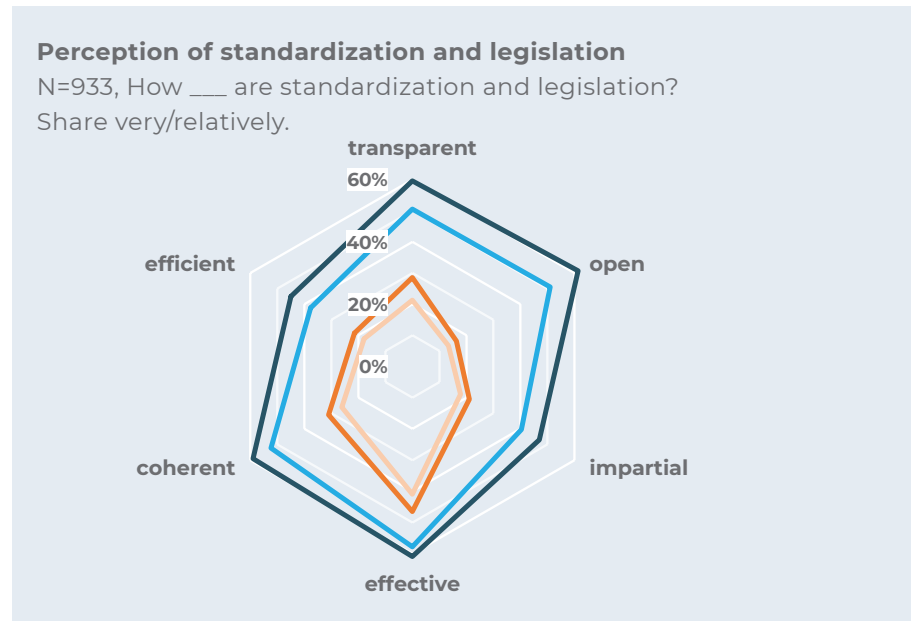


Summary

The results of the special section confirm that standards that are referenced by laws hold a special significance. Although the application of (European) harmonized standards is *de jure* as voluntary as the application of other standards, they and complying to them are considered to be more important by companies. The "presumption of conformity" which they confer makes them highly relevant and, for most companies, complying to harmonized standards is the method of choice or even the *de facto* necessary method of demonstrating that their products and services fulfill national and European regulation. It also shows, however, that other options, such as companies' own technical documentation of non-standard products, play a role and continue to be utilized regularly.

Since complying to harmonized standards is of such great importance to many companies, corresponding development and coordination processes are put into enhanced focus. The companies' assessments show that they see an opportunity in the standardization process to contribute their technical knowledge and be involved in developing rules that are relevant to them - more than they would be able to in the legislative process. In connection with the positive perception of standardization with regard to criteria such as transparency and openness, this confirms that companies regard the current relationship between standards and laws as expedient and legitimate.

Figure 13



CONCLUSION

Central findings of the seventh round of the German Standardization Panel

The results of the 2018 survey of the German Standardization Panel and its connection with preceding waves of the survey validate the last years' findings. They also confirm initial trends and yield new insights into the development of standardization activities over time.

Formal standards, technical rules, and specifications developed by formal standardization institutes are by far the most important types of standards for the responding companies. These standards mostly serve to ensure legal security and to fulfill formal and informal market entry conditions. The third spot is taken by internal company standards which are of particular importance for larger companies, in order to achieve increased productivity. External company standards, de-facto standards, and informal consortia standards are generally considered less relevant.

In the period from 2013 to 2018, the importance of international standards is growing. While formal standards are not gaining in importance on average at European level, they remain the most important standards for participating companies. All other standards and types of standards, especially consortia and de-facto standards, are gaining in relevance not only at the international level, but also at the European level. This corresponds to the development of participation in standard setting organizations at various regional levels - the proportion of companies active in international standards organizations has risen the most.

The companies were again asked about criteria that influence their decision to participate in standardization compared to consortia. The large lead of formal standardization over previous years continued to decrease slightly. Since the advantages of consortia were also perceived as somewhat less pronounced, the overall picture was more balanced. Criteria that perceived as drivers for participation in consortia were faster processes, lower document costs and the use of open source content and mechanisms. Benefits of participating in formal standardization were, among others, the widespread use of formal standards, and the possible influence on government regulation.

Certification according to ISO 9001 is the most prevalent among panel participants, but the number of initial certifications has decreased in recent years. There is also a slightly negative trend in the certification of environmental management systems. The certification of energy management systems according to ISO 50001 has become more important in recent years. In the surveys of the last two years, a certain saturation is emerging. A robust evaluation will only become possible with the addition of the observations of the next surveys.

The analysis of responses from the survey's special section showed that harmonized (European) standards are of high importance for companies. The vast majority of respondents consider complying to these standards to be not really voluntary or often even absolutely necessary. By participating in standardization, companies

perceive to have an increased opportunity to shape rules that are relevant for them. The general perception of formal standardization as being transparent, open and impartial can be understood as a confirmation of its legitimacy.

After the initial focus on company standards in the first waves of the German Standardization Panel, attention has in recent years shifted to the advantages and disadvantages of formal standardization compared to consortia standardization. Here, a certain convergence between the two systems could be registered. The most recent survey further augments the overall picture of the system of technical rule-making by exploring formal standardization within the context of the national and European legal frameworks. The link between standardization and legislation, especially in regard of the reference of harmonized (European) standards by legislation, appears to play an important role for businesses. In the future, standardization will face further new challenges. Topics, such as the increasing importance of open source software, are becoming pressing issues rapid pace of digitization. The German Standardization Panel will continue to monitor such new developments and their effects on the standardization system.

SURVEY DETAILS

The German Standardization Panel is conducted by the Department of Innovation Economics at the Technical University of Berlin (TU Berlin) and is financed and supported by DIN and DKE.

To present representative results for the companies involved in standardization, the results of the survey are being compared to DIN's data on companies active in standardization. In the medium term, data from the innovation surveys commissioned by the German Federal Ministry of Education and Research since the 1990's, and from the survey on the research and development of economic statistics by the "Stifterverband für die Deutsche Wirtschaft" are being used to complete the picture.

For the next surveys, it will be important to motivate previous participants to take part in subsequent survey waves in order to establish a useful panel structure. Finally, other businesses will need to be encouraged to participate in further surveys, in order to gain a wider, more representative data base.

Catalogue of questions

The goal of the German Standardization Panel is to measure not only the expenses and effort of companies invest in standardization, i.e. the activities in standards organizations, but also their utilization of the results of this work, that is, the application and implementation of standards and specifications. The questionnaire was divided into four sections:

1. Importance of formal and informal standards and specifications
2. Standards and laws
3. Formal and informal standardization activities
4. General information on participating businesses

The complete questionnaires of all surveys since 2012 can be downloaded from the DNP website: normungspanel.de

GLOSSARY

Formal standardization

In Germany, “formal” national standardization (also called “full consensus standardization”) is defined as the “systematic unification of material and immaterial subjects carried out by all stakeholders working in consensus for the benefit of society as a whole” (see *DIN 820-1:2014-06 Standardization – Part 1: Principles, definition from DIN 820-3:2014-06*). Provisions are laid down with full consensus and are adopted by recognized formal standards institutes (such as DIN German Institute for Standardization and DKE German Commission for Electrical, Electronic & Information Technologies of DIN and VDE). Formal standardization has a high level of legitimacy due to its well-established processes.

In addition, the international and European standards organizations form a network of national standards institutes. DIN’s staff administer international and European standardization activities carried out in Germany, ensuring that all rules of procedures and guidelines are complied with. They prepare, carry out and follow up meetings of international and European bodies and of the corresponding German “mirror” committees (see www.din.de).

Informal standardization

In Germany, a differentiation is made between “Normung” (“formal”, full consensus standardization) and “Standardisierung” (“informal” standardization that is not based on full consensus). The latter process results in specifications, such as the “DIN SPEC”, or consortia standards, for example. Usually these are developed by a temporary body or standardization consortium. Full consensus and the involvement of all stakeholders are not required.

National standards organizations

DIN, the German Institute for Standardization, is a privately organized provider of services related to standardization and the development of specifications. By agreement with the German Federal Government, DIN is the acknowledged national standards body representing German interests at all levels, including the European and international standards organizations. DIN’s purpose is to encourage, organize, steer and moderate standardization and specification activities in systematic and transparent procedures for the benefit of society as a whole and while safeguarding the public interest. DIN publishes its work results and encourages their implementation. Some 30,000 experts contribute their skills and experience to the standardization process, which is coordinated by 400 DIN employees (for further information see www.din.de).

The **DKE German Commission for Electrical, Electronic & Information Technologies** of DIN and VDE is a modern, non-profit service organization which ensures that electricity is generated, distributed and used in a safe and rational manner, thereby serving the good of the community at large. DKE is the German national organization responsible for developing standards and safety specifications in electrical engineering, electronics and information technology. Its work results form an integral part of the collection of German standards. VDE specifications also form the VDE Specifications Code of safety standards (see www.dke.de).

European standards organizations

In Europe, standards are drawn up by the three officially acknowledged European standards organizations: the European Committee for Standardization (CEN), the European Committee for Electrotechnical Standardization (CENELEC) and the European Telecommunications Standards Institute (ETSI). The national standards bodies of CEN and CENELEC's 33 members work together to draw up European standards, which are adopted by the members at the national level (see <http://www.cenelec.eu/aboutus/Pages/default.aspx>).

Each country is represented within Cen and CENELEC by one member body. German interests are represented by DIN within CEN and by the DKE at CENELEC. Each DIN standards committee decides on active participation at the European level. This work is supported by a working committee designated as the "mirror committee" to the relevant European body. This committee determines the German position on a particular subject and sends delegates to the European committees to represent this position and participate in the consensus-building process.

ETSI is responsible for drawing up globally applied standards for the information and communications technology (ICT) industry. This includes television and radio technologies as well as the internet and telecommunications. The European Union has officially recognized ETSI as a European standards organization(see www.etsi.org/about).

Figure A.1

Formal standardization at three levels (Source: www.din.de)

	National level e.g. Germany	Regional Level e.g. Europa	International level
General			
Electrotechnical			
Telecommunications			

International standards organizations

ISO International Organization for Standardization and IEC International Electrotechnical Commission are private organizations whose members are the national standards organizations. The secretariats of ISO and IEC technical committees are held by these member organizations, who come from all over the world. DIN's standards committees decide on active participation at the international

level and on the adoption of an international standard as a national standard. The main bodies of ISO and IEC are the respective general assemblies; other bodies include policy-making bodies such as the council and technical executive committees, such as the Technical Management Board. Standards work is carried out by national delegations and their experts acting in technical committees, sub-committees and working groups.

Another international body that sets rules is the **ITU International Telecommunication Union**. The ITU is a subsidiary organization of the United Nations, and is based in Geneva, Switzerland. Recommendations of the ITU are developed by government representatives of the 191 member countries and representatives of companies and regional and national organizations. They serve as guideline for legislators and companies in the member countries.

Formal standards

In Germany, formal standards are developed by the standards committees in DIN and DKE with the full consensus of all stakeholders, and are largely recommendatory in nature. However, if they are cited in a law or contract, their use may become mandatory. They “provide, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at achieving the optimum degree of order in a given context” (definition as in *DIN EN 45020:2006 Standardization and related activities – General vocabulary (ISO/IEC Guide 2:2004)*). Standards define the state of the art at the time of their publication, and contain recommended properties, test methods, safety requirements or dimensions, for example (see www.din.de).

The most important designations for standards:

- **DIN** – National German Standard
- **DIN VDE** – National electrotechnical German Standards containing safety-relevant or EMV-specific provisions
- **DIN ISO, DIN IEC, DIN ISO/IEC** – German translation of an International Standard published by ISO and/or IEC and adopted, unchanged (but sometimes with national elements such as National foreword or National footnote), as a German standard
- **DIN EN** – Official German version of a European standard. All European standards are to be adopted, unchanged, by the members of the European standards organizations CEN/CENELEC/ETSI
- **DIN EN ISO** – Official German version of a European standard which is the unchanged adoption of an International Standard

Specification (e.g. DIN SPEC)

In Germany, a “specification” such as the “DIN SPEC” is the result of an “informal” standardization process, and describes products, systems or services by defining characteristics and laying down requirements. Like standards, such specifications are developed by experts in formal standards organizations such as DIN. However, they differ from formal standards in that full consensus and the involvement of all stakeholders are not required.

- Consortia standards** Like specifications, consortia standards are drawn up in an “informal” standardization process. They are developed on the basis of majority decision by a selected group of companies and organizations taking the form of a “consortium”.
- De-facto standards** De-facto standards are not developed by specific consortium, but are a consequence of market demand. De-facto standards are also known as “industry standards” and are developed in what is called an “informal” standardization process. All standards drawn up by industrial interest groups are de-facto standards.
- Technical rules** Technical associations actively participate in DIN’s standards committees in order to represent the interests of their members at the national, European and international level. Some of these associations also draw up their own technical rules (see www.din.de), which contain recommendations on how to comply with legislation, a regulation or an established technical procedure. Although they are not legal documents in themselves, they can become legally binding where cited in a law or regulation, for example in building regulations. Technical rules published by organizations such as VDI, VDMA, VDE are not drawn up with full consensus.
- Company standards** Company standards are developed and adopted by companies themselves and or by cooperating businesses (e.g. suppliers). For example, their use can be mandatory for a company’s suppliers.
- Panel survey** A panel survey is a survey carried out among the same economic players (persons or companies) on the same topic and over time.



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