Technische Universität Berlin

DIN DKE

GERMAN STANDARDIZATION PANEL

Standardization Research, Policy and Promotion

Indicator Report 2024

» **European Standardization**

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Authors Prof. Dr. rer. pol. Knut Blind
Luzie Kromer, M.A.

Technische Universität Berlin

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Office DIN e.V.
Burggrafenstraße 6
10787 Berlin
Phone: +49 30 2601-2691
Fax: +49 30 2601-42691

Executive Board Christoph Winterhalter (Chairman)
Daniel Schmidt

Edited by Technische Universität Berlin
Department for Innovation Economics
Office H47
Straße des 17. Juni 135
10623 Berlin

Collaborators Daniele Rosenberg

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MESSAGE OF GREETING

from **Dr. Franziska Brantner**

Parliamentary State Secretary at the Federal Ministry for Economic Affairs and Climate Action,

for the 2024 German Standardization Panel

Since 2012, the annual survey of companies on the subject of standardization has been providing German industry and policy makers with up-to-date scientific findings from standardization research. At a time of radical change, these insights are all the more important, as we are called upon to support the industrial sector and the business sector at large as they take key decisions for the digital transformation, the transition towards CO2 neutrality and for a European standardization policy guided by European values. An analysis of the responses has shown that standards for the fields of the circular economy, artificial intelligence and security and resilience are not only well-known, but are also regarded as highly advantageous for these sectors in terms of the green and digital transition.

It is also encouraging to see European and international standardization being considered an important pillar for the promotion of trade and innovation and close cooperation at European level being regarded as decisive for safeguarding standards and minimising barriers to trade.

In its Standardization Strategy of February 2022, the European Commission highlights the strategic importance of standardization. The newly created High-Level Forum on European Standardization is to enable Europe to play a leading role in the establishment of global standards. At national level, we responded by taking the initiative for the German Strategy Forum for Standardization at the Federal Ministry for Economic Affairs and Climate Action and by supporting this body. In addition to the key issues of hydrogen, the circular economy, artificial intelligence (AI), data and quantum technologies, the Forum has also drawn up initial recommendations regarding the recruitment of much-needed experts. It is especially important for the national Forum to match and synchronise its activities with European standardization activities and the agenda of the EU High-Level Forum.

The European Regulation on harmonised provisions on AI is the first such comprehensive legal act regulating AI. Its implementation requires action by the EU Member States, but also the European standardization organizations so that an AI standardization mandate can be defined.

It is therefore important for the 2024 German Standardization Panel to focus on European standardization, to highlight its importance and usefulness, and to illustrate the implications.

Not least in my position as a patron for the German Standardization Panel, I would like to thank all participants for their contributions to this year's survey and the Department for Innovation Economics at Berlin Technical University for designing and conducting this analysis.

I hope that you, the readers of this report, will find that it benefits your daily work.

AUTHORS

Prof. Dr. Knut Blind

is Professor of Innovation Economics at the Faculty of Economics and Management of the Technical University of Berlin (TU Berlin) and coordinator of Innovation and Regulation at Fraunhofer Institute for Systems and Innovation Research ISI.

Luzie Kromer, M.A.

is a research associate at the Chair of Innovation Economics of the Technical University of Berlin (TU Berlin) and scientific director of the German Standardization Panel.

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EXECUTIVE SUMMARY

Innovations are largely responsible for the growth and prosperity of a society. When an idea successfully becomes a marketable solution, many factors play a role in this success. These factors include standardization in particular, as highlighted in the OECD's Oslo Manual[1] in 2018. The EU Standardization Strategy of February 2022 aims to strengthen the importance of standards for the EU's competitiveness and to harmonize and accelerate standardization processes, which was further advanced under the German patronage of the G7 in 2022.

In order to strengthen research in the field of standardization, the German Standardization Panel (DNP) was launched in autumn 2011 by the German Association for the Promotion of Research on Standardization (FNS). The aim was to gain a better understanding of standardization processes and their implications through scientifically sound findings. Today, the German Standardization Panel is supported by DIN and DKE and conducted by the Department of Innovation Economics at the Technical University of Berlin. The annual surveys conducted as part of the DNP provide important data for the analysis of standardization activities and make it possible to examine the impact of standards on various economic and social areas. Since 2016, the German Federal Ministry for Economic Affairs and Climate Action (BMWK) has been the patron of the DNP.

A comprehensive analysis of standardization requires a reliable database. In particular, panel data is essential for researching the complex effects of standardization processes and the application of norms and standards on organizational success. This data, which is collected over a longer period of time and among the same economic actors, provides insights into changes in standardization behaviour and the use of norms and standards by organizations from 2013 to 2023. The pilot study from 2012 could not be included in the panel dataset due to an insufficient number of observations, but the data from twelve waves of the DNP this year provides a unique basis for the analysis.

[1] *OECD and Statistical Office of the European Communities (2018): Oslo Manual. Guidelines for Collecting and Interpreting Innovation Data, 4th Edition. Retrieved from https://www.oecd.org/science/oslo-manual-2018-9789264304604-en.html.*

The present evaluation validates the results from previous years but also offers new insights into the development of companies' standardization activities. The following central findings can be derived:

1 Formal standards and technical rules or specifications from the official standardization organizations are by far the most important types of standards for all the organizations surveyed. They promote the creation of legal certainty and facilitate market access for the organizations. Over time, the importance of (external) company standards is declining, while technical rules and specifications at national and EU level are gaining in importance. Compared to previous years, Consortia Standard become less important at all levels, particularly for SMEs (small and medium-sized enterprises).

2 Internal company standards are the third most important type of document and are considered to be more important than informal Consortia Standards or De-facto Standards. They are used by the majority of the organizations participating in the survey, but especially by smaller and more innovative organizations, and are particularly relevant for quality and productivity improvements. Small organizations value external company standards for a good negotiating position with suppliers and customers. In addition to that, internal company standards are the most important standards when it comes to the implementation of more sustainability and resilience within companies.

3 Informal Consortia and De-facto Standards are particularly relevant for the realization of technical interoperability. Participation in consortia is primarily motivated by the speed of the processes, while in formal standardization, the quality of the information and the informal exchange as well as as the quality of results speak in favour of formal standardization.

4 Certifications in accordance with DIN EN ISO 9001 (quality management) and DIN EN ISO 14001 (environmental management) are already very widespread among the organizations surveyed. In contrast to previous years, an increase in these established certifications was observed among the participating organizations this year. ISO/IEC 27001 (IT security management) recorded the strongest growth in certifications. In addition, more ISO 14001 certifications are planned.

5 Standardization in the area of green and digital change is important for the respondents. They would particularly benefit from standardization in the areas of the circular economy, artificial intelligence and digital product passports. The presumption of conformity of standards plays a major role for most organizations, and the link between European and international standardization is considered important. For the majority of respondents, it is clear that the link between the areas of research and standardization needs to be strengthened.

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

Introduction

In autumn 2011, the German Standardization Panel (DNP) was initiated by the German Association for the Promotion of Research on Standardization (FNS). The aim of the FNS was to promote research on topics and issues relevant to standards and standardization in order to be able to deliver scientifically sound recommendations related to standardization policy aspects. The German Standardization Panel is now commissioned and supported by DIN and DKE. Annual surveys conducted as part of the DNP collect data that contribute to an inventory of standardization activities and make it possible to examine the impact of standards and standardization on various economic and social dimensions. In 2016, the Federal Ministry for Economic Affairs and Climate Protection (BMWK) took over the patronage for the first time.

Inspired by the innovation survey[2] established in the early 1990s (on the initiative of the European Commission) in the member states of the European Union, the DNP created a comprehensive empirical database with a wide range of organizational information that can be used to answer key questions in standardization research.

Objectives

The data available through the DNP forms a basis for gaining new scientific insights into the standardization activities of organizations, the implementation of standards and their impact on organizational success. The results of the survey also offer the opportunity to actively derive strategies for the involvement in European and international standardization and to articulate national interests to the European Commission, among others. Another aim of the DNP is to take up and evaluate current standardization policy initiatives. In the last survey waves, the effects of the covid-19 pandemic, climate change and the importance of the United Nations Sustainable Development Goals for standardization were addressed in this regard. The DNP can also be used to record the impact of economic and geopolitical events, such as the covid-19 crisis or the consequences of the Russian war of aggression in Ukraine, on the standard-setting organizations.

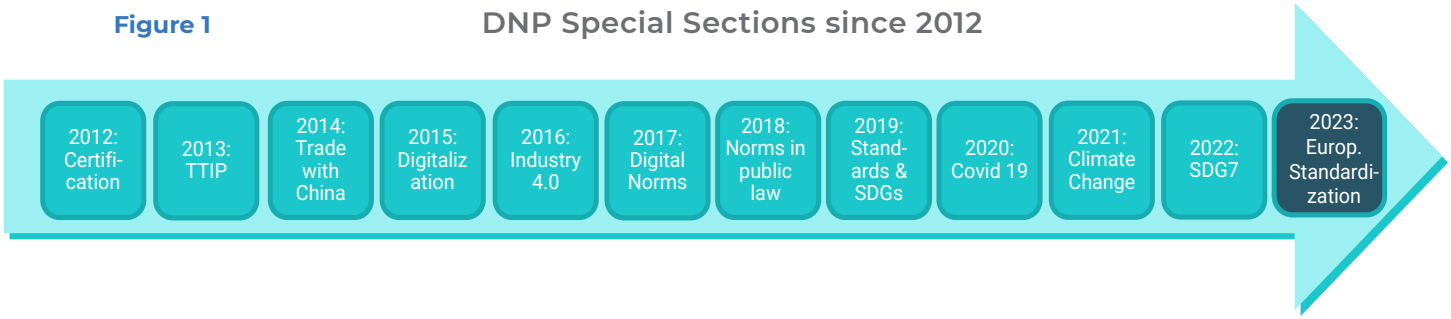
Finally, the DNP is intended to contribute to sensitising companies that have not used standards or have not used them much or are not actively involved in standardization to the topic and to motivate them to participate. Furthermore, target groups are addressed for whom the topic of standardization is still foreign. One

[2] This is the panel survey of the Community Innovation Survey (CIS), in which companies are repeatedly asked about their innovation activities, problems and successes.

means to this end is the widespread dissemination of the results of the surveys, for example through reports like this one or public events. The DNP is intended to achieve these mutually compatible goals with regard to standardization research, policy and promotion.

Figure 1

DNP Special Sections since 2012



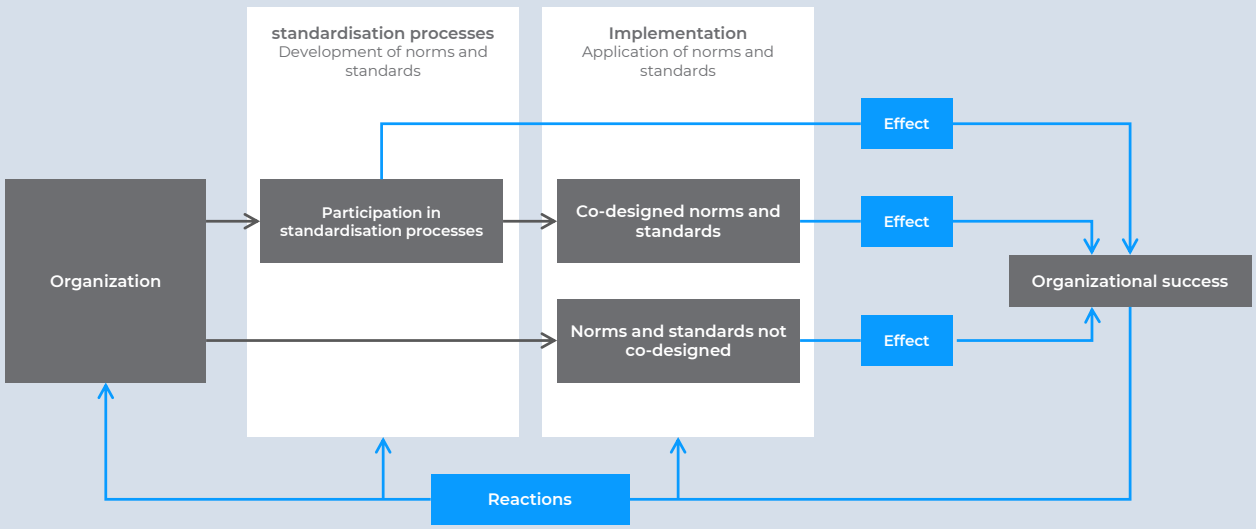
Heuristic Model

The annual survey is divided into core questions and a topic-oriented special section. Conceptually, the core survey of the DNP is based on a heuristic impact model (see Figure 2). This model is designed in a way that the broadest possible range of questions can be integrated. In particular, the model depicts the multidimensional relationships between standardization participation and standardization, the implementation of standards, and corporate success.

To characterize the standardization activities, the type and scope of the standardization work are recorded, such as the time and personnel effort or the engagement within standardization bodies. In the area of the implementation of standards, the various cost and benefit dimensions are surveyed. In addition to these aspects, which are aimed more at the development processes and the implementation of standards, the DNP has the long-term goal of recording the effect of standardization and the application of standards on the success of companies.

Figure 2

Heuristic structural model for the German Standardization Panel



Realization

Method

On 14 October 2023, World Standards Day, the twelfth wave of the DNP's organizational survey was launched. The project is carried out by the Department of Innovation Economics at the Technical University of Berlin and is financed and supported by DIN and DKE. The Federal Ministry of Economics and Climate Action (BMWK) has once again kindly taken on the patronage of the DNP in 2023. More than 37,000 experts were contacted in total. The number of usable questionnaires is 1,628 (approx. 1,806 in the previous year), which means that the response rate of just under 5% is slightly lower than in the previous year (6%).

Panel data

This year, data from 211 organizations that have participated at least five times since the 2013 and 2014 surveys was analyzed. A balanced panel data set was created on this basis. In order to obtain a detailed overview of the development of various indicators over the entire survey period, responses from the individual samples of the respective years were also compared. With the aim of enabling more robust comparability and a sufficient degree of representativeness, the responses of the organizations were weighted according to the size of the organization and the as- signed sector. The target distribution was an estimate of the distribution of organization size and industry classification of the organizations active in standardization at DIN, which was created on the basis of a database with almost 10,000 organizations. Based on this unique data set, it is possible to gain insights into changes in standardization behavior and the use of standards by organizations over time.

Composition of the 2023 sample

In this report, the sector affiliation, the size of the organizations and their activities in the field of research and innovation are used as a basis to structure the results and highlight specific characteristics. The composition of the organizations participating in the 2023 survey is largely similar to that of previous years. This ensures that the structures of the sample and the experts and organizations participating in the DNP allow the results for 2023 to be compared with previous years.

Participants

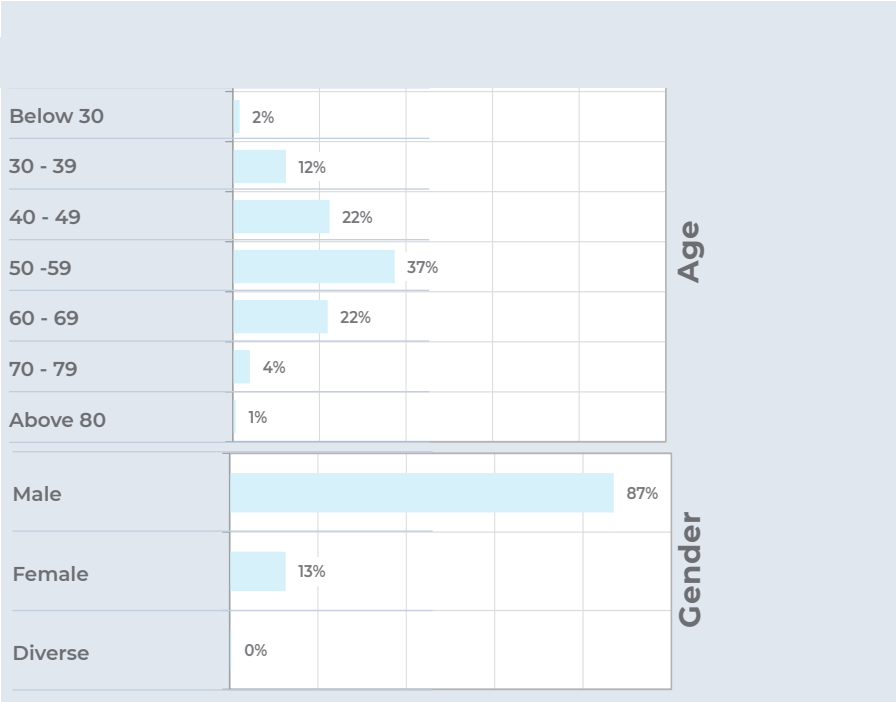
Of the almost 1,630 questionnaires used for the evaluation, 64% represent organizations or groups of organizations. Around 36% of the responses came from experts who answered on behalf of a representative organization in their sector (compared to the previous year, there were slightly fewer organizations and more experts). In smaller organizations with up to 50 employees, mainly one person from the management or plant management answered the questions. In larger organizations, respondents were more often based in research and development departments or had a specialized background in standardization. Around 25% of respondents (previous year: 26%) came from research and development departments, while 19%, as in the previous year, came from management or plant management. Employees from dedicated standardization departments and those with a quality management background together accounted for around 10% of respondents (previous year: 11%), which corresponds to the overall distribution of previous years.

Age

For the first time, questions were asked about the age and gender distribution of the participants in the standardization. The almost 2,604 questionnaires used for the calculation show the normally distributed age of the participants. The largest age group is 50 to 59-year-olds, who make up 37% of respondents. This is followed by the 40 to 49-year-olds with 22% and the 60 to 69-year-olds with 22%. Younger age groups are less represented: 12% of participants are between 30 and 39 years old, and only 2% are under 30 years old. Older age groups are also rarely represented, with 4% in the 70 to 79 age group and 1% over 80. This age distribution indicates a possible ageing in standardization, which could lead to greater challenges in recruiting younger professionals.

Figure 3

Number of participants in different age groups and according to genders N = 2,604



Gender

The gender-specific distribution of participants shows a clear majority of males. Men account for 87% of respondents, while women make up 13% of participants. The 'Diverse' category is represented by 0.39%. This distribution shows that the respondents are heavily dominated by male participants, with a lower representation of female and diverse respondents.

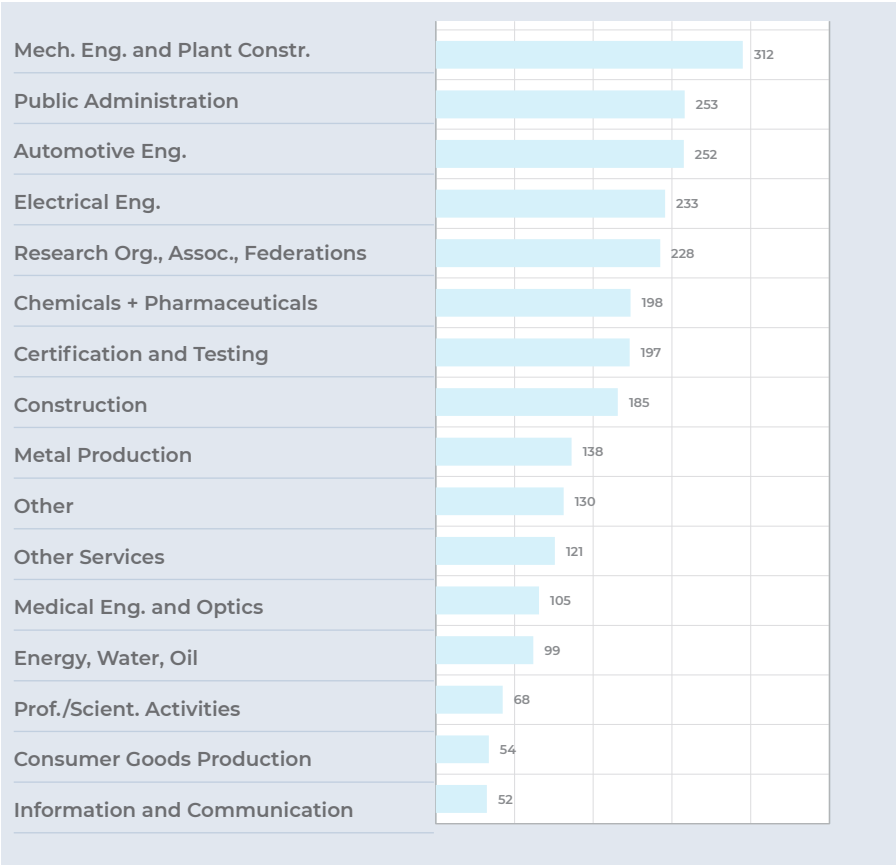
Provenance & Company size

As in previous years, the survey focused on German organizations. Organizations headquartered in Germany thus made up the largest group of participants by far, with just under 90%. Most foreign organizations have their headquarters within Europe (7%), followed by the USA (2%). The size distribution of participating organizations has remained relatively stable since 2013. Each group formed according to organizational size contains around a quarter of the participants (classification: < 50, 50 - 249, 250 - 999, 1,000+ employees). This means that the views of small and medium-sized organizations (< 250 employees), which make up 51% of the sample, were also well represented. While the proportion of smaller organizations was highest in the service sector (> 50%), responses from organizational groups with more than 1,000 employees came mainly from industry, particularly the automotive, chemical and pharmaceutical sectors.

The composition by sector has changed only slightly compared to previous years. Most of the participating companies (12%) are active in the mechanical and plant engineering sector (N = 354), followed by 10% in the public administration sector (N = 312), 8% each from vehicle construction (N = 253), the electrical engineering sector (N = 252), universities and associations (N = 223) and organizations in the chemicals and pharmaceuticals sector (N = 228). In contrast, only 2% of organizations were active in the information and communication (ICT) sector (N = 68). Compared to the 2022 survey, the proportion of participants from mechanical and plant engineering, vehicle construction and public administration sectors has increased and the proportion of organizations from the construction industry and certification and testing sectors has decreased (see Figure 4).

Figure 4

Number of participants by sector



Research & Innovation

The innovation activities of the organizations have increased slightly in some cases compared to the previous year's survey and have otherwise remained at a constant level. For example, 62% of the 1,085 organizations stated that they had introduced product innovations and 55% process innovations in the last year. These figures correspond to those of the previous years. A comparison of the weighted samples shows a slight decrease compared to the previous year's survey. A total of 61% of organizations carried out (internal) research activities and 50% cooperated with external research institutions. Collaboration with ext. research institutions therefore increased compared to the previous year. The proportion of organizations that carried out innovations, conducted research or entered into research and innovation collaborations was lower for small (44%) and medium-sized (48%) than for very large organizations (51%). Companies in the vehicle construction sector were the

most likely to have introduced product innovations (72%), followed by mechanical and plant engineering (68%), the service sector and electrical engineering (67% and 64%). The highest proportion of (internally) researching companies was found in electrical engineering and the energy, water supply and oil sector (69%), mechanical and plant engineering (68%) and the service sector (67%). The lowest proportion of researching organizations was recorded in metal production (33%) and chemicals and pharmaceuticals (47%). Firms the vehicle construction sector (65%) cooperated most frequently with external research institutions, while those in the chemicals and pharmaceuticals sector did so least frequently (35%).

Export

Between 374 to 412 organizations provided information on their export activities in 2023. Here, 52% execute export within the EU, 18% to Asia (a sharp increase compared to the previous year), 16% to the USA and 14% to the rest of the world. Most exports to the US and the rest of the world are made by large companies.. The sectors with the most organizations exporting were ICT (38%) and electrical engineering (33%). The highest average share of exports in terms of turnover was in mechanical and plant engineering, energy, water supply, oil and vehicle construction. The largest corresponding share of exports to the USA was recorded by the services sector (34%) and electrical engineering (20%). Within the European Union, the services sector (33%) dominated exports, followed by chemicals and pharmaceuticals (18%) and electrical engineering (18%).

IMPORTANCE OF STANDARDS AND SPECIFICATIONS

The annual survey of the German Standardization Panel deals in its core part with the importance of standards for organizations in different sectors. Five types of standards are distinguished: Formal standards such as DIN standards, technical rules or specifications (e.g., DIN SPEC), informal Consortia Standards, De-facto Standards, and internal and external company standards. Except for the latter, a distinction is made between their importance at national, European, and international levels. In the case of formal standards, this thus refers, for example, to DIN standards (national), the European standards EN (CEN, CENELEC or ETSI), and e.g., ISO standards (international). The glossary provides further information on the different types of norms and standards.

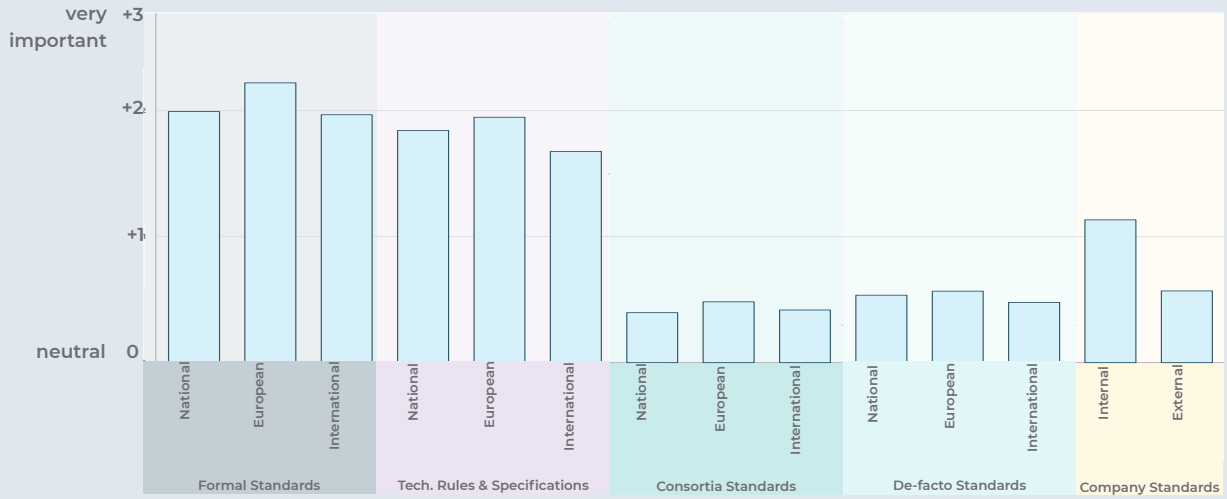
Formal standards continue to have the greatest importance, especially at the European level

As in previous years' surveys, formal standards and technical rules or specifications are the two most important types of standards for experts active in standardization in 2023 (see Figure 5). While this applies regardless of industry and innovation and research activities, the importance of formal standards at European and international levels increases on average with the size of the organizations. Although European standards are also of the greatest importance for small organizations, national standards are more important than international standards. The assessment

Figure 5

Importance of standards

Average rating of the importance of norms and standards at various regional levels. Rating scale from -3 (very unimportant) to +3 (very important). N = 1,623 -1,626

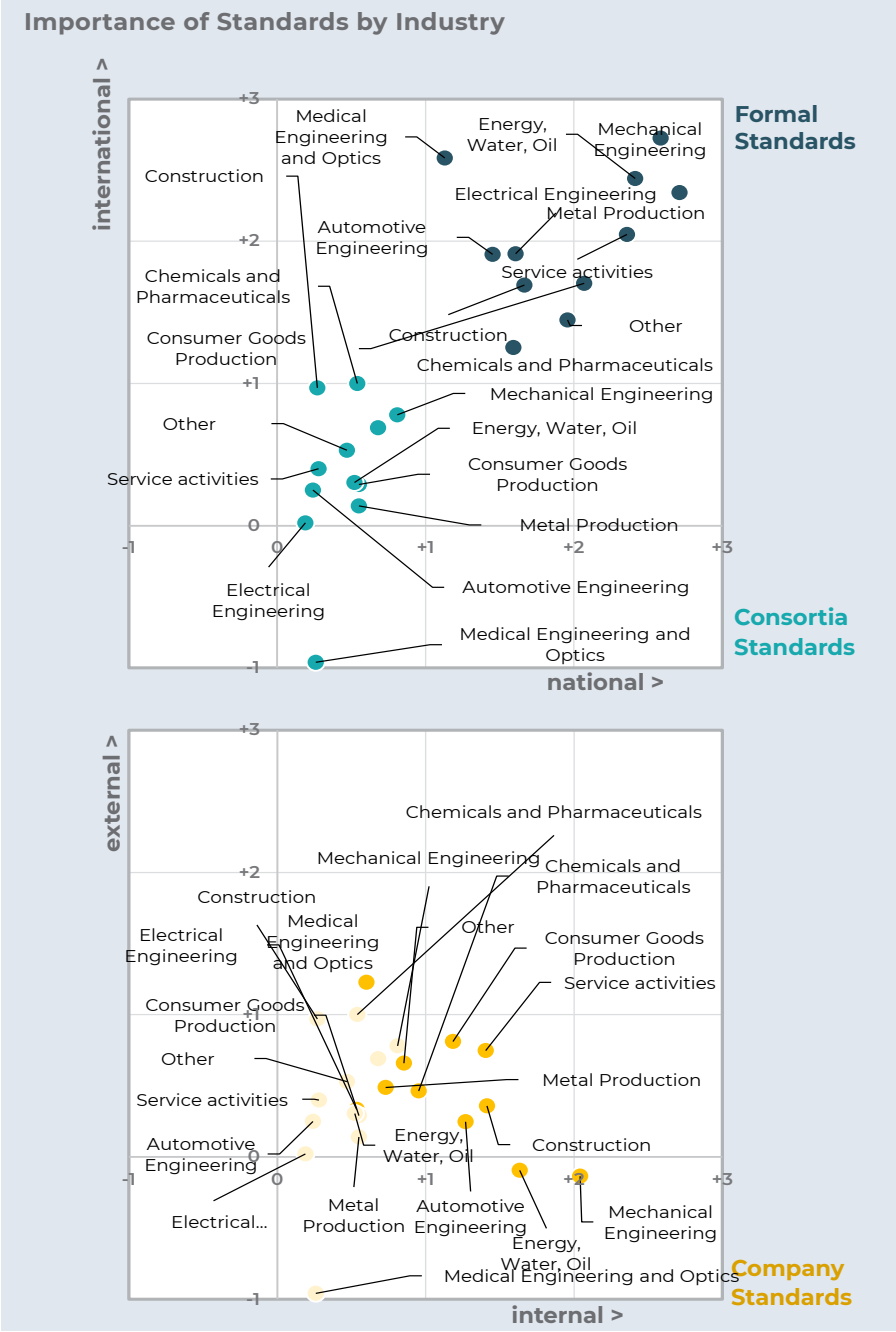


by SMEs and large organizations differs most clearly with regard to company standards. In general, the role of Consortia Standards and company standards is rated significantly lower this year than in previous years, especially for SMEs.

Overall, organizations that have fewer than 250 employees are involved in international standardization activities, have introduced product or process innovations or

Figure 6

Importance of national and international formal standards and Consortia Standards, as well as internal and external company standards by industry. -3 (very unimportant) to +3 (very important).
Total N = 2,180 - 2,192



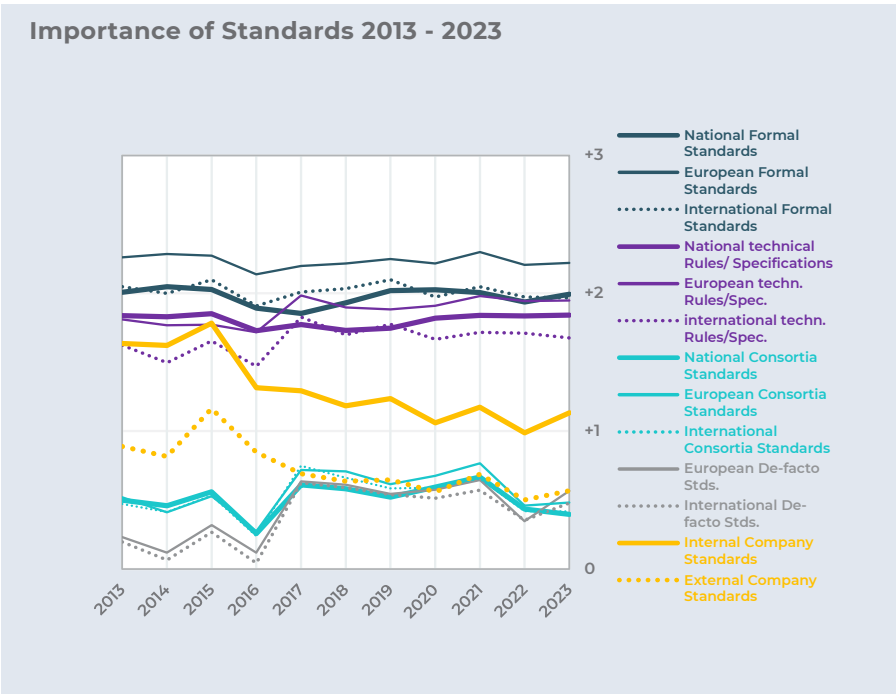
conduct internal and external research and development attach greater importance to internal company standards on average (change compared to the previous year). The mechanical and plant engineering sector and the energy, water supply, oil sector stand out here in particular.

Figure 7

Average assessment of the impact of different standard types on success factors. -3 (very negative) to +3 (very positive) N = 5,687 to 7,381

Figure 8

Change in the assessment of the importance of various types of standards between 2013 and 2023. Scale -3 (very unimportant) to +3 (very important). Weighted sample 2013 - 2023, N = 6,653 to 7,661



External company standards, i.e. standards that are often set by organizations downstream in the value chain, are particularly important in the medical and optical sector and the manufacture of consumer goods and other industries. In these sectors, they are valued for quality and productivity improvements, as well as for an improved negotiating position with suppliers and customers. In particular, very large organizations and organizations that are involved in international standardization and have developed product and process innovations consider them to be important. This year, strong approval was also noted in the public administration sector.

De-facto Standards and informal Consortia Standards are rated as less important in comparison, which is particularly clear this year. They mainly play a role in achieving technical interoperability and quality improvement for large, innovative organizations. This applies in particular to organizations that are part of a multinational group and are involved in international standardization. The construction industry in particular rates this type of standard as unimportant at an international level. The vehicle construction, medical technology and optics sectors see these types of standards as important at European and international level. At national level, they play a major role for public administration.

On average, participants attach the greatest importance to European standards and all types of European standards overall. This applies in particular to formal standards and De-facto Standards. Metal production and mechanical and plant engineering rate the importance of this type of standard as particularly high, while the service sector attaches the least importance to them.

In contrast to other industries, national standards play a greater role for the construction and service sectors than international standards. For consumer goods manufacturers and the information and communication sector, standards at a higher level are more important. Public administration and the energy sector rate national standards as very important.

The most internationally oriented sectors are optics, medical technology and vehicle construction. Organizations in these sectors attach the most importance to international formal standards. Organizations from the information and communication sector and vehicle construction perceive international Consortia Standards as very important. While such standards were only considered unimportant (negative mean value) by the construction industry in previous surveys, this year professional and scientific services were also voted negatively. Overall, the assessment of the importance of Consortia Standards has fallen sharply this year, with electrical engineering, for example, rating the importance of international Consortia Standards with an average of zero (no influence), which contradicts the more positive assessment in previous years.

Compared to the previous year, the average assessments based on the weighted samples and the balanced panel sample fell and reached the pre-pandemic level. The low assessment of Consortia Standards, De-facto Standards and company standards is particularly striking compared to an upward trend in previous years. So far, the falling values have only been significant for internal company standards, but not yet for the other types. Compared to the previous year, there has been a slight

Figure 9

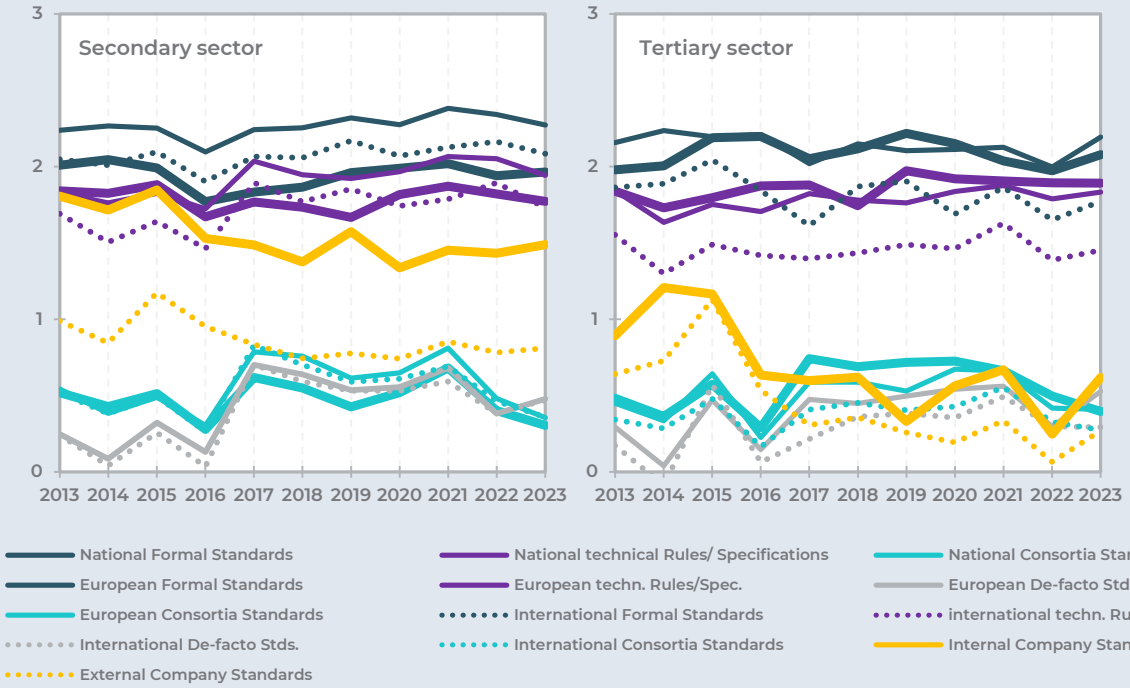
Change in assessments of the impact of standards on success factors 2013 - 2023

Average assessment of the impact of different types of standards on success factors. -3 (very negative) to +3 (very positive). Weighted Samples 2013 - 2023, N = 8,481 - 11,384

Figure 10

Change in assessments of the importance of different types of standards between 2013 - 2023

-3 (very negative) to +3 (very positive). Weighted samples 2013 - 2023, N = 4,512 - 5,824 (secondary sector), N = 2,150 - 2,721 (tertiary sector)



decline in approval ratings for national and European formal standards and European specifications. A very slight increase in importance can be observed for national and international technical rules and specifications.

Influence on success factors through formal standards and technical rules or specifications increasing again

Overall, the assessment of the previous surveys confirms that formal standards have a much stronger influence on (organizational) success factors than consortia or De-facto Standards. It is also clear to see that the importance of all types of norms and standards has returned to pre-covid-19 pandemic levels (see Figure 9), particularly the sharp increase in the importance of technical rules and specifications. The influence of De-facto Standards, Consortia Standards and external company standards is considered to be less strong than that of the other types of standard, even though it is clear that the coronavirus shock has been overcome.

In particular, the organizations see more advantages in aspects relating to transaction costs through use and access to the market. Formal standards and technical rules and specifications are seen as having a much greater influence than other types of standards in terms of ensuring legal certainty, fulfilling formal and informal market access conditions, establishing technical interoperability and negotiating with suppliers and customers, which have stagnated in importance this year or have only seen a slight increase in importance.

When considering factors that affect the improvement of internal organizational processes - especially quality and productivity increases - company standards play a similarly important role as formal standards and technical specifications. The role of internal company standards in particular must be emphasized at this point. For years, these have received a higher level of approval than formal standards when it comes to increasing productivity. This approval had declined since the covid-19 pandemic, but this year there is an upward trend, although the importance of internal company standards is lower than the importance of formal standards and technical rules or specifications for the first time since the survey. The same trend can be observed for the quality improvement factor, which was already occurring before the covid-19 pandemic. Since 2016, the role of internal company standards has been considered less relevant than that of formal standards and technical specifications. At the same time, De-facto Standards and Consortia Standards are more popular for these two factors than for the other aspects linked to organizational success.

A similar picture emerges with regard to the optimization of research, development and innovation activities as well as competitiveness. Here, greater importance is attached to internal company standards compared to consortia and De-facto Standards. In particular, a stronger increase can be seen in competitiveness this year. The approval ratings for the importance of formal standards and technical rules are remarkable in the area of research and innovation activities, as technical rules and specifications are rated as more important than formal standards this year.

This dichotomy in the assessments is consistent with the results of an earlier survey on the overall economic benefits of standardization[4] . This also came to the conclusion that internal company standards are important for the success of internal organizational processes and formal standards are particularly important for successful market operations. The latest surveys indicate that formal standards and technical rules or specifications are increasingly taking on both functions (Figure 8).

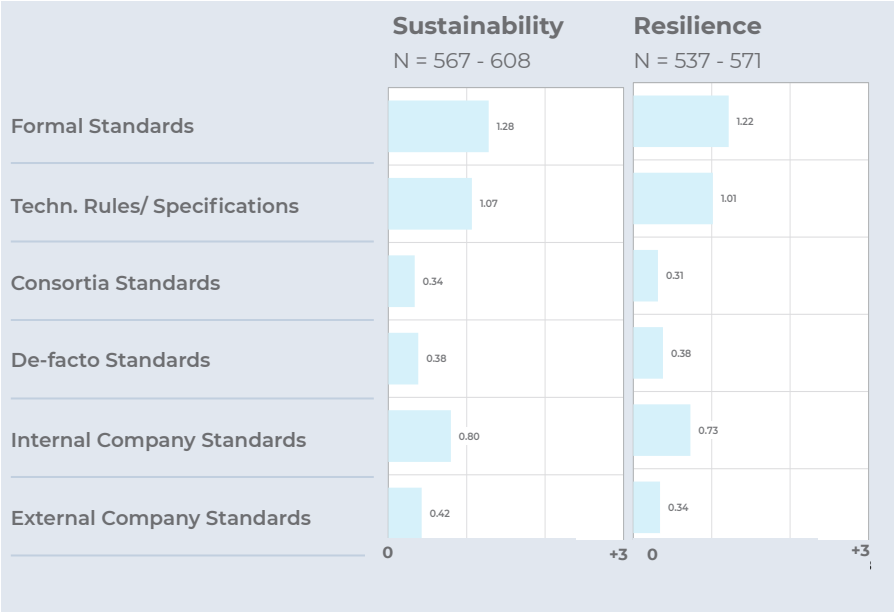
Importance of standards for 'sustainability' and 'resilience' decreases compared to previous year

In view of the current developments in society and the unstable geopolitical situation as well as the threats to the environment, the German Standardization Panel team decided to include two new success factors in the panel survey: The aspects of sustainability in organizations, products and processes as well as resilience, which have become increasingly important in the industry in recent years (Fraunhofer Zukunftsinstitut 2021). We define resilience as the ability of an organization to withstand external shocks or upheavals in the social, economic or political environment and to adapt to new conditions (Gabler Wirtschaftslexikon, 2022).

[4] DIN Deutsches Institut für Normung e. V. (2000): 'Gesamtwirtschaftlicher Nutzen der Normung: Zusammenfassung der Ergebnisse. Scientific final report with practical examples', Berlin, Vienna, Zurich: Beuth Verlag.

Figure 11

Average assessment of the impact of different types of standards. -3 (very negative) to +3 (very positive). Unweighted, mean values



As with the previous success factors, it was found that formal standards and technical specifications are classified as the standards with the greatest influence, followed by internal company standards. Especially in the area of sustainability, certifications such as ISO 14001 and ISO 50001 play an important role and resilience can only be addressed within an organization. De-facto Standards, Consortia Standards and external company standards are considered less important for the implementation of sustainability and resilience in an organization. In comparison with the previous, purely economic success factors, the values for the influence of different types of standards on the two success factors of sustainability and resilience correspond approximately to those of competitiveness.

Figure 12

Assessments of the importance of different types of standards on various aspects related to business success

STANDARDIZATION ACTIVITIES

Participation in standardization bodies stable

The core part of the DNP survey deals with the external and internal standardization activities of the organizations. In total, between 628 and 715 organization and industry representatives provided information regarding participation in standardization organizations in 2022 and 2021 at various regional levels (DIN and DKE at national level, CEN, CENELEC and ETSI at European level and ISO, IEC and ITU at international level). The evaluation shows that overall standardization activities remained stable in direct comparison to the previous year.

While most of the organizations surveyed participate in the standardization processes of national organizations, participation in standardization at European and international level is lower. To a certain extent, this can be attributed to the system of representation of the interests of national bodies in European and international mirror committees by individual delegates. Around 66% of respondents are active in committees at both national and supranational international level, an increase on the previous year. This is particular true for very large organizations from the automotive industry (89%) and small and medium-sized organizations from the chemical and pharmaceutical industry (74%). While 97% of very large organizations with 1,000 employees or more and 94% of large organizations (250 - 999 employees) were represented on at least one committee of a standards institute in 2022, this proportion was 89% for very small (< 50 employees) and medium-sized organizations (50 - 249 employees).

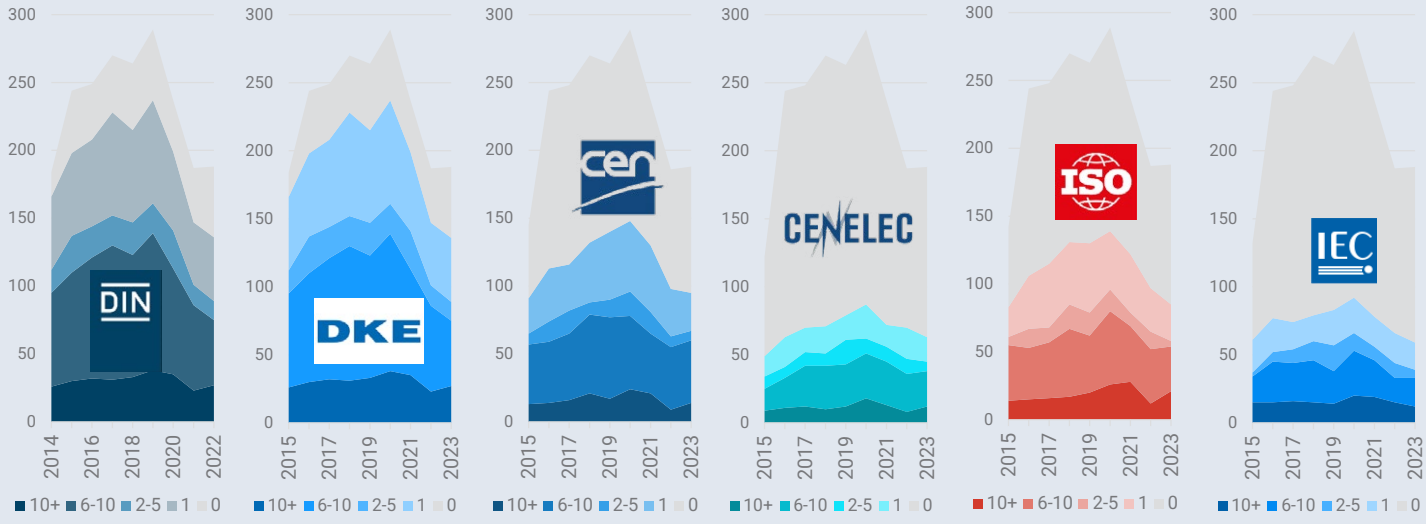
Participation in standardization committees

Participation in DIN committees shows that, compared to previous years, there has been a noticeable decline in organizations with more than ten seats at DIN, as in 2020 there were still 38 participating organizations with several seats. Participation in DKE committees fell compared to previous years, especially compared to 2020, when 168 organizations were involved in DKE. Participation in European formal standardization bodies (CEN and CENELEC) shows a slight upward trend. Participa-

Figure 13

Balanced panel: committee seats in standardization organizations

Balanced panel (organizations that provided 5 statements each between 2013 and 2022)
N = 1,750 - 2,112



tion in ETSI bodies recorded a slight increase. The figures for international standardization bodies such as ISO and IEC tended to decline.

Participation in national and international consortia increased compared to previous years. European consortia participation remained relatively stable with a slight increase from 99 in 2021 to 105 in 2022. Overall, it can be seen that participation in standardization bodies and consortia has decreased slightly over the years.

Standardization departments rather in large organizations

Of the organizations surveyed, 12% stated that they had a standardization department in 2021 and 2022. Most organizations from the vehicle manufacturing sector and very large organizations answered this question in the affirmative. Among very large organizations, the number stating that they had a standardization department decreased by 2% between 2021 and 2022. Participants also indicated whether expenditure for standardization departments decreased, remained the same or increased. The total expenditure for the standardization department did not change for most organizations between 2022 and 2023 (52%). Of the small organizations, 43% stated that they had not changed the total expenditure for the standardization department had not changed, 40% had increased expenditure for the standardization department. For only 5-6% of organizations, spending on the standardization department had decreased.

Quality of information exchange particularly positive in national standardization bodies

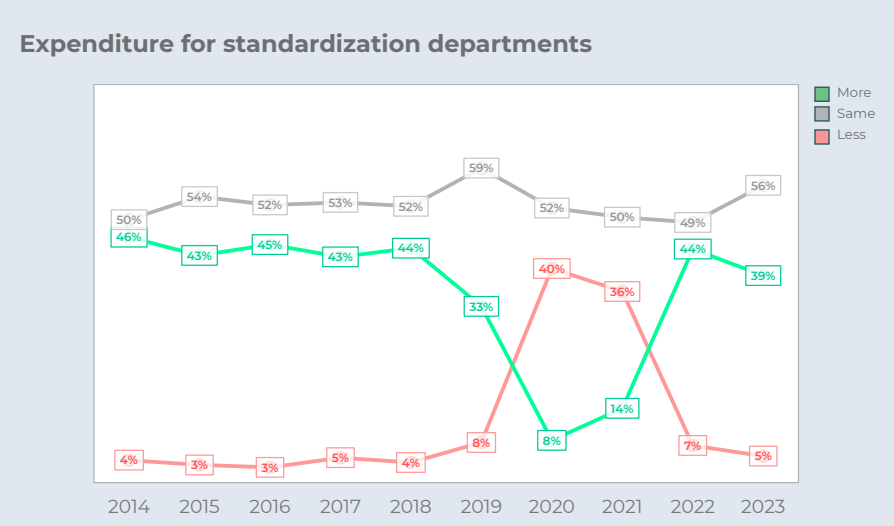
In this year's survey, participants were asked about their working environment in the various standardization bodies and consortia. For this part of the survey, only those participants were selected who had indicated that they were represented in the respective standardization bodies and consortia. The questions on the working environments were differentiated according to national, European and international standardization bodies and consortia. Different aspects of the working environment were rated on a scale from -3 (very negative) to +3 (very positive). The quality of the exchange of information in national standardization bodies was rated particularly positively (Figure 15).

This aspect of the working environment was rated highest in the national standardization bodies, but it also ranks first in the other standardization bodies and consortia. In second and third place are the quality of informal exchange and the quality of the results. The search for consensus, the overall quality of the processes and the extent and diversity of participation were also rated positively. Participation costs, travel costs and the speed of the processes were rated negatively. It is striking that these three aspects were rated better for consortia than for standardization bodies, while all aspects with a positive mean value were rated higher for standardization bodies.

Overall, the values for the European and international standardization bodies are similar, although the national standardization bodies were rated much more positively. This can also be observed in the case of consortia, although the difference is significantly smaller. An exception here is the diversity of participation, which was

Figure 14

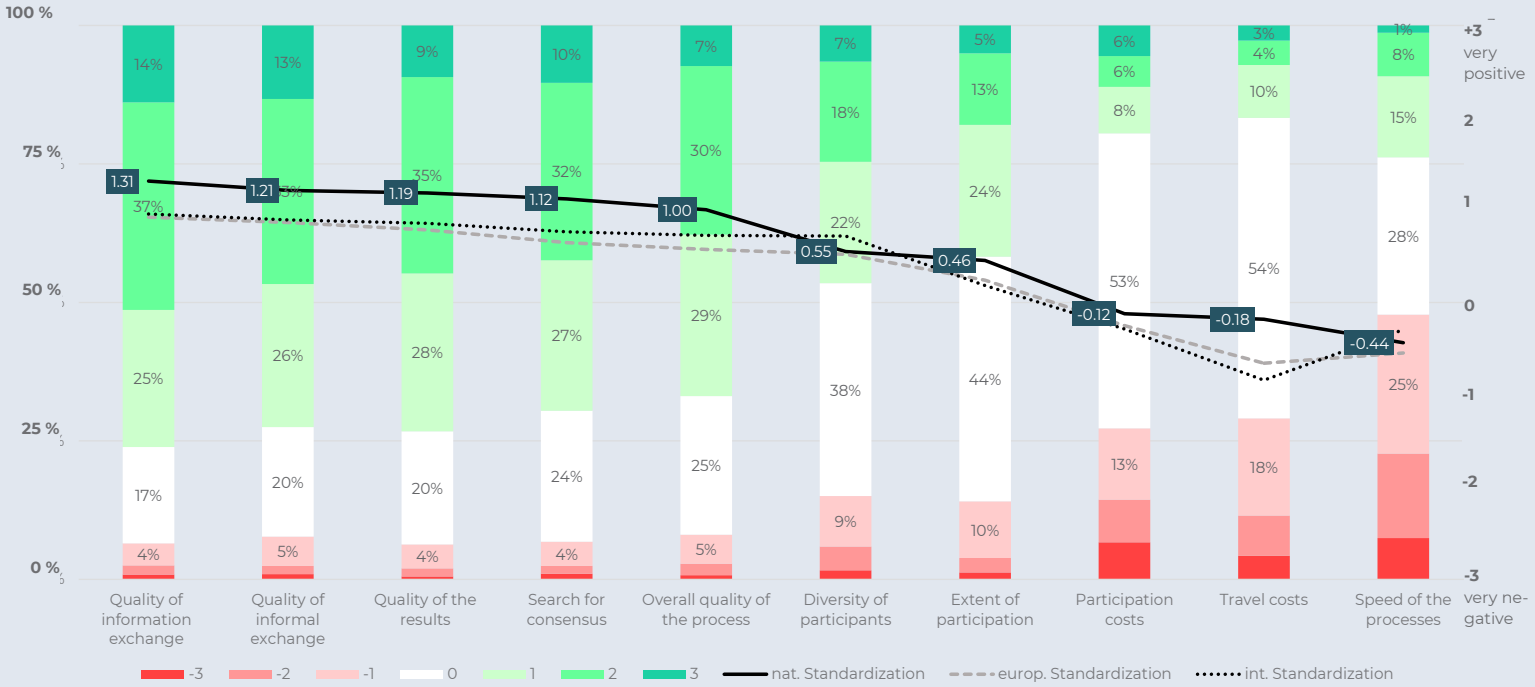
Change in expenditure on standardization departments.
N = 957



rated more positively for international standardization bodies (+0.72) than for national and European standardization bodies (+0.55 and +0.52). For consortia, the diversity of participation is also highest at international level (+0.52), although the difference is significantly smaller (+0.50 and +0.42) than for national standardization bodies. The biggest difference is in the assessment of travel costs. Travel costs were rated least negatively for national standardization bodies and consortia (-0.18 and -0.04). Travel costs relating to European and international standardization bodies and consortia were rated the lowest of all aspects of the working environment. Although the cost aspect of organizations for consortia was rated even more positively, the standardization bodies received a slightly more positive rating for the criterion of personnel costs. As already suspected in previous years, the increased digitalization of standardization processes, which was established due to the covid-19 pandemic, may have led to a reduction in the difference between work in consortia and standardization bodies in terms of costs.

Figure 15

Working environment in standardization committees
Assessment of the working environment in standardization bodies
Scale from -3 (very negative) to +3 (very positive)
N = 424 - 435, weighted sample



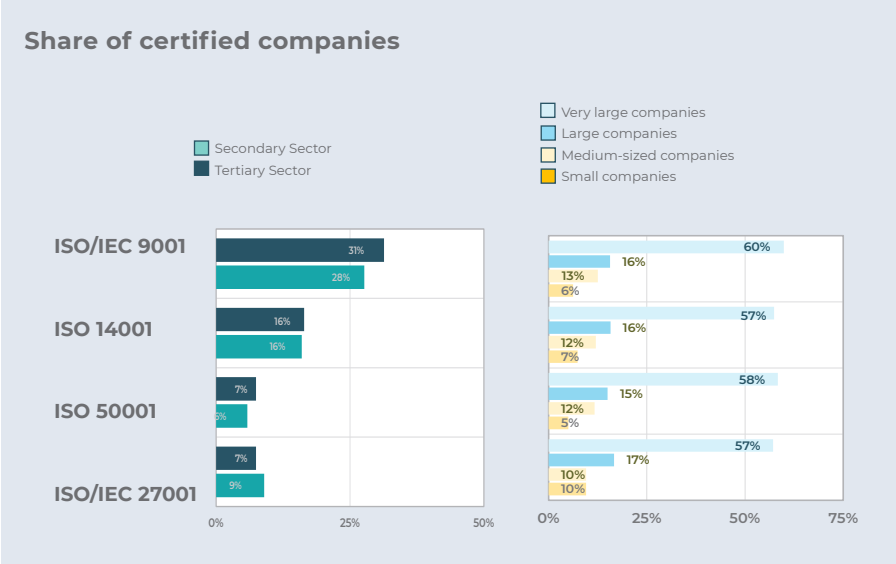
CERTIFICATION OF MANAGEMENT SYSTEMS

More ISO 14001 certifications planned

Another aspect on which participants provided information in the survey was whether they were certified according to certain formal standards in the previous year of the survey (2022). If this was the case, they were also asked to indicate in which year the initial certification took place.

Figure 16

Proportion in 2022 of companies certified according to various standards
N = 256 - 610



As in the previous surveys, the majority of organizations (52%) stated that they were certified according to at least one of the major quality, environmental, energy or IT security management system standards in 2023. The results of the individual certifications show that their importance has increased compared to the previous year. With 95% of organizations certified, the most widespread certification in 2023 was for the ISO 9001 quality management system standard, which represents a significant increase compared to the previous year's sample. In addition, 52% of organizations stated that they had an environmental management system certified to ISO 14001. Energy management systems in accordance with ISO 50001 are represented with 18%. ISO/IEC 27001 in relation to IT security procedures was implemented by 29% of the participating organizations.

Certification according to ISO/IEC 27001 still relevant for large companies and vehicle construction

As expected, there was a significantly higher proportion of certifications among very large organizations (1,000 employees or more). The biggest difference was seen in IT security management: 15% of small and medium-sized organizations were certified to ISO/IEC 27001, compared to 58% of very large organizations. Certification to ISO 50001 was rare among small organizations, while 10% of medium-sized organizations stated that they were certified to the energy management standard.

ISO 14001 is now used in 7% of small organizations, while 12% of medium-sized organizations have already achieved this certification. In very large organizations, the figure is more than half (57%). Certification of quality management systems in accordance with ISO 9001 was slightly more prevalent among small organizations, with a share of 6%, and around 13% among medium-sized organizations.

A total of 187 organizations stated that they were certified according to other standards, mainly the chemical and pharmaceutical industry (81%), the services sector (79%) and vehicle construction (67%). As in the previous year, testing and calibration laboratories and certification bodies certified according to ISO/IEC 17025, ISO/IEC 17065 or ISO/IEC 17020 accounted for the largest proportion (N = 160). On the other hand, industry-specific quality management systems, particularly in the medical devices sector (ISO 13485, N = 51) and in the automotive industry (ISO/TS 16949, N = 29), as well as certifications of occupational health and safety management systems in accordance with ISO 45001 (formerly OHSAS 180001, N = 47) played an important role.

The trend towards the certification of energy management systems identified in the previous year is not reflected in answers above. Compared to ISO 9001 and ISO 50001, there was a slightly stronger increase in initial certifications in accordance with ISO/IEC 27001 and ISO 14001. A slight trend towards more initial certifications in contrast to the previous year was identified, with the environmental management standard ISO 14001 in particular leading the way at 20%.

EUROPEAN STANDARDIZATION

Structure of the special section

The special section of this year's survey by the German Standardization Panel dealt with European standardization, European standardization policy and examined how these topics are perceived from the perspective of the German standardization community. This part of the questionnaire was drawn up jointly with the European standardization organizations CEN, CENELEC and ETSI as well as the STAIR Group. The three topics on which questions were asked were

1. the *green* and *digital transition*, i.e. how important are these topics for the organizations, what is their willingness to engage in standardization in these areas. What is the level of knowledge and needs of the organizations in this context?

2. European standardization processes, i.e. how is the approach to cooperate with research at European level assessed. Are the organizations aware of alternative standardization processes and have they ever used them?

3. questions about European standardization policy, i.e. the presumption of conformity and the link between international and European standardization and the support of standardization activities in tax schemes?

STANDARDIZATION IN THE CONTEXT OF THE GREEN AND DIGITAL TRANSITION

The first block of questions in the special section dealt with the green and digital transformation. The European standardization organizations are striving to support the green and digital transformation. They do this by formulating clear guidelines and standards that promote both environmental protection and the digital transformation and shape a sustainable and innovative future for Europe. In the questionnaire, participants were asked specifically about the importance of standardization in these two areas and thus how important these areas are considered to be and what efforts are already being made by standardization experts with regard to the two areas in standardization.

The 'green transition' refers to efforts to promote environmental protection, sustainability and a smaller environmental footprint in various sectors of the economy. This includes the development of standards that can guide organizations to adopt greener practices or help consumers to choose more sustainable products. One example of this practice is the circular economy.

The 'digital transformation' refers to the timely integration of digital technologies into various aspects of daily life and industry. This is particularly important to increase consumer confidence in digital products and services while taking advantage of the benefits of digitalization, such as artificial intelligence or the digital product passport.

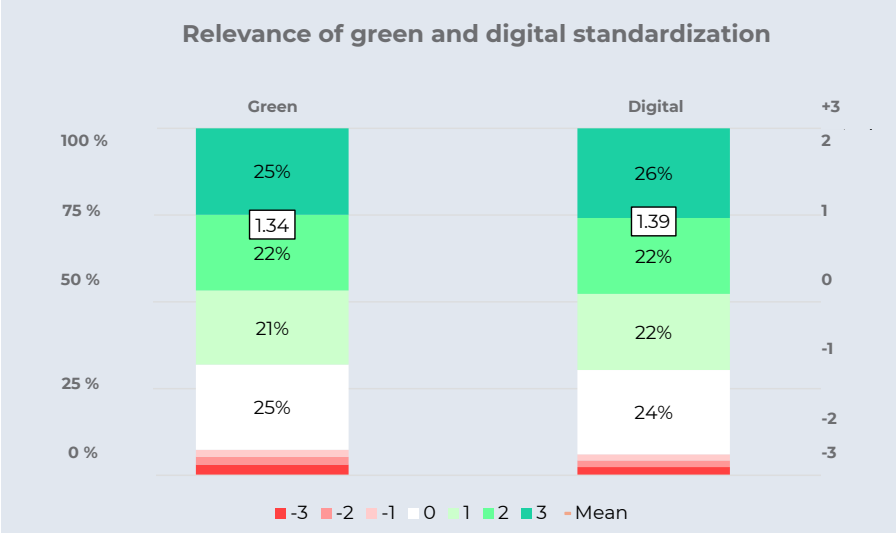
Digital change slightly more relevant for standard-setting organizations than green change

The first question asked was about the relevance of standards for the green and digital transitions. Both were considered relevant by the participants, with between 1,109 and 1,123 respondents answering this question. The relevance of these two transitions could be rated from -3 (not important) to +3 (very important). The digital transformation is considered slightly more important (mean value = 1.39) than the green transformation (mean value = 1.34). For both transformations, less than 10% gave a rating below zero. The standard development for the green and digital transformation is not important for a quarter of respondents (rating = 0). Around 70% of respondents rate the relevance of the digital and green transitions as at least important.

The development of standards for the green transition is rated as almost equally important by SMEs and larger organizations. The difference is slightly greater for the digital transformation: for SMEs, the digital transformation is slightly more relevant with a mean value of 1.35 than for larger organizations, which voted 1.30 on average. One explanation for this result could be that the development of standards in the context of digital change is more likely to be associated with financial incentives

Figure 17

Relevance of the development of standards for the green and digital transition
N = 1,109 bis 1,123



for organizations. This explains why it makes more sense for organizations to make efforts in this area, especially for small organizations with up to 49 employees. It is specifically here that the digitalization of work steps can make things much easier.

The results of the survey show that the development of standards for green and digital change has a certain relevance for the organizations surveyed, although differences can be identified between the sectors. The medical and optical industry (mean = 2.25 for green, mean = 1.75 for digital) and the energy and water supply and oil industry (mean = 1.67 for green, mean = 1.76 for digital) consider these standards to be particularly important. For the service industry (mean = 1.35 for green, mean = 1.45 for digital), the development of standards for the digital transformation is con-

sidered slightly more important than those for the green transformation. The mechanical and plant engineering sector (mean = 1.06 for green, mean = 0.88 for digital), on the other hand, rates standards for the green transition slightly higher than those for the digital transition. The chemicals and pharmaceuticals sector rated the green (mean = 0.7) and digital transformation (mean = 0.8) as less relevant than the other sectors. It is possible that the chemical and pharmaceutical industry voted this way, because their production processes are often based on complex chemical reactions that may be difficult to change in order to become more environmentally friendly.

A look at the evaluation between the organizations that conduct research and those that do not conduct research shows no difference for the digital transformation, as the mean value is 1.3 in each case. For the green transition, it can be seen that organizations that are active in the area of research only rate this as relevant with a mean value of 1.2, while organizations without research activities responded with a 1.3.

Only a quarter of organizations carrying out standardization activities related to the green and digital transitions

The question of whether the organization had already carried out activities in relation to the green and digital transition together with the national standards organization was answered by 1,134 of the participating organizations. The response shows a clear deficit in standardization work in the areas of green and digital change, as only 24% of respondents stated that activities are already being carried out. Among the organizations that are already carrying out activities in this area, 91% are large organizations (250 employees or more) and only 9% are SMEs. A look at the sectors shows that these are primarily organizations from the service sector (30%), followed by firms from the electrical engineering sector (25%) and the construction industry (17%). Companies from the metal production and medical technology sectors carried out the fewest or no activities at all in this area.

Organizations most likely to support the green and digital transition by identifying necessary standards

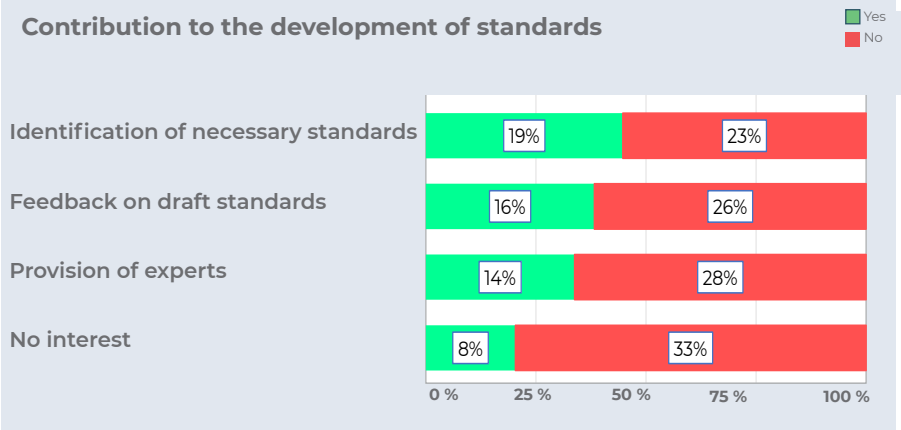
In the next question, respondents were asked to rate their interest in four types of contributions to the development of standards to support the green and digital transitions. These were a. identifying necessary standards, b. providing experts for the development of standards, c. providing feedback on draft standards and d. no interest.

A total of 1,241 participants answered the question. For most respondents, the answer option 'identifying necessary standards' is the contribution they would be most likely to make to support the green and digital transition. Here, 45% of respondents voted yes. The two options 'Provide feedback on draft standards' and 'Provide experts for the development of standards' came in second and third place with 38% and 34% approval respectively. Only 20% of respondents answered yes to'Not interested', which can be seen as a positive sign of the standard-setting organizations' commitment. In the differentiation between SMEs and larger organizations, it is clear from all question options that large organizations are more willing than small ones to engage in activities with regard to the development of the green and digital standardization.

Looking at the sectors, it can be seen that electrical engineering in particular has high approval ratings and thus a strong commitment to standardization for the green and digital transition. On the other hand, the manufacturing of consumer goods and other industries, machinery and plant engineering as well as medicine and optics tend to be less active or interested in standardization activities related to the green and digital transition. The energy, water supply and oil (54%), electrical engineering (52%) and services (50%) sectors in particular agreed that they would contribute to the possibility of identifying necessary standards. The sectors that agreed the least were the manufacture of consumer goods and other industries (14%), mechanical and plant engineering (24%) and others (30%). Industries such as energy and water supply and electrical engineering, which are heavily involved in technological and infrastructural developments, show a higher interest in identifying standards that support the green and digital transition. In the response 'Provide feedback on draft standards', organizations from the electrical engineering (44%) and services (42%) sectors indicated that they would

Figure 18

Contributing to the development of standards to support the green and digital transitions
N = 1,241



provide support in this area. It appears that sectors that are heavily dependent on technical draft standards, such as electrical engineering, show a particularly strong interest here. Organizations from the medical and optical sector (33%), vehicle manufacturing (35%) and the manufacture of consumer goods and other industries (11%) were the least likely to agree to provide feedback on standards. With regard to the provision of experts for the development of standards, the electrical engineering (44%), services (40%) and construction (37%) sectors stated that they were willing to release staff. Organizations from the fields of medicine and optics (33%), manufacturing of consumer goods (8%) and vehicle construction (21%) are less willing to make experts available for the development of standards.

The statement 'Not interested' is most likely to be selected by firmsfrom the areas of vehicle construction (17%), manufacturing of consumer goods and other industries (11%) and mechanical and plant engineering (9%).

Standardization in the area of Circular Economy and safety & resilience best known

In the questions in the next section, respondents were asked specifically about their awareness of current standardization topics related to green and digital transformation and the potential for their organizations, e.g. Circular Economy, Data Interoperability, Photovoltaics or Low-Carbon Cement. Respondents were able to rate on a 7-point Likert scale between -3 and +3 whether they were aware of the topics and then rate whether they would benefit from standardization in these areas.

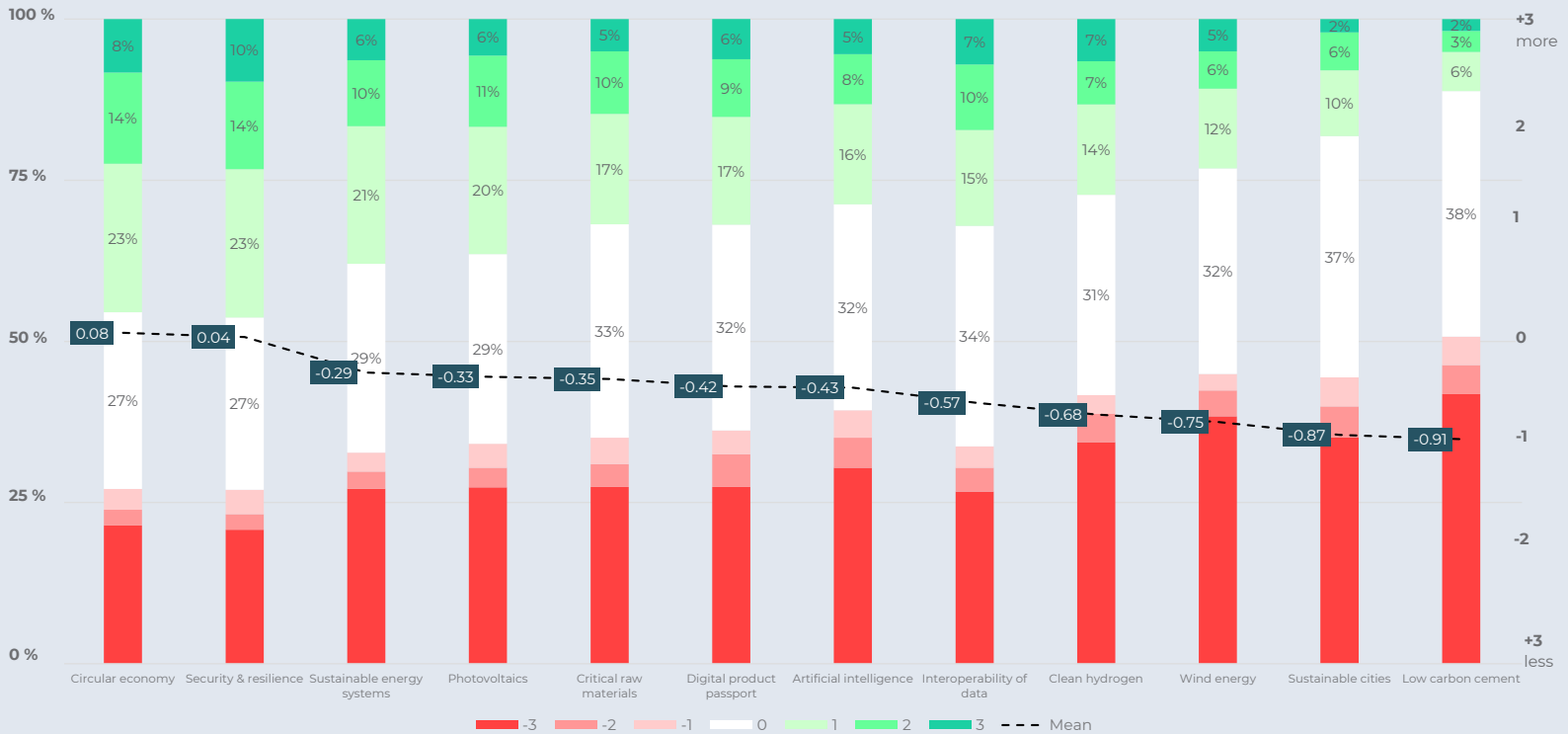
The first question in the section on awareness of standardization in specific areas clearly shows that most respondents were unaware or only slightly aware of standardization in the proposed areas (by scoring 0, -1, -2 or -3). This is particularly true for the areas of Low-Carbon Cement, Wind Energy, Sustainable Cities and Clean Hydrogen and Artificial Intelligence, where more than a third of respondents rated the level of awareness as -3 in each area. Standardization in the areas of Safety and Resilience and Circular Economy are the only ones that were rated with a positive mean (0.08 and 0.04) and are, therefore, the areas that respondents are most likely to be aware of.

Looking at the organizational sizes, it becomes clear that the awareness of SMEs is greater than the awareness of organizations with 250 employees or more, which is particularly evident in the circular economy. Industries that voted particularly positively are medicine and optics, which have positive mean values in several categories, such as Artificial Intelligence (mean value = 1.5) and Security & Resilience (mean value = 1.0). Artificial Intelligence is particularly important for the medical industry as it improves the diagnosis and treatment of diseases and enables personalized medicine. Security and Resilience are also of great importance, as medical devices and systems must be protected against cyber attacks and remain functional in crisis situations. The manufacturing of consumer goods, other industries and vehicle manufacturing in particular scored negatively, showing strongly negative

Figure 19

Awareness of green and digital standardization

Scale from -3 (less) to +3 (more)
N = 852 - 1030



mean values in almost all categories, e.g. Low-Carbon Cement (mean value = -1.9) and Wind Energy (mean value = -1.3).

SMEs would benefit from standards in the area of green and digital transformation

The next question in the section on standardization for the green and digital transitions asked respondents whether they would benefit from standardization in the areas mentioned above. As with the previous question, respondents could give a rating between -3 and +3, indicating whether they would benefit from standardization in the topic areas. The areas where most organizations agreed that they could benefit from standardization are Security and Resilience (mean = 0.7) Data Interoperability (mean = 0.6), followed by Artificial Intelligence (mean = 0.5) and Circular Economy and the Digital Product Passport (mean = both 0.4). These results differ from those for the level of awareness of standardization, where only the areas of safety and resilience had a positive mean average. This means that the potential benefit that the standardization experts see in these areas is higher than they are aware of standardization in these areas. There seems to be a knowledge and action gap between what standardization experts are aware of and what they actually consider important. Looking at organizational sizes in terms of whether organizations would benefit from standards in different areas, there is a clear difference between SMEs and large organizations. SMEs consistently show higher mean values, which indicates that they would benefit more from standards. This is particularly clear in the area of Security and Resilience, where SMEs have a mean score of 0.81, while large organizations only score 0.46. The situation is similar for Data Interoperability (mean value = 0.67 vs. 0.37) and Artificial Intelligence (mean value = 0.69 vs. 0.37). This shows that SMEs expect considerable benefits from standards in these areas, as they often have fewer resources of their own for the development and implementation of standards. Large organizations, on the other hand,

Figure 20

Potential benefits of green and digital standardization
Scale from -3 (less) to +3 (more)
N = 831 bis 1.010

would benefit less from standards in the areas mentioned and even see negative values for Photovoltaics (mean value = -0.09) and Green Electricity Systems (mean value = -0.21), which indicates that they have already implemented their own systems. Overall, it is clear that SMEs could be given more support through standards in order to remain competitive and promote sustainable practices.

Looking at the sectors, it can be seen that the energy, water supply & oil sector has high mean scores in several categories, such as Security and Resilience (mean = 1.28) and Data Interoperability (mean = 1.20). The construction industry also recorded positive mean values in these areas. These results suggest that standards could help to optimize processes and increase safety. In contrast, sectors such as manufacturing of consumer goods & other industries and vehicle construction show negative mean values in almost all categories. These differences indicate that some industries would already benefit greatly from standards, while others still see greater challenges in implementing them.

Survey participants who answered the questions on awareness or benefits of standardization in the areas of green and digital transformation with the option 'Other' were then given the opportunity to explain this further in a free text field. When asked about awareness of standardization in relation to the green transition and digitalization, adaptation to climate change, sustainable transport and cooling technology were mentioned several times. The latter two were also mentioned several times when asked whether the participants would benefit from standardization there. More standardization related to digitalization and sustainability is also desired for sustainable data centers.

Green and digital standards primarily known among SMEs

The data shows interesting differences between awareness of standards and the potential to benefit from them based on industry and organization size. While some industries such as energy and water supply, oil, and construction show high mean scores in awareness of standards and also see a clear potential to benefit from them, other industries such as manufacturing of consumer goods and other industries and vehicle manufacturing show lower mean scores in both aspects. This suggests that while there is an awareness of standards in some sectors, the actual benefits are not yet fully recognized or may be limited due to specific requirements and challenges in these industries. SMEs in particular show greater awareness of standards and also see greater potential to benefit from them compared to larger organizations. This suggests that SMEs are more flexible and agile and could potentially benefit more from norms and standards. The discrepancy between awareness and perceived benefits underlines the need for improved awareness and education about standards and standardization across different industries and organizational size classes.

Participants who voted negatively on each question regarding awareness and benefits of standardization in the green and digital sectors were directed to two follow-up questions that asked if they were not aware of any standards in those sectors or if they would not benefit from standardization in the two sectors mentioned above. This indicates that there is either a lack of information about standards or that

the respondents doubt the benefits of standards in their respective field of activity. A total of 779 respondents answered this question. The breakdown by organizational size shows that these are mainly large and very large organizations. This could indicate that smaller organizations see a greater need for clearly defined standards in order to optimize their business practices and increase their competitiveness.

The analysis of the data by industry also shows interesting results. Industries such as chemicals and pharmaceuticals, construction and electrical engineering tend to have higher mean scores in response to this question, suggesting that they are either less informed about standards or question the usefulness of standards in their respective areas of work. Overall, these results highlight the need for increased awareness and training on standards across different industries and organizational sizes. By improving awareness, organizations could be better able to recognize the benefits of standards and effectively integrate them into their business strategies to improve their performance and competitiveness.

THE EUROPEAN STANDARDIZATION SYSTEM

In the next section of the questionnaire, three questions were asked about the processes and strategies of the European standardization system and the standard-setting organizations. With these questions we wanted to find out whether the standardization system

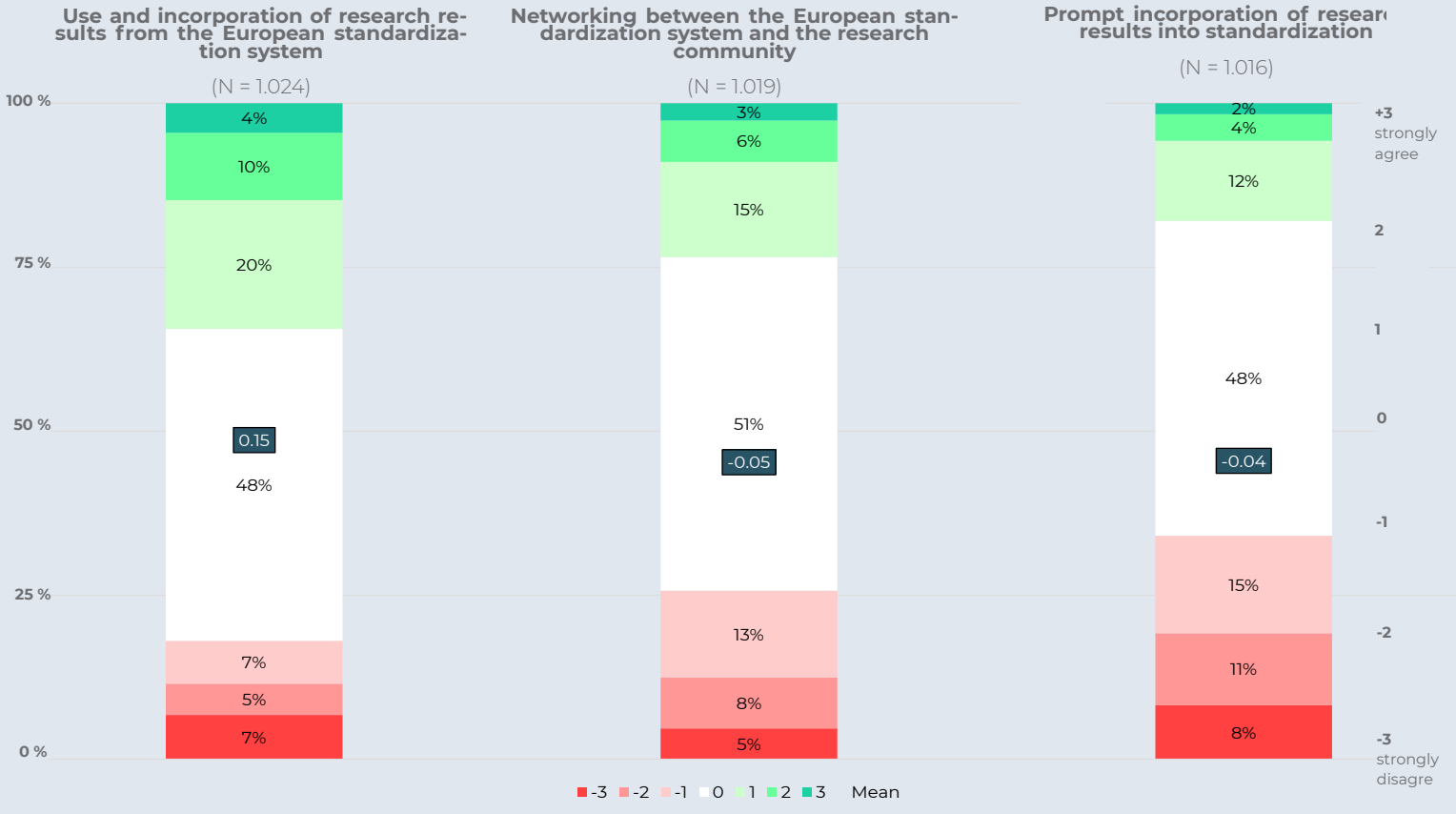
1. effectively incorporates relevant research results for organizations to develop new standards,
2. is sufficiently connected to the European research and innovation community, and
3. incorporates research results into standardization in a timely manner.

The assessments of the questions relating to the European standardization system indicate that there is room for improvement, particularly with regard to the integration of relevant research results into the standardization process. Although the system tends to incorporate research results in a timely manner, there may still be a need for greater networking with the European research and innovation community to ensure that current knowledge is used effectively. These findings may suggest that while the European standardization system is on the right track, efforts should continue to be made to strengthen its links with the research community to enable more effective development of new standards. Firms in the construction and electrical engineering sectors tend to show positive ratings in terms of integration of research results and networking with the research and innovation community. This could indicate that these industries are open to innovation and are willing to integrate new research findings into their standardization processes in order to strengthen their competitiveness.

On the other hand, organizations in the manufacturing of consumer goods & other industries give lower ratings. This could indicate that these industries have diffi-

Figure 22

Statements on the European standardization system
Scale from -3 (strongly disagree) to +3 (strongly agree)



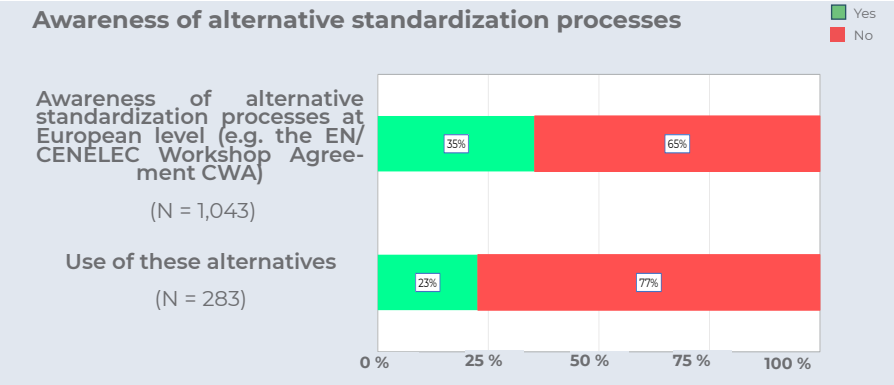
culty incorporating current research findings into their standardization activities. This could be due to the fact that these industries may be less dependent on technological innovation. With regard to the size of the responding organizations, SMEs tend to show slightly higher ratings than larger organizations. This could mean that SMEs are more agile and better connected in order to benefit from current research findings and incorporate them into their standardization processes. Larger organizations, on the other hand, may be less flexible when it comes to integrating research results into standardization in a timely manner due to their size and complexity. Overall, these differences illustrate the diverse requirements and challenges that different industries and organizations face when it comes to integrating research results and networking with the research and innovation community within the European standardization system.

Awareness and use of alternative standardization formats mostly in large organizations

CWAs, short for CEN/CENELEC Workshop Agreements, provide a platform within the European standardization system particularly for stakeholders outside the standardization community to address new issues and develop consensus-based documents outside the formal standardization process. ETSI offers similar alternatives that allow industry stakeholders to respond quickly to changing technological and market requirements. The answers on this question show that 35% of the organizations surveyed are aware of rapid alternatives to traditional processes within the European standardization system, while 65% stated that they are not aware of them. In terms of organizational size, larger organizations were slightly better informed (42%) than smaller organizations (36%). In terms of sectors, organizations from the electrical engineering (45%), construction (41%) and mechanical and plant engineering (41%) sectors were particularly well informed about the alternatives. In contrast, organizations from the public administration and defence sector and from the health and social services sector were the least aware of these alternatives. The responses illustrate that despite the potential for rapid alternatives to traditional standards, a significant number of organizations, particularly in certain industries and smaller organizations, are unaware of these options. This suggests that

Figure 23

Alternative standardization processes



further awareness-raising work is needed to promote the use of these alternatives and improve the efficiency of the European standardization system. If respondents answered that they were aware of the fast-track procedures, they were asked to indicate whether they had already used them. The follow-up question was answered by 283 participants. Of these, 23% answered yes and 77% no. In terms of organizational size, very large organizations in particular (42% of 'yes' responses) made use of this option, while small organizations did so only very rarely (37% of 'no' responses). In terms of sectors, mechanical and plant engineering (16% of 'yes' responses) was the sector that most frequently made use of the alternatives. The sectors that made the least use of the fast-track option were electrical engineering (20% of 'no' responses) and other sectors (14% of 'no' responses). In summary, both the awareness and the use of these approaches have to further promoted.

EUROPEAN STANDARDIZATION POLICY

In the next section of the questionnaire, three questions were asked about current issues in European standardization policy. These were:

1. How relevant is the presumption of conformity that harmonized European standards create for your organizations?
2. How important do you consider the link between European standardization (CEN, CENELEC and ETSI) and international standardization (ISO/IEC) in the development of European standards (EN)?
3. How important is the consideration of standardization activities in fiscal research funding?

Relevance of the presumption of conformity

The presumption of conformity is a central principle in the European standardization landscape. It states that products manufactured in accordance with harmonized European standards are automatically deemed to comply with the essential requirements of the relevant EU directives. This makes it much easier for manufacturers to prove compliance with EU regulations and streamlines the process of bringing products to market within the European Union.

The question on the relevance of the presumption of conformity that harmonized European standards create for organizations was rated as very relevant by more than a third of the participants (34%), which corresponds to a mean value of 1.40. Looking at the ratings by organization size, it can be seen that very small organizations find the presumption of conformity slightly more important than very large organizations. In terms of sectors, the energy, water and oil sector (mean = 1.73) and the construction industry (mean = 1.74) rated the presumption of conformity as particularly relevant. By contrast, sectors such as the chemical and pharmaceutical industry (mean = 1.03), medicine and optics (mean = 1.00) and mechanical and plant engineering (mean = 0.77) found it less important. Overall, the assessment of the presumption of conformity shows that it is important for many organizations, especially those in highly regulated industries. However, there are also industries that attach less importance to the presumption of conformity, which indicates different needs and priorities in relation to European standards.

Link between European and international standardization less relevant for large organizations than for small organizations

CEN, CENELEC, IEC and ISO pursue a common approach to harmonizing European standards with international standards in order to ensure consistency and facilitate global interoperability. For example, the institutions work together in joint technical committees to promote cooperation and coherence in the development of standards. In general, this joint approach is a complex task, as the different regional requirements for European standards need to be reconciled with the global perspective. The Vienna Agreement (1991) between ISO and CEN and the Dresden Agreement

(1996) between IEC and CENELEC play a crucial role in this process. These agreements promote close cooperation between international and European standardization organizations, leading to harmonization of standards at international level. This ensures that many European standards are identical to international standards.

When asked how important this connection is, over 70% of participants answered with at least important.This results in an average mean score of 1.60. Small organizations find the link particularly important. Sectors with high energy consumption such as energy, water, oil (mean value = 1.79), electrical engineering (mean value = 1.76) and construction (mean value = 1.74) rate the link between European and international standardization as very important. It is least important for the sectors of other services (mean = 1.44) and mechanical and plant engineering (mean = 1.46). These differences show that sectors with intensive use of international markets or high levels of technical regulation value the harmonization of standards more than others.

Consideration of standardization activities in tax incentives for research more important for SMEs

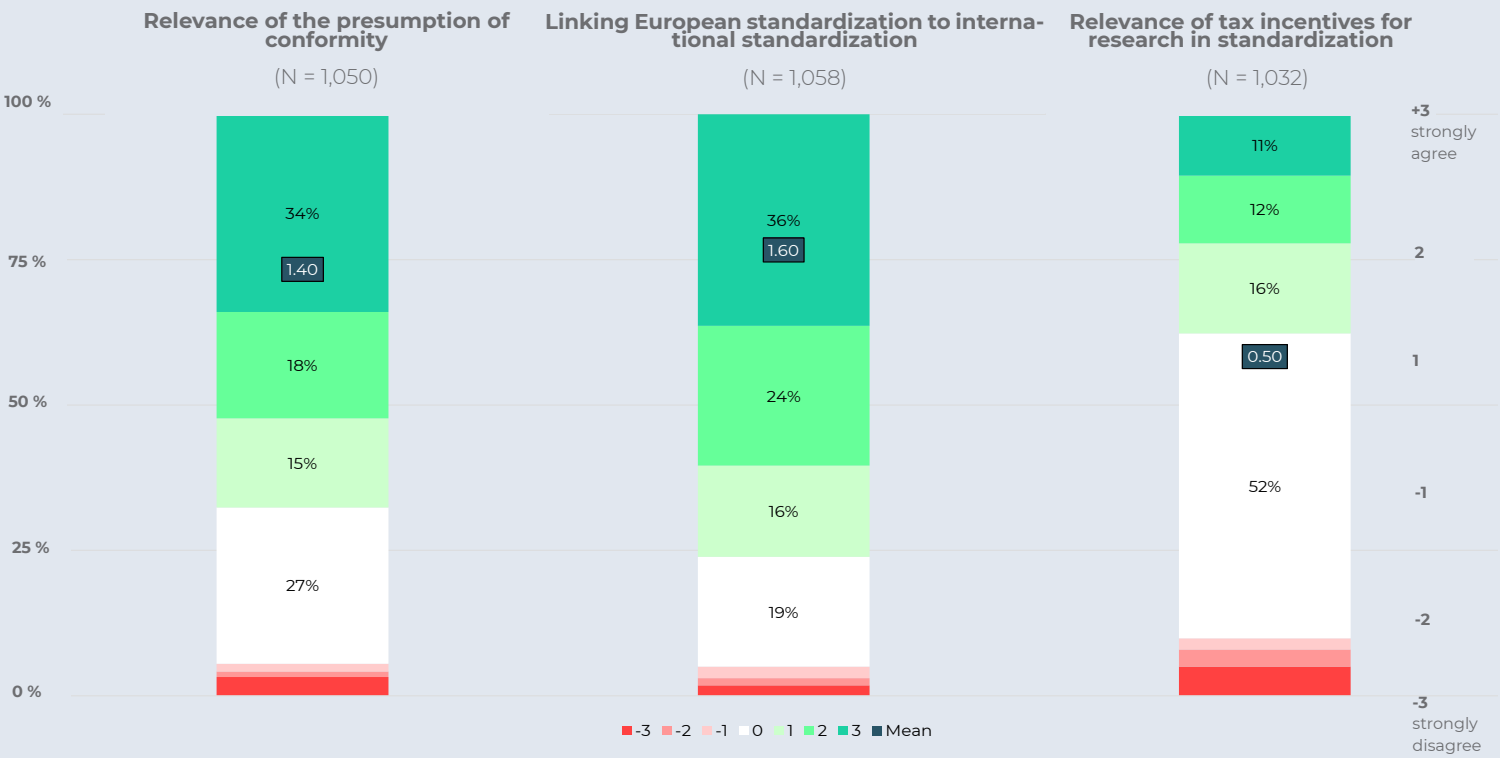
The consideration of standardization activities in tax incentives for research was rated as important by almost 40% of the participants (mean = 0.50). The analysis by organizational size shows that SMEs rate the relevance slightly higher than large and very large organizations, which have limited benefits from such schemes.

A differentiation by sector also shows differences in the ratings. The consideration of standardization activities in fiscal research funding is particularly important in the construction industry (mean value = 0.80) and in the energy, wa-

Figure 24

Questions on European standardization policy

Evaluation of the statements on European standardization
Scale from -3 (strongly disagree) to +3 (strongly agree)



ter and oil sector (mean value = 0.73). The electrical engineering sector also rates the relevance relatively high (mean value = 0.56). In contrast, the chemical and pharmaceutical sectors (mean value = 0.02) and mechanical and plant engineering (mean value = -0.4) see the relevance as significantly lower.

CONCLUSION

Key findings from the twelfth survey of the German Standardization Panel

In the context of the European Year 2024, marked by political and sporting events, the twelfth survey of the German Standardization Panel highlights the importance of European standardization. Not only are European standards perceived as the most important type of standardization, they also play a central role in tackling global challenges such as climate change and digitalization. A common European standardization strategy is important for European industry, as demonstrated by the results of the German Standardization Panel's assessment of the high relevance of the link to international standards and the presumption of conformity in the European Single Market.

The analysis of the results makes it clear that formal standards and technical specifications continue to be seen as highly relevant for competitiveness, technical interoperability, legal certainty and market access. In contrast, external company standards and Consortia Standards are less important. The importance of internal company standards generally remains high, but their relevance for productivity increases is declining. Work in standardization committees remains stable and expenditure on standardization departments in organizations shows a slight upward trend.

Particularly in the context of the green and digital transformation, there is a discrepancy between the importance of standards and the commitment of organizations. While only a quarter of organizations have activities in these areas, the identification of necessary standards and feedback on draft standards are cited as the most important contributions. This underlines the need to involve the organizations that implement standards more in the standardization process and to intensify their role in the green and digital transformation, both at national and European level. A positive trend is the increase in planned certifications with ISO 14001, which indicates a growing environmental awareness and the importance of standardization for climate change.

In addition, standardization organizations should consider the increasing importance of European and international standards compared to national standards. The importance of standards in the green and digital transformation, especially in Security, Resilience and the Circular Economy, underlines the growing awareness and importance of these topics for companies and organizations. Standards in these areas not only promote trade within the EU and innovation, but also support policy objectives such as environmental protection and cybersecurity. Even closer cooperation between national standardization organizations and the European Standardization System can help to create synergies and improve the efficiency of standardization activities in the context of the green and digital transformation.

For the future of European standardization, it is essential to intensify the exchange between standardization organizations, users, science and politics. The timely introduction of new research results and the networking of different fields of knowledge are essential. A joint strategy of national, European and international standardization organizations can significantly support the management of the green and digital transformation. The importance of the presumption of conformity and the need to create harmonized European standards are considered high overall, indicating that close cooperation at the European level continues to be of great importance to promote compliance with standards and remove barriers to trade. In addition, standardization organizations should increase their efforts to strengthen further the link between European standardization and international standardization in order to create synergies and promote the global acceptance of European standards.

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 survey results are being compared to DIN's data on companies active in standardization. Furthermore, in the medium term, data from the innovation surveys commissioned by the German Federal Ministry of Education and Research since the 1990s and from the study on the research and development of economic statistics by the "Stifterverband für die Deutsche Wirtschaft" are being used to complete the picture. For the subsequent surveys, it will be essential to motivate previous participants to participate in the following survey waves to establish a helpful panel structure. Finally, other businesses will need to be encouraged to participate in further surveys to gain a broader, more representative database.

Catalogue of questions

The goal of the German Standardization Panel is to measure not only the expenses and effort of companies investing in standardization, i.e., the activities in standardization organizations but also their utilisation 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. European Standardization
3. Formal and informal standardization activities
4. General information

The complete questionnaires of all surveys since 2012 can be found on 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 reconised 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 legitimation due to its well-established processes.

In addition, the international and European standards organizations form a network of national standards institutes. DIN's staff administers 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 Consortia. Full consensus and the involvement of al stakeholders are not required.

National Standardization Organizations

DIN, the German Institute for Standardization, is a privately organised 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 standardization organizations. DIN's purpose is to encourage, organise, steer, and moderate standardization and specification activities in systematic and transparent procedures for the benefit of society 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 that 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 Standardization Organizations

In Europe, standards are drawn up by the three officially acknowledged European standardization organizations: the European Committee for Standardization (CEN), the European Committee for Electrotechnical Standardization (CENELEC), and the European Telecommunications Standardization organization (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.cencenelec.eu/aboutus/Pages/default.aspx).

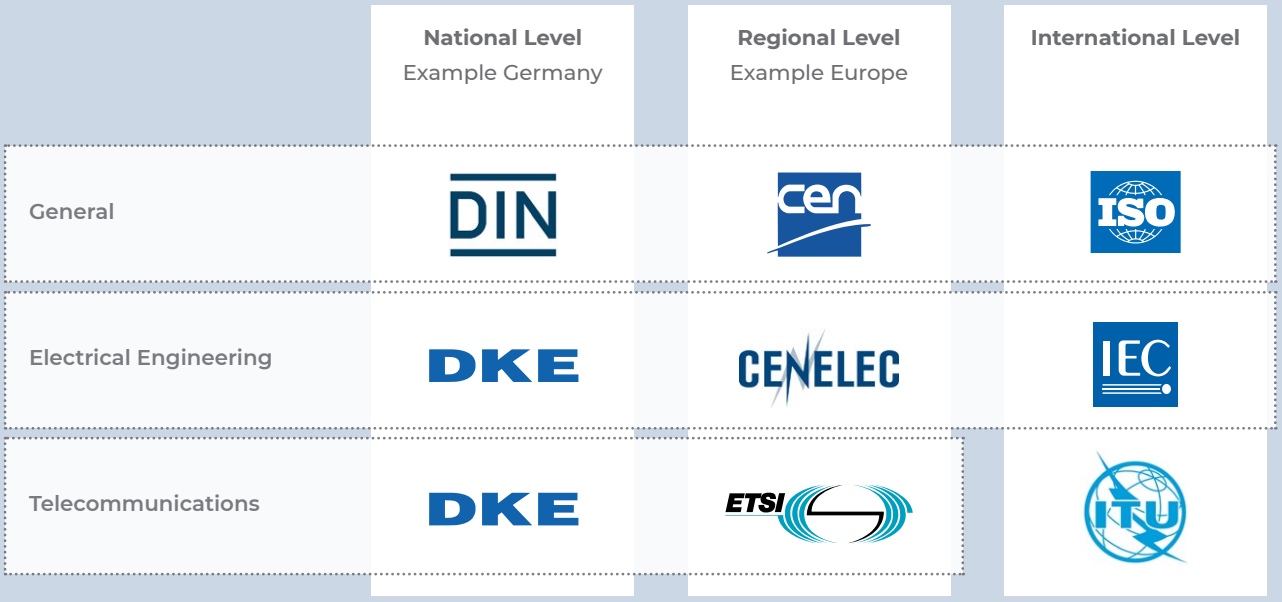
Each country is represented within CEN and CENELEC by one member body. German interests are represented by DIN within CEN and by the DKE at CENELEC. Each DIN standards committee decides on active participation at the European level. This work is supported by a working committee designated as the 'mirror 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 recognised ETSI as a European standardization organization (see www. etsi.org/about).

International Standardization Organizations

ISO International Organization for Standardization and IEC International Electrotechnical Commission are are private organizations whose members are

Figure A.1 **Structure of international standardization** (Source: www.din.de)



the national standardization 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 guidelines 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 import and 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 Europeans standards are to be adopted, unchanged, by the members of the European standardization organizations CEN/CENELEC/ETSI

– **DIN EN ISO** – Official German version of a European standard which is the unchanged adoption of an International Standard

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 standardization organizations such as DIN. However, they differ from formal standards in that full consensus and the involvement of all stakeholders are not required. Like specifications, Consortia Standards are drawn up in an 'informal' standardization process. They are developed based on a majority decision by a selected group of companies and organizations taking the form of a 'Consortia'.

De-facto Standards

De-facto Standards are not developed by specific consortia 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 to represent the interests of their members at the national, European, and international levels. 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 or were cited in a law or regulation, for example in building regulations. Technical rules published by organizations such as VDI, VDMA, and VDE are not drawn up with a 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.

Contact

Hermann Behrens
DIN e.V.
Burggrafenstraße 6
10787 Berlin
Telephone: 030 2601-2691
Telefax: 030 2601-42691
Mail: hermann.behrens@din.de
Internet: www.din.de

Johannes Koch
Bernd Arts
DKE Deutsche Kommission Elektrotechnik
Elektronik Informationstechnik
in DIN und VDE
Merianstraße 28
63069 Offenbach am Main
Telephone: 069 6308-268
Telefax: 069 6308-9326
Mail: johannes.koch@vde.com, bernd.arts@vde.com
Internet: www.dke.de