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Indicator Report 2015

GERMAN STANDARDIZATION PANEL (DNP)

STANDARDIZATION RESEARCH, POLICY AND PROMOTION

Supported by the German Society for the Promotion of Research on Standardization (FNS)

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GERMAN STANDARDIZATION PANEL 2015 – Indicator Report for the importance of standards and standardization activities of German companies

Summary

Based on representative data on German companies engaged in standardization, this 2015 indicator report of the German Standardization Panel (DNP) provides information on several aspects of standardization. The contribution of innovations to the competitiveness of businesses as well as to other entrepreneurial dimensions is undisputed. However, the benefits of standardization and the application of standards have not yet been fully recognized as a significant influencing factor – not least due to a lack of empirical investigations in this area. For this reason, the German Standardization Panel was set up in autumn 2011 by the German Society for the Promotion of Research on Standardization (FNS). Annual surveys are carried out to collect data on standardization activities of and the application of standards by companies, which is then used to examine the impact of standardization and standards on various economic and social dimensions. Such a systematic analysis requires reliable, detailed data, particularly which is collected through surveys carried out among the same economic players (persons or companies) on the same topic and over time. So-called panel data is crucial for the exploration of the complex effects of standardization processes and the application of formal and informal standards on business success.

This year, for the first time, DNP data from the 2013 and 2014 surveys can be combined to such a panel. Based on this unique data set, insights are gained into changes in standardization activities and the application of formal and informal standards.

The following core results can be derived from the analysis:

1. Formal standards, specifications and other technical rules developed by the standardization organizations are by far the most important types of documents for the companies interviewed. These promote legal certainty and facilitate market access for companies. The great significance of standards work, above all for medium-sized and large companies, is reflected in the large number of businesses that maintain specialized standardization departments. However, investigating changes from 2013 to 2014 reveals that this topic is of increasing importance also for smaller companies and service providers.

2. Internal company standards represent the third most important type of document and are considered more relevant than informal consortia or de-facto standards. Company standards are applied by the majority of businesses surveyed, especially by large and innovative companies, and primarily promote quality and productivity improvements. As compared to the survey performed in 2013, internal company standards gained in importance, especially among medium-sized companies. For smaller companies, this type of document still plays a minor role.

3. ISO 9001 certifications are widespread among the companies interviewed. Most initial certifications were purchased before the turn of the millennium. In contrast, certifications of environmental management are a more recent phenomenon.

4. The special section concerning the role of standards in trade with and investment in China reveals that Chinese regulations concerning intellectual property impede exports and investments of German companies most. Of particular interest is the comparison with the results of last year´s special section concerning standards and the Transatlantic Trade and Investment Partnership (TTIP) with the United States.[1] Challenges in trade with China and the United States significantly differ and German companies are much more skeptical about the recognition of Chinese standards than about harmonization within the framework of TTIP.

Providing an empirical basis for exploring the German standardization landscape

Introduction

Innovation is commonly regarded as a source of growth and prosperity. Many factors contribute to the transformation of ideas into successful market solutions, standardization being one of them. Data that is gathered on regular basis is needed for the scientific analysis of the effects of standards. For example, the 2012 survey revealed that companies active in standardization invest more in innovations and realize their innovations with higher success[2]. This correlation, however, does not necessarily imply that participation in standardization positively affects innovativeness of firms. Rather, innovative companies could be more likely to become active in standardization. In order to define directions of effects and make statements about causality, companies' activities have to be observed over a longer period of time.

Inspired by the innovation survey carried out among EU Members by the European Commission started in the early 1990s, the German Standardization Panel (German: Deutsches Normungspanel, acronym "DNP") is generating

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1 For detailed analyses see: Indicator Report 2014. German Standardization Panel – Standardization research, policy and promotion. Publisher: German Society for the Promotion of Research on Standardization. (http://projects.inno.tu-berlin.de/DNP/Studie_FNS_en_web.pdf)

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

a comprehensive collection of empirical data containing a large amount of information on businesses which can be used for the exploration of central issues in standardization research.[3]

Goals

The data generated by the German Standardization Panel forms the basis for scientific research into the standardization activities of companies, their implementation of standards, and the effects of standards on entrepreneurial success. Furthermore, the results of the survey can be used to draw up strategies for European and international standardization, in order to articulate national business interests vis-à-vis the objectives of the European Commission.

A further goal of the German Standardization Panel is to deal with current standardization policy issues to assess any initiatives taken. At this, the last two survey waves addressed the role that standards and standardization play in trade with the United States and China.

Moreover, the Panel helps businesses who yet have not used formal standards or have not been active in standards work become more aware of the importance of standardization, and motivates them to participate. One means of doing so is widely disseminating the results of its surveys via reports like this one. Thus, the DNP helps achieve interrelated objectives concerning standardization research, policy and promotion.

Heuristic model

The annual survey is divided into more general “core questions” and questions related to a specific subject. The core question section is conceptually based on the following heuristic model (see figure 1). This model is comprehensive, allowing for a broad array of topics and questions to be integrated. Here, in particular, the model illustrates the multidimensional links between participation in the standardization process, the implementation of formal standards and corporate success.

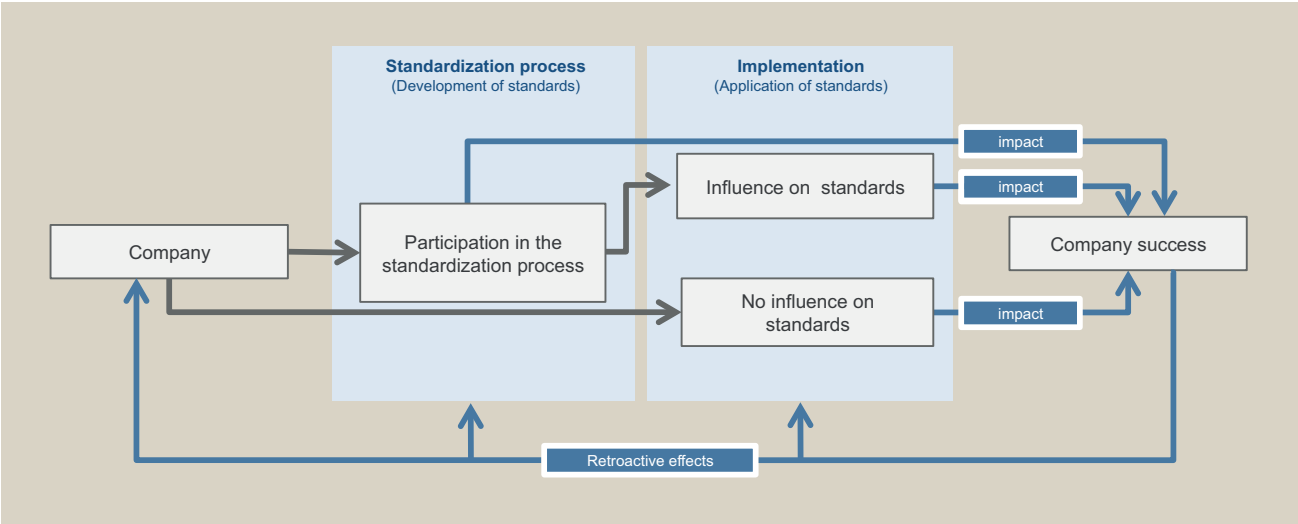
Standardization activities are characterized by the nature and scope of the work itself, e.g. the time required, necessary human resources, participation in standards committees, etc. With regard to the implementation of standards, various dimensions of costs and benefits are determined. Apart from these

[3] Concerned here is the panel by Community Innovation Surveys (CIS) (see http://epp.eurostat.ec.europa.eu/portal/page/portal/microdata/cis), that repeatedly interviewed the same companies about their innovation activities, successes and problems.

aspects, which mainly concern the standardization process itself and the implementation of standards, the German Standardization Panel's long term goal is to assess the impact of standardization as well as the application of standards on business success. A number of questions can be asked in this context: Does participation in the standardization process increase the success which can be achieved through the implementation of formal standards? Does standardization have a direct impact on corporate success or rather an indirect one through networking with other companies and organizations in standardization? Which dimensions of success are influenced by standardization? Do the insights gained apply mainly to the standards which one has actively helped develop, or is this a more general learning process? What does this learning process look like? How do company-specific characteristics influence company success through standardization work? Does the impact of standards work vary depending on sector or company size?

While the first and the second wave of surveys provided first evidence for answering the last two questions, the more complex questions, e.g. regarding learning effects, can only be answered through the analysis of standardization activities, the implementation of formal standards, and business developments over a period of time.

Figure 1:
Heuristic model of the Standardization Panel.



Realization

The third survey wave of the German Standardization Panel was launched on 14 October 2014, the World Standards Day. Although the response rate has slightly dropped in comparison to 2013, the participation of 2,000 active standardization experts, who represent about 1,000 (12%) of the companies active in standardization, emphasizes the great acceptance of the German Standardization Panel. The focus on the significance of standards for trade

with and investment in China helped achieve maintained interest. The survey as well as analysis, interpretation and editing of data was conducted by the Chair of Innovation Economics at the Technische Universität Berlin. The project was initiated in the context of the foundation of the German Society for the Promotion of Research on Standardization (FNS), who supports the project and provides long-term financial support.

The following indicator report summarizes the answers of 1,020 questionnaires from the third survey. This year, for the first time, the data from 2013 and 2014 can be merged to establish a comparison. 515 companies took part in both years and are thus included in the Panel. To increase consistency of response behavior, it is most desirable to have the same person answer over time. This was achieved in 412 cases. Based on this unique data, insights were gained into the development of standardization behavior and the application of formal and informal standards over time. Of particular interest is the analysis of the questions from the special sections on standardization and foreign trade. While in 2013 the focus was on TTIP between the United States and the European Union the equivalent questions in this year's survey concerned trade with China. For the first time, the attitude of companies active in standardization concerning barriers to trade with two of the most important trading partners of Germany, the United States and China, can be compared.

In the following indicator report, industry affiliation and company size served as criteria for structuring the results and identifying particularities. On average, the companies´ characteristics are similar to the year before. Corresponding to the classification by the German Federal Statistical Office, one quarter of the companies surveyed are service providers, mainly active in freelance, scientific and technical services such as architectural and engineering offices, technical, chemical and physical analysis and management consulting. Another 24% engage in electrical engineering. Companies in the information and communications technology (ICT) sector and in the mining industry are least represented. Concerning size classes, operationalized as the number of employees, companies are evenly distributed. Medium-sized (50 to 249 employees), large (250 to 999 employees), and very large companies with 1,000 or more employees each account for about a quarter of the sample. While still 17% of the survey participants have between 10 and 49 employees, the dataset contains only a very small portion of companies with less than 10 employees. For this reason, the latter two are summarized in one category in the following analyses.

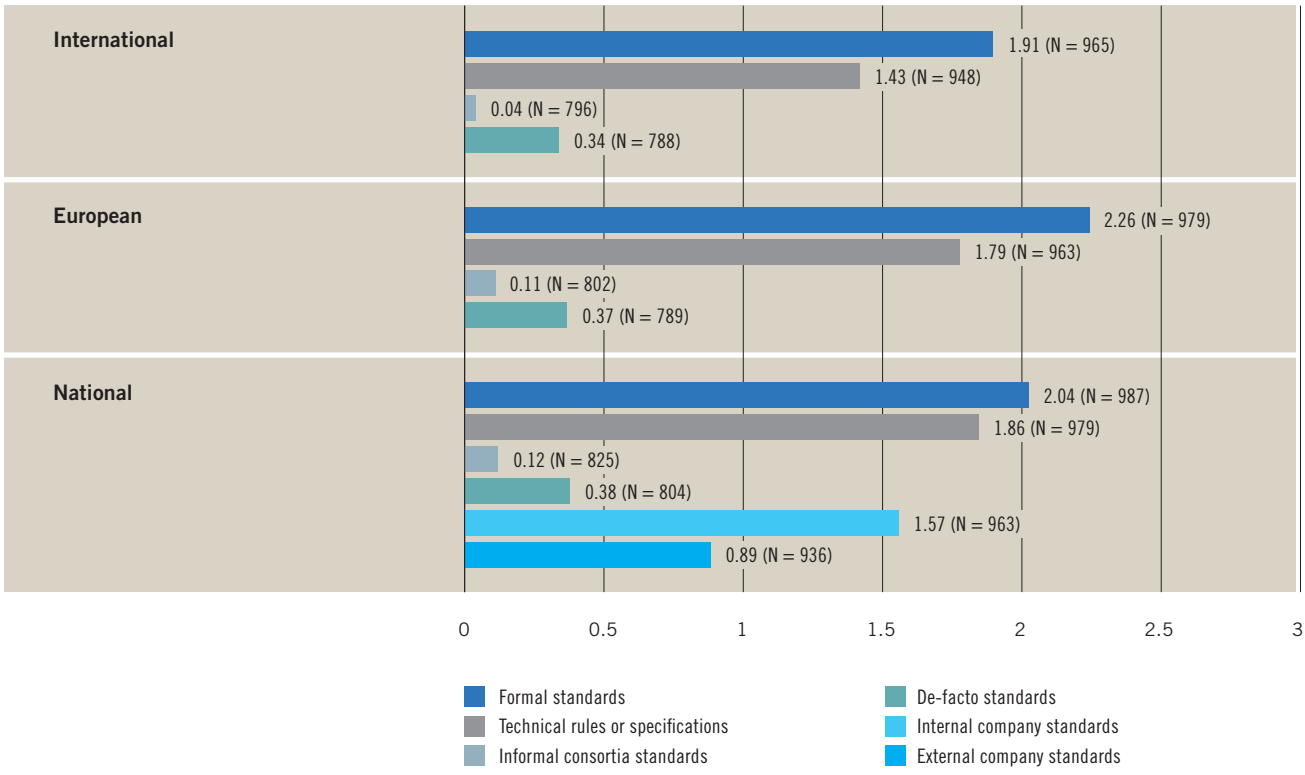
Confirmed: Formal standards are the most important type of standard for businesses

Relevance of formal standards, informal standards and specifications

First, the general significance for businesses of six different types of standards is discussed. Figure 2 shows that formal standards and technical rules are most important for the surveyed businesses, especially those issued by European institutions. The third-place ranking of company standards was maintained in 2014. Differentiating between internal and external company standards reveals that internal company standards have much greater significance. Informal consortia and de-facto standards are still considered to be least important.

Figure 2:
Assessment of the general importance of different types of standards published at different levels.

On a scale from –3 (not important at all) to +3 (very important)



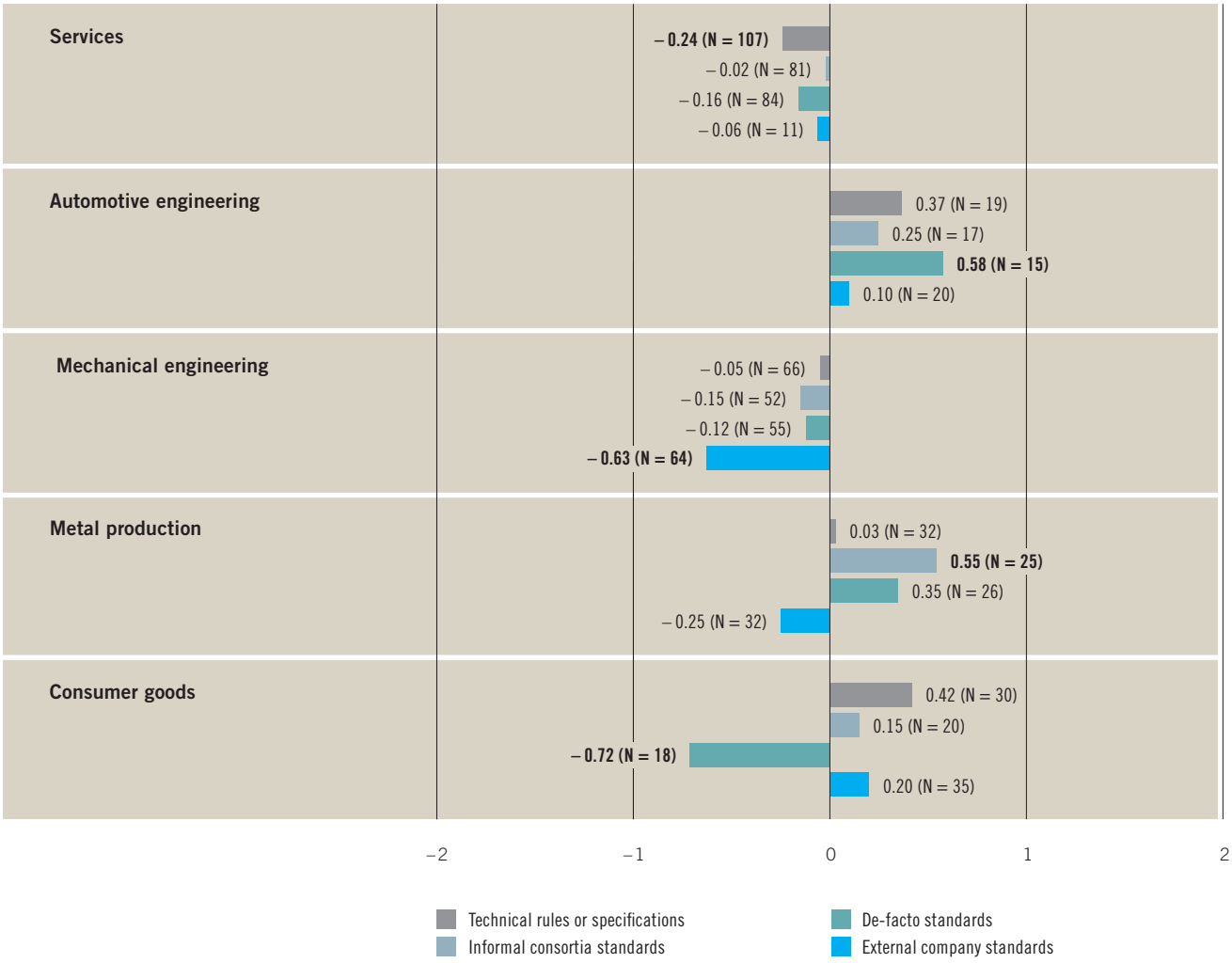
Although the overall picture concerning the importance of the different types of standards applies for all sectors and company sizes, some interesting differences still exist. For companies in vehicle manufacturing formal standards and internal company standards are equally important. While for companies in the chemical and pharmaceutical industry internal company standards are most relevant, for firms in the ICT sector it is technical rules and specifications. The latter, in addition, consider informal consortia and de-facto standards more important than other industries. Differentiation according to company size also reveals some interesting aspects. While formal standards are regarded as very important by businesses of any size, the significance of internal company standards rises linearly with the number of employees. This pattern was also found in last year's answers.

Internal company standards more important than last year, especially for medium-sized companies

The structure of a panel dataset allows to observe changes in the importance of various types of standards over time. Only internal company standards, which were also a special topic in last year's report, are significantly more important in 2014 than in 2013. This applies in particular to companies with 250 to 999 employees. While no significant changes in the assessment of other standard types can be observed on average, a differentiation by sector affiliation reveals pronounced differences. Figure 3 indicates that in the service industry, technical rules and specifications play a less significant role. The importance of de-facto standards has significantly increased in automotive engineering but decreased in the consumer goods sector. Companies engaged in metal production regard informal consortia standards as being more important in 2014 than in 2013 and for companies in mechanical engineering external company standards are less relevant. Whether these changes reflect stable trends can only be answered based on the next waves of the German Standardization Panel. Then, investigating heterogeneous developments in more detail and analyzing potential causes will become possible.

Figure 3:
Changes in assessment of the general importance of different types of standards from 2013 to 2014 for selected industries.

On a scale from –3 (not important at all) to +3 (very important)

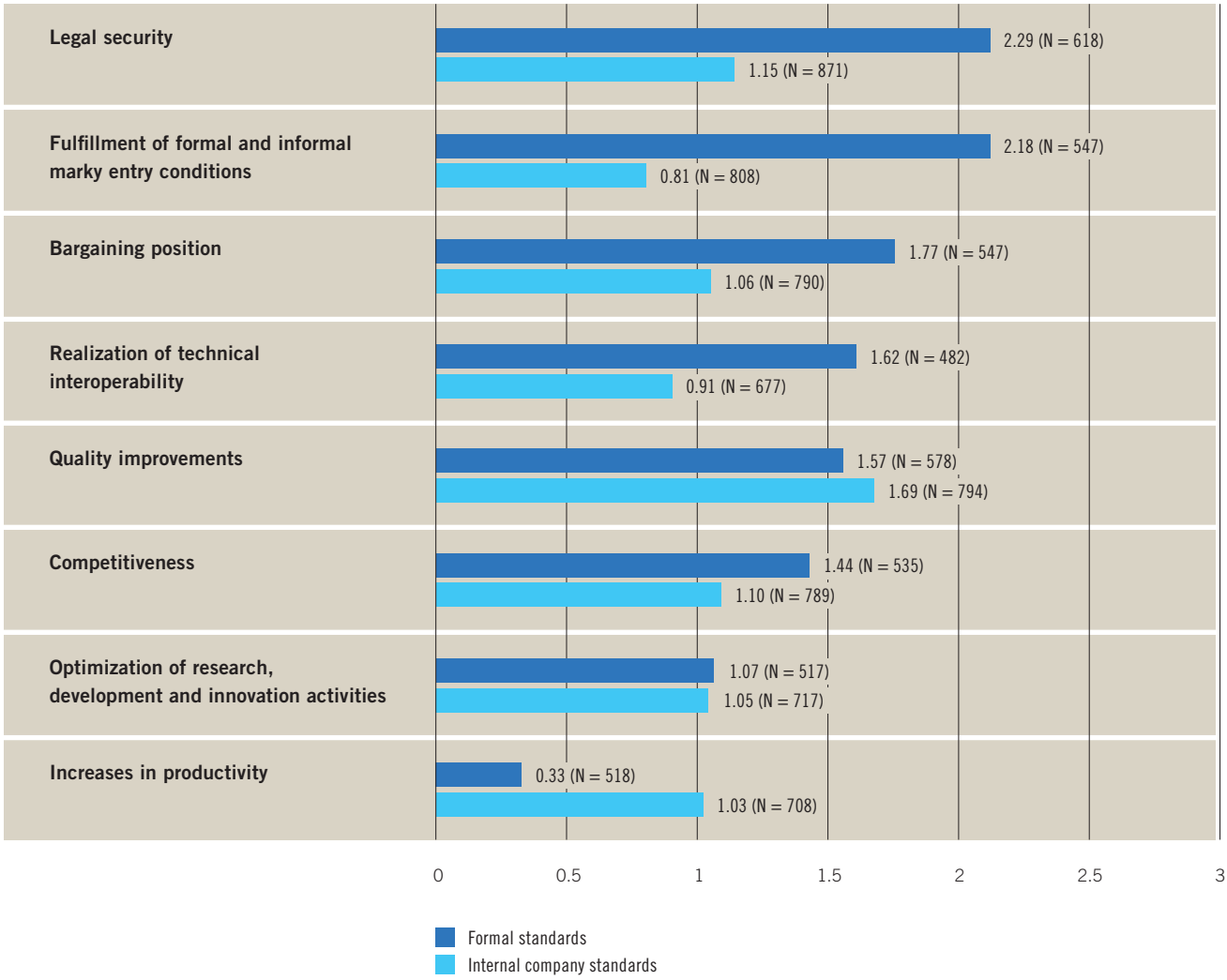


Formal standards, technical rules and internal company standards are very important for the realization of business objectives

As regards the impact of different types of standards on the realization of various business objectives, there are no substantial changes compared to last year´s findings. The analysis again shows that the companies surveyed regard the impact of formal standards and technical rules or specifications on nearly all aspects of business success as being more significant than the impact of consortia and de-facto standards. Furthermore, company standards are of extreme importance for specific business objectives. Figure 4 illustrates the significance of formal standards as compared with internal company standards.

Figure 4:
Assessment of the importance of formal standards and internal company standards for specific aspects of business success.

On a scale from –3 (not important at all) to +3 (very important)



Here it is evident that the impact of formal standards is very strong, especially as regards “Legal security” and “Fulfillment of formal and informal market entry conditions”. By contrast, formal standards only play a minor role in increasing companies’ productivity. In this regard, internal company standards are by far the most important type of standard. Internal standards also have a greater influence on improvements in quality as compared to formal standards. These results emphasize the large importance of internal company standards for the functioning of processes within companies, while formal standards are primarily decisive for success on the market. Previous investigations concerning the macroeconomic benefits of standardization conclude that company standards improve internal business processes. Formal standards, on the other hand, are the dominant means of lowering transaction costs when businesses interact with suppliers and customers to strengthen their position within the value creation chain.[4]

No significant changes in the number of applied standards from 2013 to 2014

Application of formal and informal standards and specifications

Again, the great significance of formal standards and technical rules or specifications is reflected in the number of formal standards applied within companies. Only 0.4% of the companies declared they did not use any formal standards in 2013, whereas 29% said they have applied more than 100 formal standards. Also, the majority of businesses (approx. 97%) applied technical rules and specifications, with 13% of these companies applying more than 100 such documents. The very low significance of de-facto and informal consortia standards is, like in 2013, mirrored in the fact that the percentage of companies not using either type is the greatest (36%). Still, more than 50% of the companies stated that they applied de-facto- and consortia standards in 2013. Solely one out of 50 companies implemented more than 100 documents, however, indicating that there are only few important informal standards. Additionally, the relatively great importance of company standards is also indicated by the extent of their application. In 2013, almost 85% of the companies apply internal company standards and still nearly 73% of all firms applied external company standards.

4 Economic benefits of Standardization – Summary of results. Final report and practical examples. DIN German Institute for Standardization e. V. Berlin; Wien; Zürich: Beuth, 2000

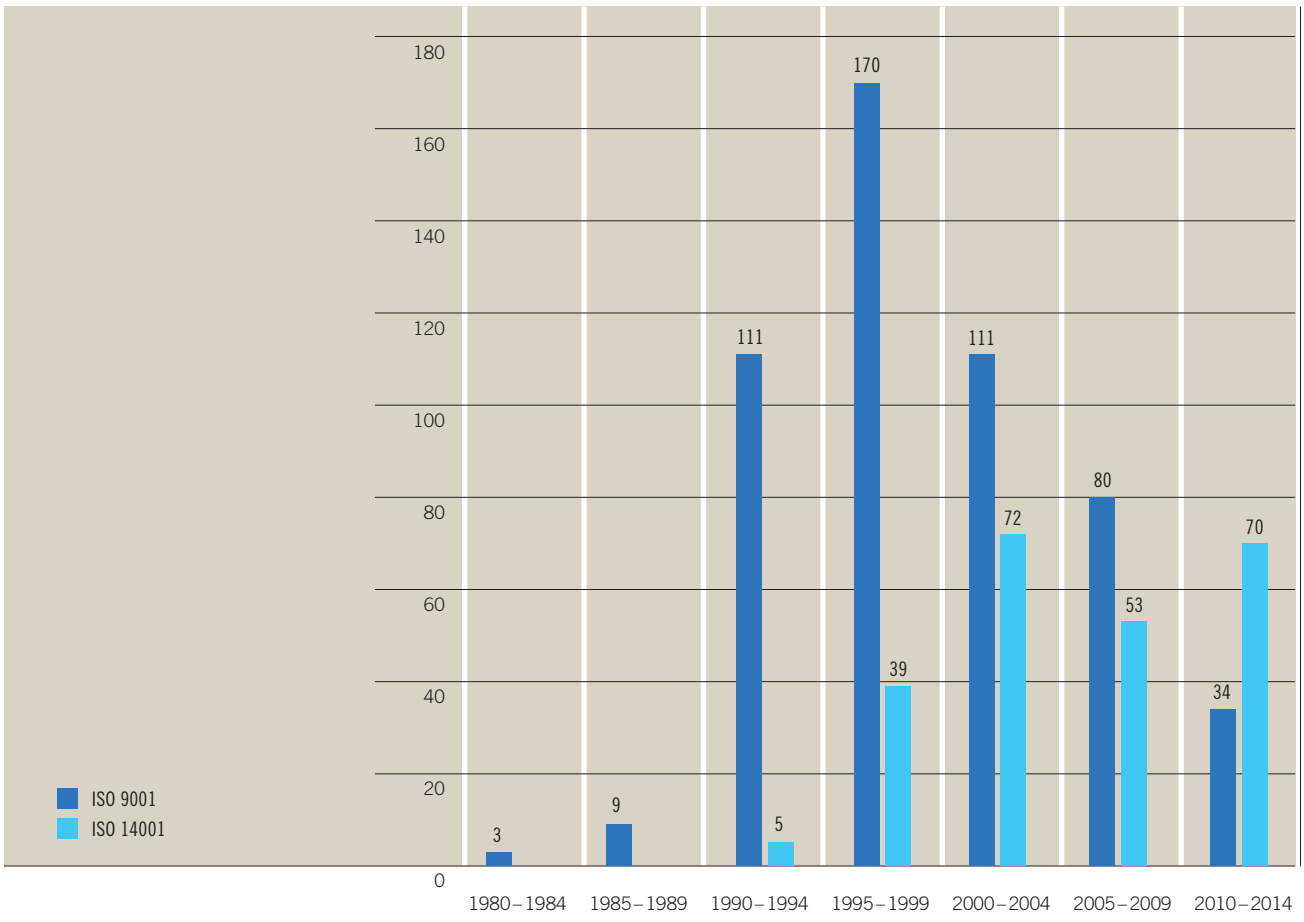
Further differences in the application of different types of standards can be observed when comparing smaller and larger companies. The number of applied standards rises significantly with the number of companies' employees. This effect is especially pronounced in the application of company standards. For example, about a quarter of the interviewed micro-sized companies does not use any internal company standard, which is true only for 4% of the large companies.

ISO 9001 certification widespread

ISO 9001 and ISO 14001 certification

In 2014, for the first time, companies were asked, if, and if yes to which extent, they were certified according to ISO 9001 (quality management) and ISO 14001 (environmental management) in the past financial year. About 80% of the participants held ISO 9001 certifications. This appears to be particularly indispensable for companies in vehicle manufacturing (98%) and metal production (91%), and, surprisingly, for more than 50% of microenterprises, i.e. companies with less than 10 employees. In contrast, only 47% of all companies are certified according to ISO 14001. It is again primarily large enterprises in automotive engineering (72%) and in the chemical and pharmaceutical industry (67%) which are certified. Furthermore, the survey reveals that most ISO 9001 certificates were first purchased before the turn of the millennium. Since then, a decreasing trend can be observed (figure 5). Certifying environmental management became possible only 10 years later and, therefore, is a more recent phenomenon. Accordingly, ISO 14001 certificates were mostly acquired after 2000. In comparison to the data of ISO concerning certification, these numbers appear rather high. In 2013, about 60,000 companies in Germany (1.6%) purchased ISO 9001 certificates, whereas only 8,000 companies (0.2%) certified according to ISO 14001. The results of German Standardization Panel, which mainly focuses on companies active in standardization, imply that companies engaged in standards work have a much stronger tendency to gain ISO 14001 certificates than other companies.

Figure 5:
Frequency of first certification according to ISO 9001 and ISO 14001 over time.



Development of innovation activities: Indication of slight weaknesses

In 2014, the vast majority of participants executed both product and process innovations. A comparison with 2013, however, indicates a slight innovation weakness: The share of companies implementing product innovations decreased from 85% to 83.5% within one year. Concerning process innovations, the share dropped from 75% to 67%. This is in accordance with the results from the Community Innovation Survey in 2014.[5] A detailed analysis reveals that fewer companies performed activities in research and experimental development, while more companies invested in professional training programs for innovation.

Importance of standards for innovations

The results of the survey provide important insights into the correlation between the different types of standards and innovation activities of companies (see figure 6). Formal standards and technical rules or specifications are considered exceedingly important both by companies that stated to have developed innovative products and by those who have not. By contrast, there is a relation between the assessments regarding company standards and informal standards and the innovation activities of a company. Innovators regard company and informal standards as considerably more important than businesses which did not carry out innovation. This is consistent with the finding that company standards have a positive influence on internal processes within companies.

The majority of co-operation partners in research and innovation activities are customers, local universities and suppliers. In particular, companies engaged in international standardization maintain relations of this kind (see figure 7). Co-operation with competitors, consulting companies and research institutions is less common. Overall, co-operation is taking place on national rather than international level. Establishment of relations with international co-operation partners is more frequently observed among businesses active in European and international standards committees, and is positively correlated with the importance of certain types of standards. The more significant the role of informal consortia standards in a company, the more frequently it co-operates internationally. If internal company standards are important for the company, relations with international suppliers and customers are more frequently built.

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5 Rammer et al. (2015): Innovationsverhalten der Deutschen Wirtschaft. Key figures 2014. Centre for European Economic Research GmbH (ZEW) Mannheim. (http://ftp.zew.de/pub/zew-docs/mip/14/mip_2014.pdf)

Figure 6:
Assessment of the importance of different types of standards for companies with differing levels of product innovation.

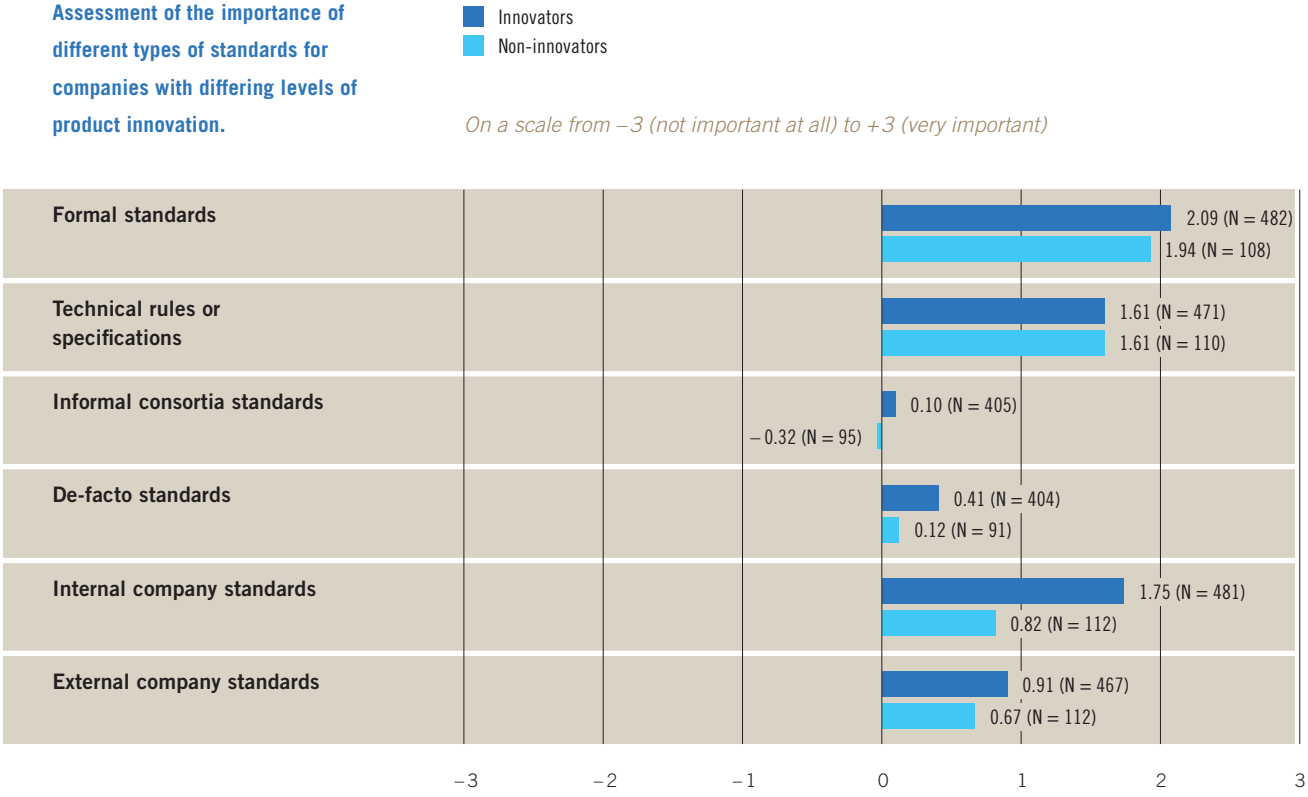
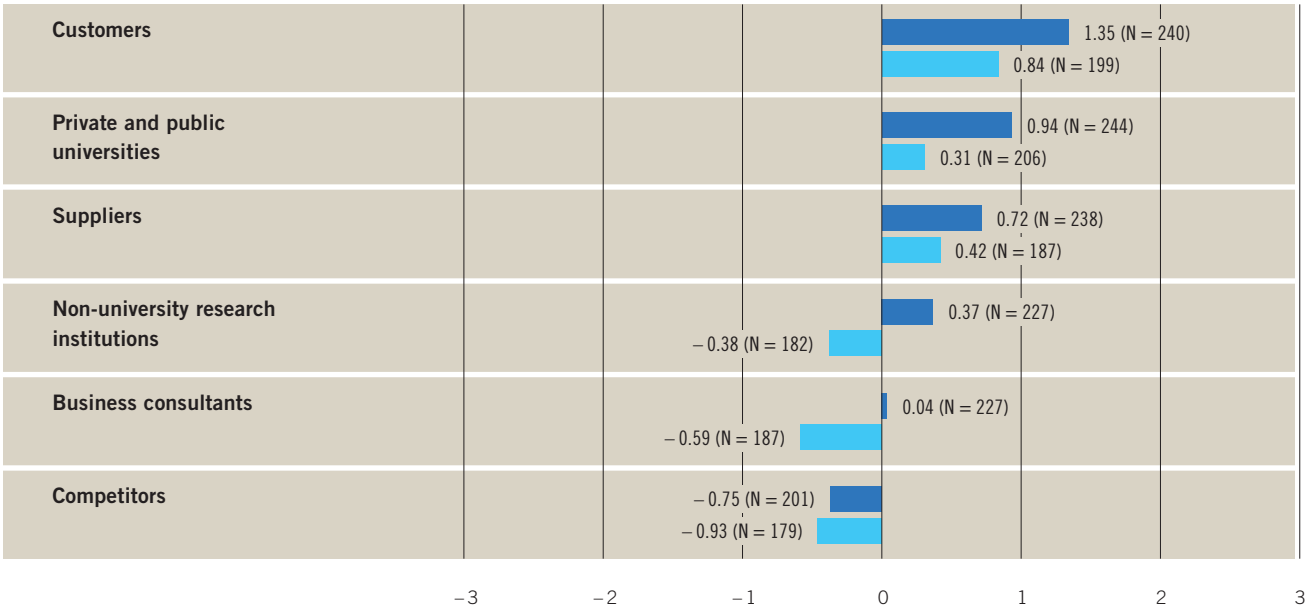


Figure 7:
Assessment of the frequency of co-operations in research and innovation activities with national organizations for companies with differing levels of engagement in international standards organizations.

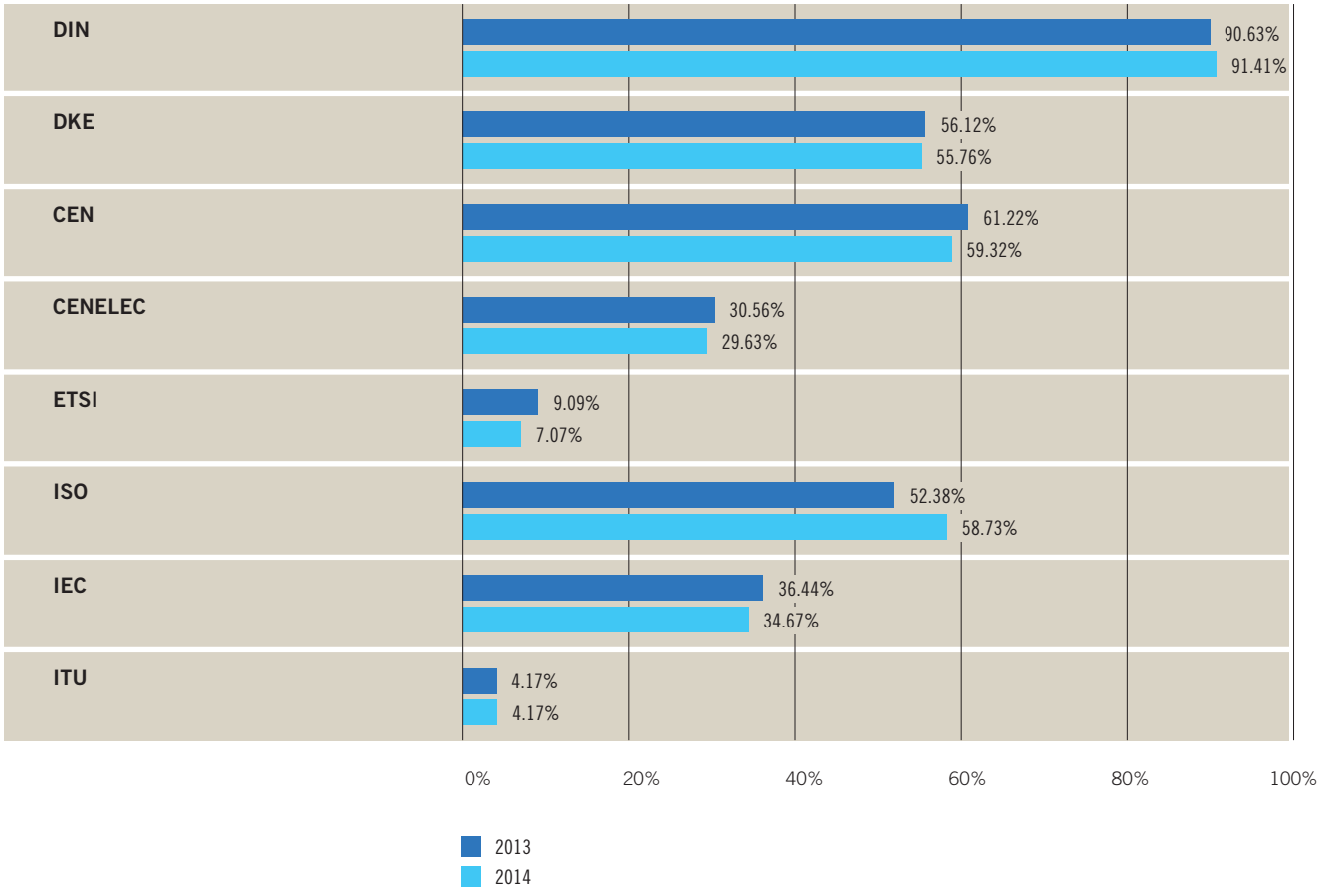


Standardization is of growing importance also for small companies and service providers

Standardization activities

As last year, companies who participated in the survey typically actively participate in committee work of the formal standards organizations. This is consistent with the survey's focus on companies that are engaged in standardization. As visible in figure 8, in 2014 nearly 91% of responding businesses were active in DIN standards committees, on average in three. 56% of responding businesses were active in the DKE, which deals with electrotechnical standardization – here even in four committees on average. At European and international level, the rate of participation diminishes across all companies. This, however, is probably due to the national delegation system where national committees send delegates to participate in European and international mirror committees.

Figure 8:
Percentage of companies active in standards organizations in 2013 and 2014.



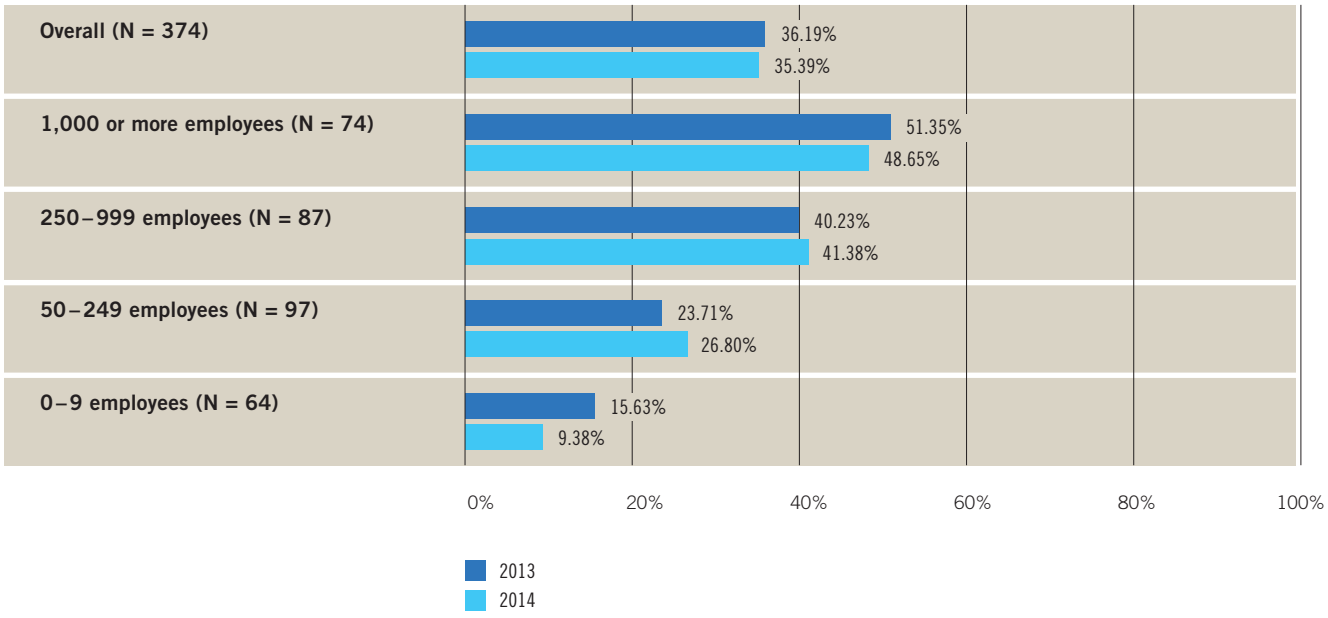
About a third of the interviewed companies are involved at European and international level in electrotechnical standardization (CENELEC and IEC), and about 5% in telecommunication (ETSI and ITU). Compared to the previous year, the share of companies in national standards organizations remained more or less constant, whereas participation on European level declined slightly. With respect to participation in international committees, the percentage of firms increased, especially in ISO (from 52% to 59%). A significant rise can also be observed with respect to the average number of international committees that companies are represented in. The results mainly result from large companies with 250 to 999 employees being more frequently engaged in standardization. Though small companies with less than 50 employees tend to be involved more in international standardization, also. Here, the share rose from 50% to 55%.

Looking at participation in standards organizations at all three regional levels according to company size, it becomes apparent that participation in national standards committees does not depend on company size, while participation on international and European level rises with the number of employees. In general, it can be said that companies have recognized the opportunity to influence and steer the standardization process through participation in standards committees of the official standards organizations and that they make good use of this opportunity.

The increasing significance of standards work is supported by the large percentage of companies with specialized standards departments. Almost one third of all interviewed companies say they have such a department. Standards departments are common particularly among companies in automotive engineering. In contrast, they are least common in companies active in Energy, Water and Oil and in service companies. Distinguishing between different levels of company size, a clear picture emerges: The larger the company, the greater the likelihood is that the company has a separate standardization department.

The share of companies with specialized standards departments slightly decreased over time. Distinguishing according to company size, however, reveals interesting differences in the development from 2013 to 2014 between sizes (see figure 9). While the share of companies with an own standards department dropped substantially among small companies (16% to 9%) and slightly among large companies with more than 1,000 employees (51% to 49%), the number of medium-sized enterprises with specialized standards department increased by three percentage points (27% as compared to 24%). Moreover, a slight increase can be observed in the percentage of service companies which say they have such a department.

Figure 9:
Percentage of companies maintaining a specialized standardization department in 2013 and 2014, differentiated by size.



As opposed to the results regarding participation in formal standardization processes, fewer companies state to have participated in consortia. Around 50% were involved in national consortia, on European and international level this applies only to a quarter of the sample. Compared with the previous year, more companies are active in national consortia, but on European and international level the figures remained constant. Considering that industries such as ICT, which tend to be organized in informal consortia due to the nature of the market, are underrepresented in the Standardization Panel, a generalization of the results is not possible. Not least because of that it is desirable to extends the target group to consortia and motivate the respective members to participate in the survey.

Concerning expenses for standardization activities patterns are the same in 2013 and 2014. About 50% of the participants state to have incurred total expenses of 1,000€ to 10,000 €, another 40% even spent 10,000 € to 100,000 €. While companies active in industrial engineering, ICT, and chemical and pharmaceutical industry on average increased budgets, companies in electrical engineering, automotive engineering and services on average cut expenditure for standardization.

The role of standards and standardization in trade

The integration of global markets is a central goal of EU trade policy in order to create new jobs and foster economic growth. European companies shall have the same opportunities with respect to market access, fair competition and an enforcement of rights all over the world.[6] In particular, negotiations with the United States and China are in the center of public interest. European companies still face great barriers to trade and investment, while not only taxes but also nontariff barriers play a major role. In the 2013 survey of the DNP, special emphasize was put on standards and standardization in the context of the Transatlantic Trade and Investment Partnership (TTIP) between the United States and the European Union. Equivalently, in 2014 the special section addressed barriers to trade and investment with respect to China, including questions concerning opportunities and risks of a potential free trade agreement. By combining datasets, for the first time it is possible to compare the attitude of companies active in standardization towards problems in foreign trade and a potential harmonization of standards in the light of free trade agreements with two of the most important trading partners of the EU.

Chinese regulations concerning intellectual property major barrier to export and investment

Effect of various trade barriers on export and investment

The special section of the 2014 survey first dealt with trade barriers impeding export to and investment in China. Chinese regulations with respect to intellectual property, enforcement of rights concerning this matter, and administrative barriers represent the largest obstacle to the exports and investments of German companies. This applies especially to companies in automotive engineering and chemical and pharmaceutical industry. While manufacturing firms consider Chinese regulations concerning intellectual property the most important aspect, service companies, for which protection of intellectual property, especially through patents, is of minor importance, put administrative obstacles first. As regards investments, Chinese taxes and tariffs are still considerably relevant. For export of goods and services, specific certifications and custom duties play a bigger role. Chinese standards are an important barrier for consumer goods producers, in particular. At the bottom of the list are

6 See „Trade and Investment Barriers Report 2014 Report from the Commission to the European Council, March 2014, European Commission. http://www.parlament.gv.at/PAKT/EU/XXV/EU/01/62/EU_16284/imfname_10447545.pdf

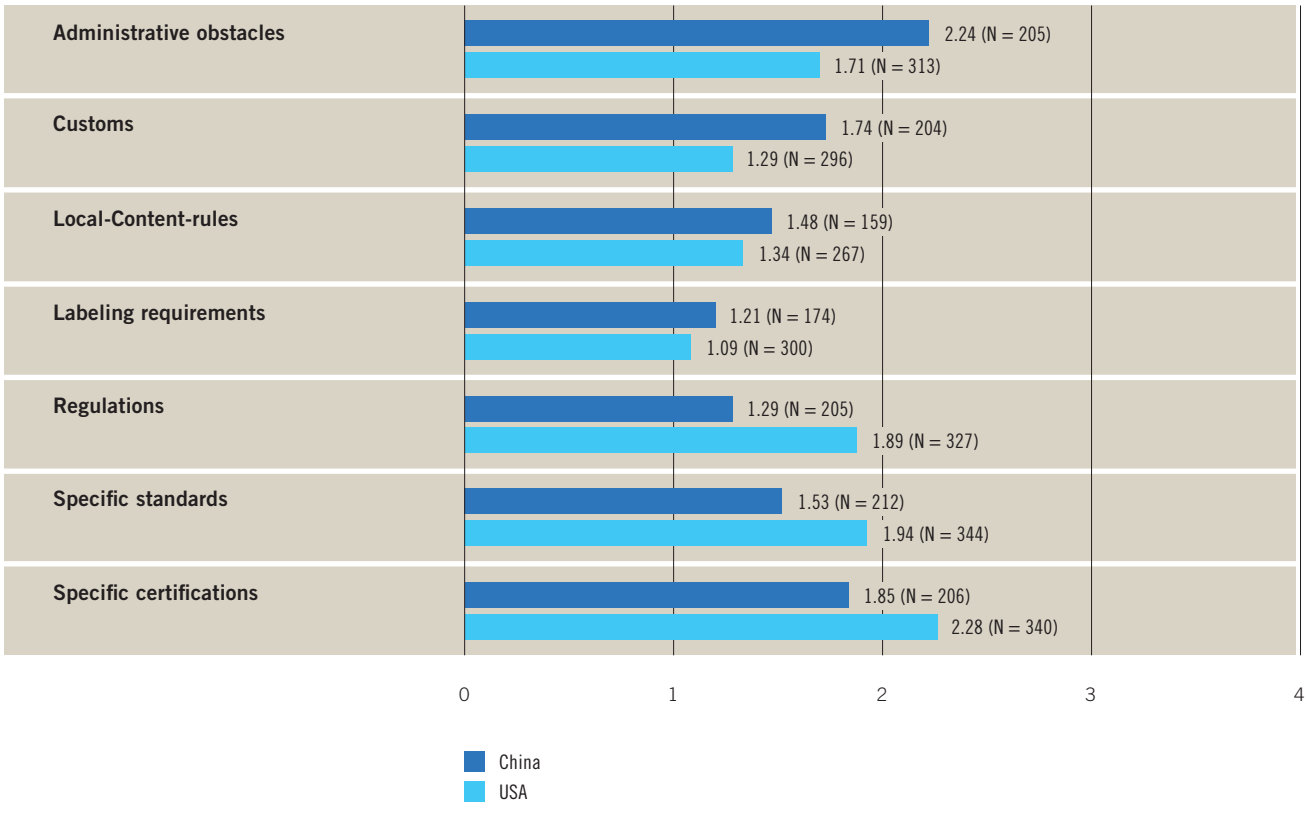
labelling requirements and non-convertibility of the Chinese currency. As expected, customs and labelling requirements are major factors for manufacturers of physical goods. In general, larger firms evaluate all barriers more restrictive than do smaller companies. Solely Chinese standards play an over-average role for companies with less than 50 employees.

Challenges concerning trade with China and the United States contrast sharply

Comparing responses on trade obstacles from 2013 and 2014 reveals that specific certifications are strong impediments for trade with both the United States and China. This barrier, however, appears to be even more pronounced for exports to the United States (see figure 10). With respect to China, administrative obstacles form a major barrier to trade. In addition, Chinese customs are an important hindrance, whereas standards and regulations are more relevant for exports to the United States. These results emphasize the substantial potential to increase German exports by reducing both tariff and non-tariff trade barriers.

Figure 10:
Extent of adverse effects on exports of German companies to the USA and China according to different trade barriers.

On a scale from 0 (no effect) to 4 (very strong effect)



German companies clearly prefer the adoption of International Standards as a harmonization solution

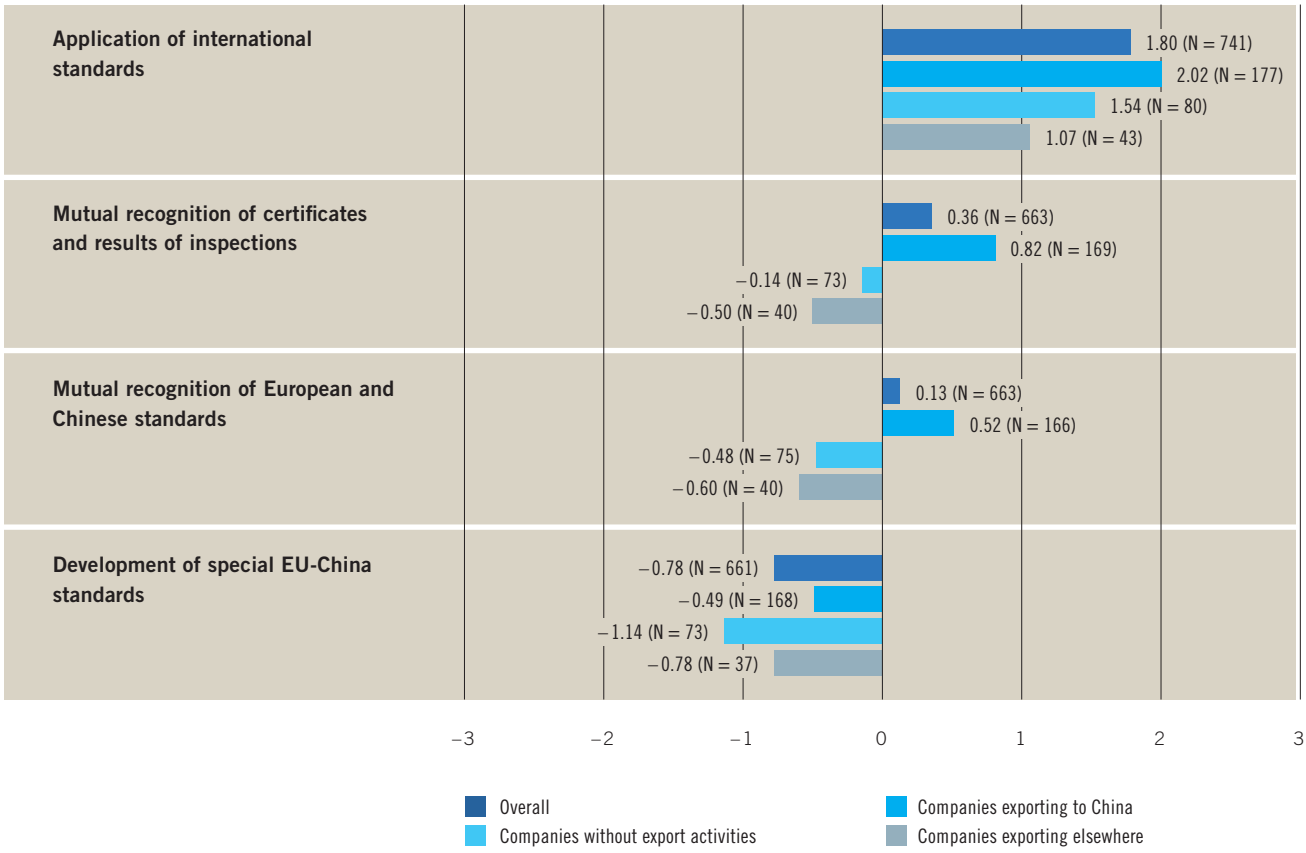
Preference for alternative harmonization solutions

Trade barriers negatively affect the European economy. The reduction of these barriers, including protectionism through national standards, is one of the core objectives shared by European trade policy. Not only in the context of TTIP, but also concerning negotiations about a potential free trade agreement with China, international harmonization of standards as well as mutual recognition of standards and certifications are debated. Figure 11 clearly indicates that the companies interviewed prefer complete harmonization through the application of international standards by Chinese enterprises. By contrast, the option of developing new standards that are tailored to the shared economic region is not supported. Mutual recognition of European and Chinese certificates and the results of inspections as well as mutual recognition of standards are moderately favored, yet only by companies which already export to China. Businesses which do not export to China are reluctant towards any form of mutual recognition. Especially exporting manufacturers are in favor of mutual recognition, while exporting service companies are not. Manufacturers can possibly compensate losses of (domestic) market share due to tougher competition after opening of markets by increases in sales on the Chinese market. Service companies that export to China do obviously not expect such advantages.

The patterns regarding the assessment of different harmonization solutions in the context of TTIP and a potential free trade agreement with China are similar, but preferences are more distinct in the latter case. Most prominent is that companies are unambiguously more positive towards a mutual recognition of standards with the United States than with China.

Figure 11:
Assessment of different harmonization solutions for formal standards and certification in the context of free trade agreement with China, for companies with various levels of export activity.

On a scale from –3 (very bad solution) to +3 (very good solution)

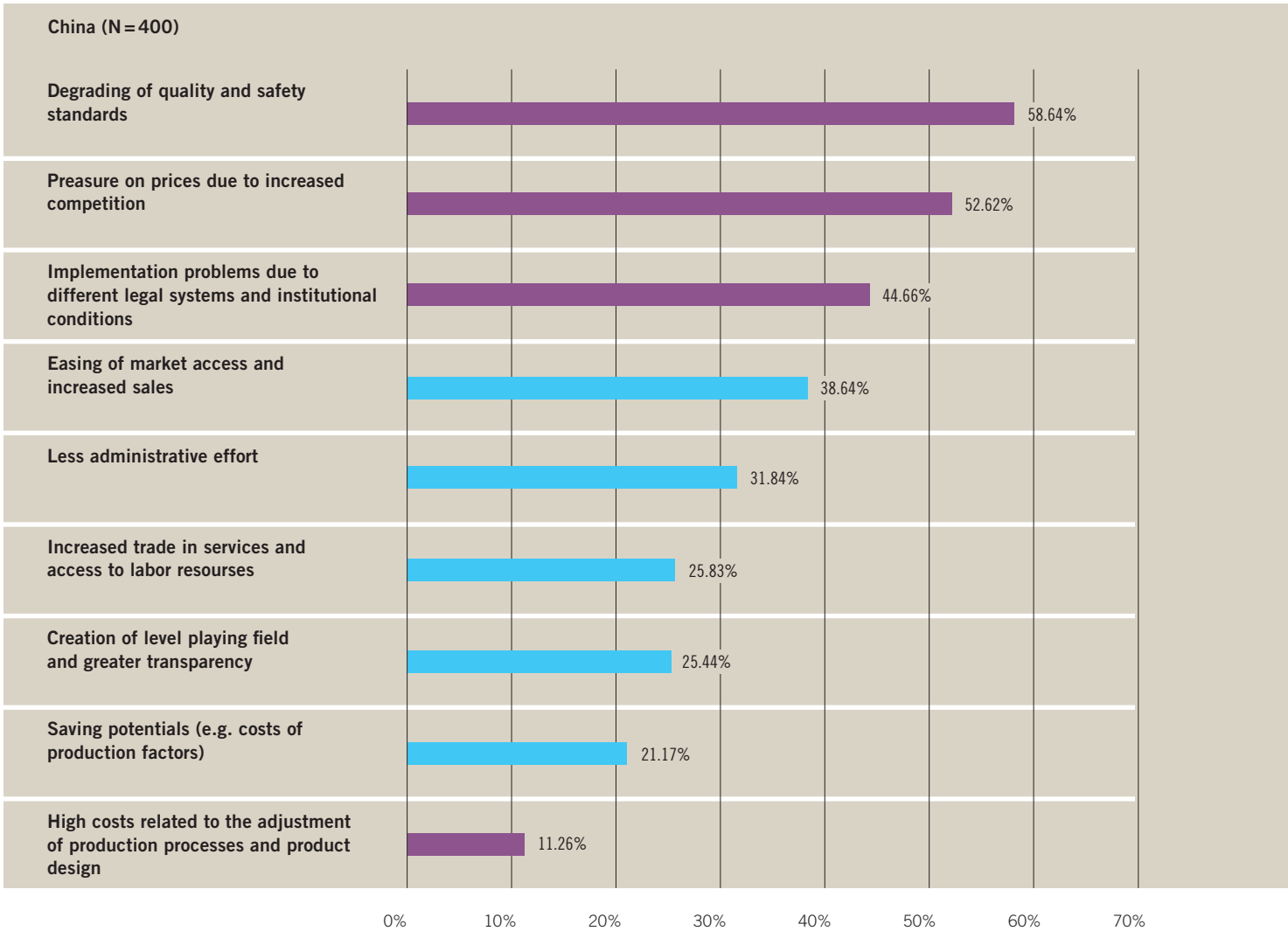


German companies more skeptical towards a potential free trade agreement with China than towards the TTIP

Chances and risks of free trade agreement

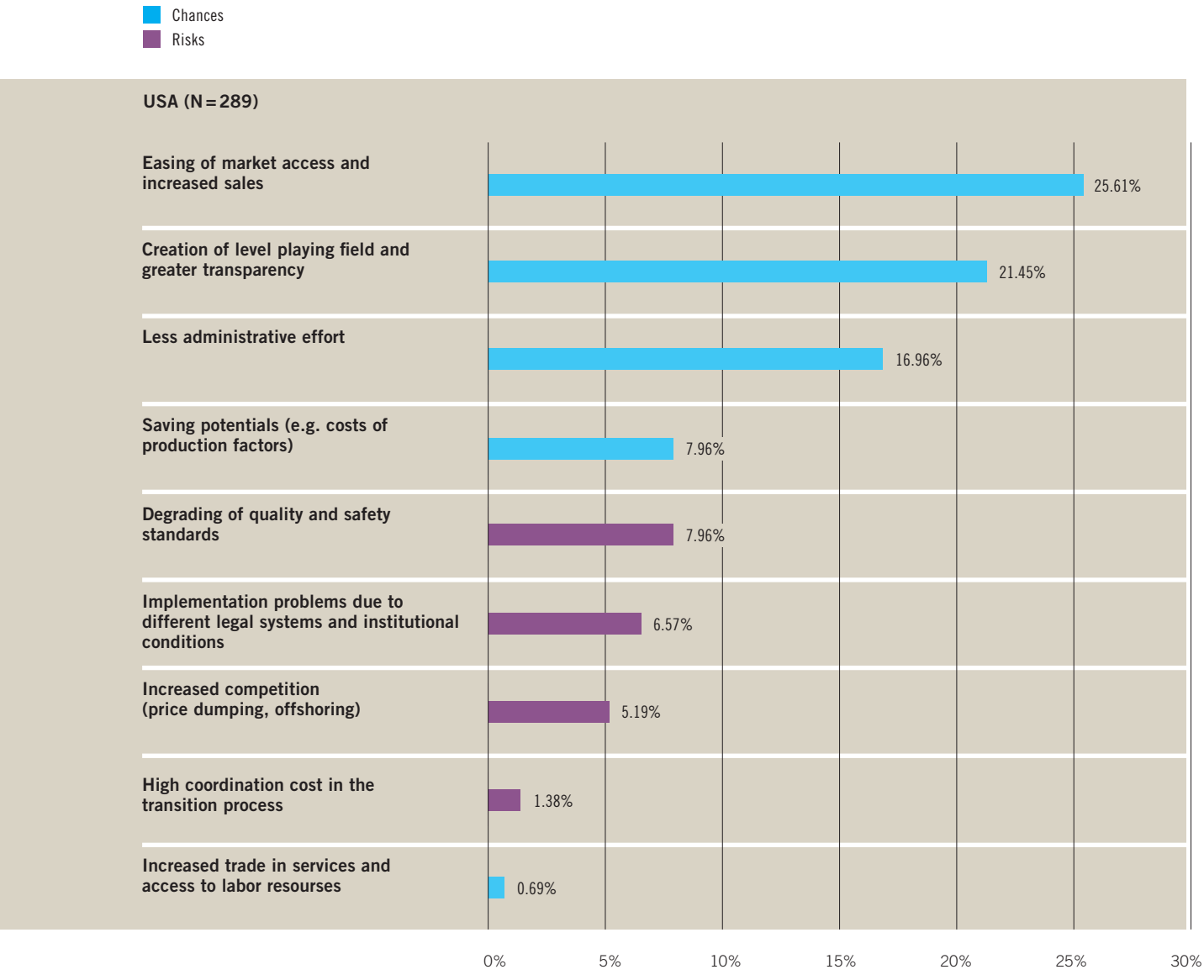
Finally, respondents were asked to select the opportunities and risks for their company potentially associated with a free trade agreement with China. The graphic on the left of Figure 12 shows that the participants most frequently mention concerns about a degrading of existing quality and security standards (59%) and pressure on prices due to increased competition (53%). Implementation problems due to different legal systems and institutional conditions pose a risk for about 50% of the businesses surveyed. Opportunities, such as easing of market access, increases in sales, and less administrative effort

Figure 12:
Percentage of companies naming various opportunities and risks potentially associated with an integration of the European and the Chinese and U.S. market.



were mentioned less frequently. Figure 12 also shows that this year´s results for China are in sharp contrast to the respective results on TTIP from 2013. Regarding an integration with the U.S. market, the number of opportunities named significantly outnumbered the number of risks.

The German Standardization Panel provides important information on perceived trade barriers, but also provides possible solutions and potential consequences of future trade agreements. Comparing the United States and China reveals that the importance of trade barriers differs by markets. Specific standards pose a barrier to export to both countries and international standards are the favored harmonization solution in both cases. Trade with China is still hampered by insufficient protection of intellectual property and high administrative costs, problems that cannot be solved by means of standardization.



Conclusion

The third wave of the survey largely confirms the results of previous surveys

Standards, technical rules and specifications developed by formal standardization institutes are by far the most important types of standards for the companies interviewed, regardless of industry and company size. These standards mostly serve to ensure legal security and to fulfil formal and informal market entry conditions. Concerning the importance and application of informal standards, company standards are significantly more important than consortia and de-facto standards. This is particularly driven by the importance of internal company standards for large, more innovative companies, which use these standards especially to improve quality and productivity. Moreover, the combination of data from 2013 and 2014 reveals a trend towards an increasing relevance of internal company standards, above all for medium-sized companies.

The great significance of formal standards and technical rules or specifications and their broad application is also reflected in the participation of German businesses in a variety of formal and informal standardization bodies. On international level, participation increased both among very large businesses and among small companies. The existence of standards departments in the majority of medium-sized and large businesses reflects the great importance of standards work. This also exceedingly applies to service companies.

ISO 9001 certifications are widely spread among the companies surveyed. Most initial certifications were awarded before 2000. Since then, a decreasing trend can be observed. Certifying environmental management became possible only 10 years after ISO 9001 and, therefore, is a much more recent phenomenon.

The special section on the role of standards in trade with and investment in China manifests that Chinese regulations concerning intellectual property form the biggest obstacle to exports and investments of German companies. Of particular interest is the comparison with last year´s special section concerning standards and standardization in the context of Transatlantic Trade and Investment Partnership (TTIP) with the United States. Chinese and U.S. trade barriers are in sharp contrast. While administrative obstacles and customs hamper exports to China, certifications and standards play a major role in impeding exports to the United States. Moreover, German companies are much more skeptical about the integration with the Chinese market than about the TTIP.

Catalogue of questions

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

- **Importance of formal and informal standards and specifications**
- **The role of standards in trade with and investment in China**
- **Formal and informal standardization activities**
- **General information on participating businesses**

Survey details

The third wave of the German Standardization Panel took the form of an online survey carried out in autumn 2014 with the support of DIN and several industrial associations. The survey itself and the data analysis and preparation were conducted by the Chair of Innovation Economics at the Technical University Berlin.

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

The project was initiated in the context of the foundation of the German Society for the Promotion of Research on Standardization (FNS).

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

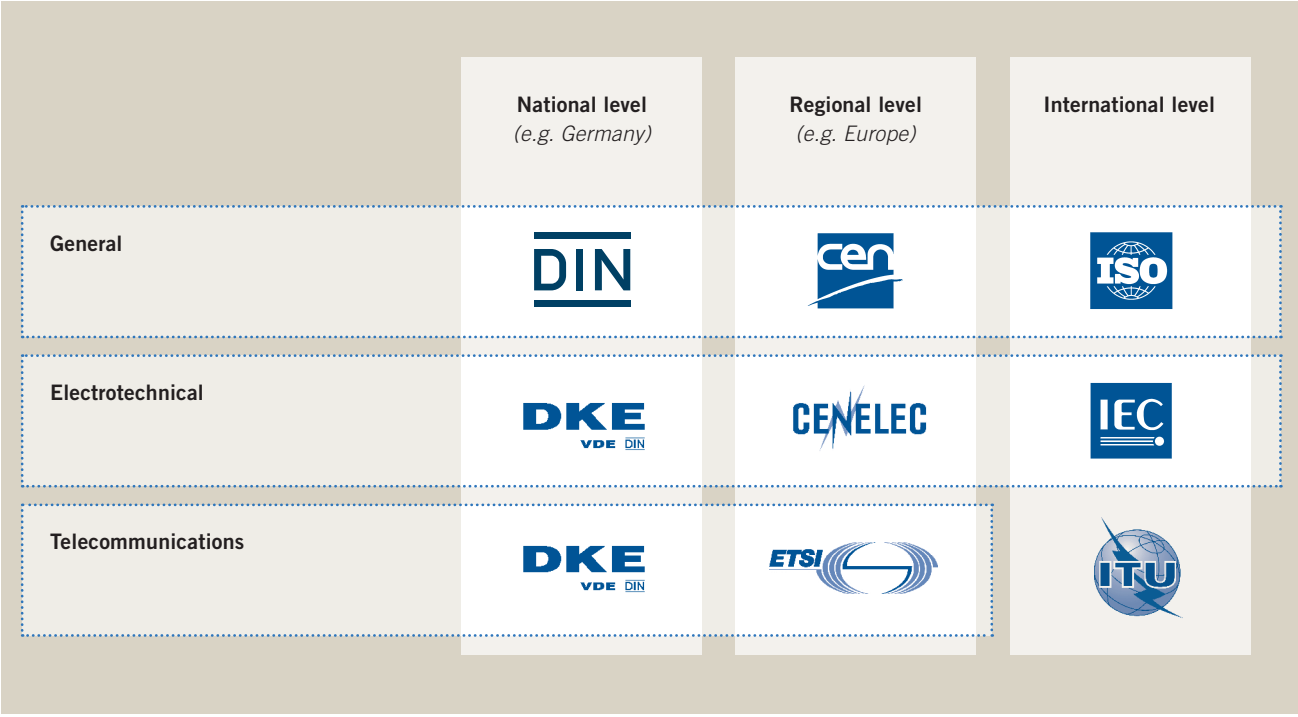
Glossary

Formal Standardization

In Germany, "formal" national standardization (also called "full consensus standardization") is defined as the "systematic unification of material and immaterial subjects carried out by all stakeholders working in consensus for the benefit of society as a whole" *(see DIN 820-1:2014-06 Standardization – Part 1: Principles, definition from DIN 820-3:2014-06)*. Provisions are laid down with full consensus and are adopted by recognized formal standards institutes (such as DIN 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 administer international and European standardization activities carried out in Germany, ensuring that all rules of procedures and guidelines are complied with. They prepare, carry out and follow up meetings of international and European bodies and of the corresponding German "mirror" committees *(see www.din.de)*.

Figure A.1:
Formal standardization at three levels
(Source: www.din.de)



Glossary

National standards organizations

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

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

European standards organizations

In Europe, standards are drawn up by the three officially acknowledged European standards organizations: the **European Committee for Standardization (CEN)**, the **European Committee for Electrotechnical Standardization (CENELEC)** and the **European Telecommunications Standards Institute (ETSI)**. The national standards bodies of CEN and CENELEC's 33 members work together to draw up European standards, which are adopted by the members at 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 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.[1]

[1] DIN: Das kleine 1 x 1 der Normung – Ein praxisorientierter Leitfaden für KMU (http://www.din.de/cmd?level=tpl-artikel&languageid=de&cmstextid=128876)

Glossary

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

International standards organizations

ISO International Organization for Standardization and **IEC International Electrotechnical Commission** are private organizations whose members are the national standards organizations. The secretariats of ISO and IEC technical committees are held by these member organizations, who come from all over the world. DIN's standards committees decide on active participation at international level and on the adoption of an International Standard as a national standard. The main bodies of ISO and IEC are the respective General Assemblies; other bodies include policy-making bodies such as the Council and technical executive committees such as the Technical Management Board. Standards work is carried out by national delegations and their experts acting in technical committees, sub-committees and working groups.

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

Formal standards

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

Glossary

The most important designations for standards:

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

Informal standardization

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

Specification (e.g. DIN SPEC)

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

Consortia standards

Like specifications, consortia standards are drawn up in an “informal” standardization process. They are developed on the basis of majority decision by a selected group of companies and organizations taking the form of a “consortium”.

Glossary

De-facto standards

De-facto standards are not developed by specific consortium, but are a consequence of market demand. De-facto standards are also known as “industry standards” and are also developed in what is called an “informal” standardization process. All standards drawn up by industrial interest groups are de-facto standards.

Technical rules

Technical associations actively participate in DIN’s standards committees in order to represent the interests of their members at national, European and international level. Some of these associations also draw up their own technical rules (see www.din.de), which contain recommendations on how to comply with legislation, a regulation or an established technical procedure. Although they are not legal documents in themselves they can become legally binding where cited in a law or regulation, for example in building regulations. Technical rules published by organizations such as VDI, VDMA, VDE are not drawn up with full consensus.

Company standards

Company standards are developed and adopted by companies themselves and or by cooperating businesses (e.g. suppliers). For example, their use can be mandatory for a company’s suppliers.

Transatlantic Trade and Investment Partnership (TTIP)

The “Transatlantic Trade and Investment Partnership (TTIP)” is a free trade agreement currently under negotiation that, if agreed upon, will take the form of an international treaty between the USA and the EU. For further information see *http://ec.europa.eu/trade/policy/in-focus/ttip/*

Panel survey

A panel survey is a survey, carried out at regular intervals, of an identical sample of surveyed individuals. This prevents falsification through changing samples.

DEUTSCHER FÖRDERVEREIN ZUR STÄRKUNG DER **FORSCHUNG** ZUR **NORMUNG** UND **STANDARDISIERUNG** E. V.

The German Society for the Promotion of Research on Standardization (FNS) aims at enhancing the significance of standardization by promoting strategic research. Presenting this research in an open German platform helps effectively disseminate results not only at national level, but within Europe and internationally as well. Standardization can thus become established as a strategic instrument that can be used together with research findings, academics and practical application by actors in science, industry, politics and society as a whole.

The Society‘s activities include identifying trends in research and technology that are relevant for future standards work and monitoring any policy-making that relates to standardization. This ensures that new areas for standardization are identified early on and allows the Society to help further develop the standardization system.

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