Federal Ministry
of Economics
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Monitoring Report Digital Germany 2011

An International Comparison of the ICT Industry

Welcome

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Economics and Technology

Information and communication technologies (ICT) are a catalyst for growth and an innovation driver for the entire economy. ICT plays the decisive role in ensuring the future viability of Germany as a high-tech location. More than half of industrial production and more than 80 per cent of German exports rely on the use of state-of-the-art ICT. We need to consistently leverage the opportunities offered through the extensive use of ICT across the entire value chain in all industries to promote Germany as the place to do business.

The findings of the "Monitoring Report – Digital Germany 2011" reveal that Germany has made progress in delivering world-class performance, managing to move up the ranking of the top 15 ICT locations worldwide from seventh to sixth place. While we are pleased with this achievement, we are of course committed to doing even better.

The Federal Government has already laid the foundations for the German ICT industry, ensuring that the information and communication industry is able to tap into future-oriented growth sectors. One key element in this approach has been the setting up and expansion of a high-performance ICT infrastructure along with the promotion of growth areas such as cloud computing, green IT and smart grids.

The Federal Ministry of Economics and Technology (BMWi) is initiating and supporting research and development projects to ensure the German ICT industry continues to perform to high standards, and to bolster Germany's position as a location for state-of-the-art and innovative technologies. Such initiatives include:

- The "ICT for Electromobility" technology programme which involves developing solutions for the charging, control and billing infrastructures for various vehicle models as well as the associated business models, services and possibly newly emerging norms and standards.

- The "IT2Green" technology programme that aims to cut energy requirements for ICT in data centres, communications networks as well as office and home applications.

- The "Cloud Computing" action programme initiated by the Federal Ministry of Economics and Technology jointly with partners from industry and science in which our contribution involves the "Trusted Cloud" technology programme to develop and test secure cloud computing solutions that meet statutory requirements.

These programmes form part of the Federal Government's ICT strategy "Digital Germany 2015", which sets out the key points for the ICT policy including objectives and initiatives. This strategy also forms the basis for the Sixth National IT Summit held in Munich on December 6, 2011. The Sixth National IT Summit will once again be a meeting point for key players from the scientific, industrial and political arenas. It will also provide a forum for discussing the findings of the Monitoring Report 2011 and agreeing on new initiatives to bolster Germany as an ICT location.

I look forward to discussing these issues with all the key players.

Hans-Joachim Otto

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Management Summary

Management Summary

How is the German ICT industry positioned relative to its global rivals?

The "Monitoring Report – Digital Germany 2011" analyses the performance of the German ICT industry as part of an international benchmark. In order to position the industries on a comparable basis, the performance of each ICT industry is benchmarked against 14 key competitor countries on the basis of 23 key indicators.

"Key indicators" are indicators for which quantitative data are available for all the selected 15 benchmark countries for the relevant analysis period. To facilitate comparison of data from disparate secondary sources with their different measurement units, index values are calculated for the individual key indicators. The respective performance of the "best-in-class country" provides the benchmark and receives a maximum index value of 100 points. The overall performance of an ICT industry is calculated from the weighted average of all key indicator values.

The German ICT industry scores 56 out of a possible 100 index points, putting it in sixth place, jointly with Sweden. The position of Germany has improved by one place from seventh to sixth compared with the previous year. The gap between Germany and the leader South Korea remains unchanged from the previous year at 14 index points.

The results break down as follows for performance in the categories of market relevance, infrastructure framework and uptake of applications:

Market relevance: Germany is the fourth strongest country in relation to ICT turnover with 5.1 per cent market share globally. According to BITKOM however, the ICT market grew 1.9 per cent in Germany in 2011, lagging behind the global markets at 4.2 per cent. Germany's best ranking is third place with "Internet advertising as a share of the advertising market", obtaining 93 per cent of the performance of the category leader. Particularly weak areas included "ICT expenditure as a proportion of GDP" with a tenth place and "Expenditure on ICT per capita" down at eleventh. Compared with the leading 14 ICT markets, German performance improved in the "Market relevance" category with nine analysed key indicators from sixth to fifth place.

Infrastructure: In the infrastructure category, Germany managed to keep pace internationally with "Broadband penetration in the population", scoring 83 index points and ranked sixth, along with 85 points in "Internet access in households" in seventh place. Germany obtained its best spot in the overall ranking thanks to a fourth place in "Mobile phone penetration in the population". The country came in fifth place, maintaining its ranking from the previous year, with its infrastructure performance in seven analysed key indicator categories. Germany obtained very good index values of more than 80 points in four out of seven indicators.

Applications: This category analyses the usage and adaptation rate of the Internet as an information, communication and transaction medium in the private sphere, in the working environment and in the context of interaction with government agencies. The United Kingdom and Denmark, ranked second and fourth respectively ahead of Germany in the overall benchmark, delivered much better performance with the uptake of new applications. This applies particularly to the "Quality of offered E-Government services" where Germany was ranked tenth. In some of the 14 top ICT countries, the uptake rate for new services is higher, including the mobile Internet (Germany: ranked seventh) and social networks (Germany: ranked 13). Germany lost its first place to South Korea in "E-Commerce use among Internet users". Consequently, Germany's ranking fell from fifth to eighth in its performance with seven key indicators in the "Applications" category, despite always being well placed over the past few years.

How can the German ICT industry get into the lead group of the 15 ICT countries?

High-ranking ICT experts at managing director and Board level from industry, science, associations and government analysed the findings of the TNS benchmark. The key fields of actions were identified as part of a process to evaluate location-specific opportunities and challenges. The recommended actions should help put Germany on a par with global leaders in a large number of areas involving cutting-edge technologies. These recommendations are aimed at all players: government, industry, science and public bodies.

"Embedding ICT into the traditional industries was yesterday. Thinking in open structures is today. Cross-industrial networking and smart working in international value-added networks will be the future of the ICT industry."

Dr. Sabine Graumann,
Director, Business Intelligence,
TNS Infratest Forschung GmbH

Germany's innovative small and medium-sized ICT companies and the leading international position of the German ICT industry with research and development were singled out as key strengths. An important task is to utilise ICT to promote Germany's traditionally competitive industrial sectors such as the automotive industry, mechanical engineering, energy, environment, healthcare and medical technology so they are at the cutting edge of developments.

According to the experts, the top priority must be to exploit opportunities, reduce weaknesses and minimise threats if the German ICT industry intends to move up into the lead group of the top 15 ICT countries.

Exploitation of opportunities

1. Focus on promising cross-industry growth and industry convergence areas. Expedite growth with smart regulation. Focus R & D on strategic growth areas.

- The experts believe the action programmes, initiatives, platforms, alliances, round tables for information and knowledge sharing that have been initiated in all industrial convergence areas are the right approach. Government support should equally run to the following industrial convergence areas on account of their major growth potential. While turnover generated from ICT in the E-Energy, E-Health, E-Mobility and smart home / building sectors totalled 46.7 billion euros in 2010, turnover will increase on average annually by 13.8 per cent to 326 billion euros by 2025, according to VDI / VDE forecasts.

- Above-average growth is also forecast for the cross-industry growth areas. The Embedded Systems, Cloud Computing and IT Security segments generated turnover totalling 23.6 billion euros in 2010. This should increase with annual average growth of 11.1 per cent to an estimated 114.9 billion euros by 2025.

- The high pace of innovation and structural change in industrial convergence areas and cross-industry growth areas call for smart regulation. This may mean that legislation in these areas falls back on laying down guidelines and the specific provisions within these guidelines left to industry self-regulation. This will allow competitive opportunities to be utilised rapidly and extensively.

- Focusing government funding on cross-industry growth areas and industrial convergence areas that are pivotal to application industries can sustainably bolster the efficiency and leading position of German R & D and, in turn, market development. The specific funding of service / business model innovations would be promising.

2. Leveraging the opportunities of a rapid expansion in digital infrastructure

- The expansion of a powerful nationwide network infrastructure underpins the policy designed to bolster the German ICT industry. The broadband strategy needs to be implemented swiftly. Across-the-board basic coverage is feasible by 2012.

- A high level of broadband coverage can also be provided in outlying regions particularly by adding the mobile technology LTE to the technology mix. Mobile broadband needs to be expanded rapidly so new applications can establish themselves in the mass market.

- High bandwidths, network stability and end-to-end network security must be ensured for B2B applications. Differentiated tariff structures also need to be introduced.

- Planning and legal certainty for infrastructure investment constitutes a key prerequisite for setting up state-of-the-art ICT infrastructure.

Elimination of weaknesses

3. Targeted training and immigration policy to combat the skills shortage. Increase investment in education. Gear education policy initiatives to ICT.

- It is the task of government, industry and society to combat the skills shortage that is primarily a result of structural weaknesses. Controlled immigration of qualified skilled staff from outside Germany needs to be supported.

- Education policy initiatives should be geared more closely to ICT.

- Media skills among the population, especially basic knowledge of new technologies, need to be improved.

4. Support innovative small and medium-sized ICT companies to move into international markets. Global players and entrepreneurship. Improve provision of risk capital.

- The experts urge all the key players to play their part in ensuring that the strong German SME segment makes better use of its opportunities. Small and medium-sized companies should receive support through funding policy as part of their internationalisation strategy. This would also facilitate long-term the development of more global players and better entrepreneurship in the German ICT industry.

- There is a lack of funding for start-ups and tax incentives for the provision of risk capital in this respect.

5. Introduce tax incentives to promote research. Promote the establishment of international standards through German companies. Initiate funding programmes to convert innovations into marketable products. Efficient public bodies with role model function.

- Government needs to introduce tax breaks for research funding in order to address Germany's competitive disadvantage compared with other OECD members. This will increase the willingness to invest and lead to more new start-ups.

- The focus of research funding should be on service / business model innovations. Greater incentives need to be attached to cooperation between companies and research.

- German companies should redouble their efforts to set international standards, and receive appropriate support from government. Whoever sets the standards will ultimately shape the markets. Standardisation relates not only to setting technical standards but also to processes and workflows.

- Funding programmes need to be initiated to convert innovations into marketable products. R & D projects should be supplemented to include conversion aspects and an assessment of commercial potential. The marketability of an innovation needs to be checked beforehand in order to close the existing invention / innovation gap.

- Government agencies should pave the way by setting a good example in the use of new applications and setting up E-Government infrastructures. They need to "assume" a pioneering role and role model function vis-à-vis companies and citizens by adopting more efficient administrative processes. This includes a greater willingness to utilise innovative products and services, especially in the area of E-Government.

Minimisation of risks

6. Timely adjustment of the digital legal framework. Bolster security and trust in digital networks. Overcome euro crisis

- The experts argue the need for a timely adjustment of the digital legal framework. Legal inequality in the global competitive environment and legal uncertainty especially with data protection and copyright law constitute in their opinion a risk factor and competitive disadvantage for the German ICT industry. A contemporary data protection law and copyright law would make Germany more competitive in the global digital markets. This would in turn sustainably bolster the trust placed by users and providers in network and information security.

- According to the experts, the ICT industry is heavily dependent on the overall economy and the state of the global economy, and especially on the financial and euro crisis.

Outlook

The aim must be to bring together all the ideas and concepts mentioned in each section and utilise them to successfully position the German ICT industry vis-à-vis the global competition. The snapshot and assessment of the German ICT industry should remain the basis for an ongoing dialogue between government, industry and science. Ultimately it is the commitment of each individual citizen, each individual company, each individual administrative unit that will count.

1.

Key findings: TNS benchmark

1. Key findings: TNS benchmark

How Germany compares to the world's top 14 ICT nations

This global benchmark report compares the performance of Germany's ICT industry with another 14 top ICT locations using the latest development figures in 23 key performance indicators. At a workshop held in November 2011, the key areas for sustainable growth of a networked, mobile digital economy and society were determined and initial recommended actions derived. The ICT industry and domestic economic policy should tailor their response to these recommendations in a bid to position the German ICT industry permanently at the cutting edge of global ICT developments.

1. The performance of the German ICT industry has improved compared with the 14 top locations, but remains mediocre

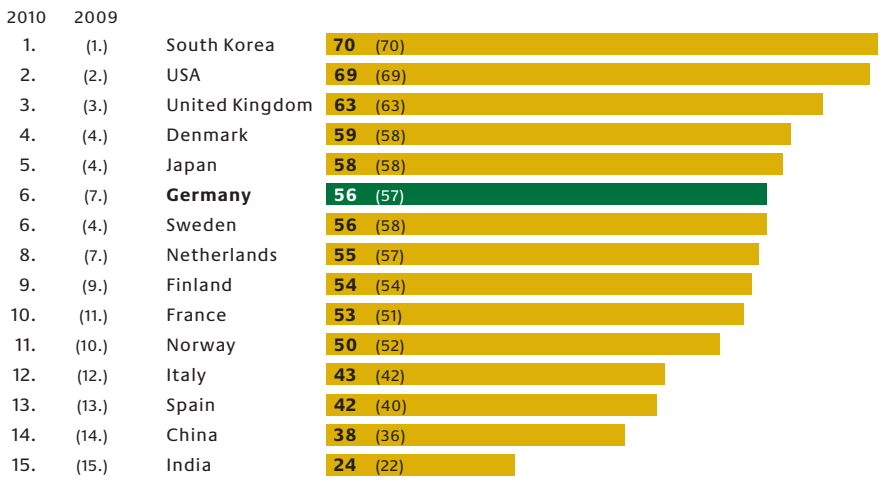
The ICT strategy "Digital Germany 2015" aims to put Germany on a par with global leaders in as many areas involving cutting-edge technologies as possible. The "Monitoring Report – Digital Germany 2011" measures to what extent the German ICT industry has made progress in this respect.

Germany and Sweden are jointly ranked sixth among the top 15 ICT locations. Although Germany's average performance fell slightly by one point to 56 index points, Germany managed to move up the ranking from seventh to sixth – a result of Swedish performance falling by a greater margin, actually two points relative to the leader South Korea, thus forcing it two places down the ranking compared with the previous year.

Germany failed to take first or second place in any of the 23 indicators. Germany's best ranking was a third place in the key indicator "Internet advertising as a share of the advertising market".

German ICT turnover (excluding consumer electronics) grew by 1.5 per cent to 124.3 billion euros in 2010 – equivalent to a global market share of 5.1 per cent, making Germany the fourth-largest ICT location by turnover of all 15 countries included in the benchmark. According to EITO, the German ICT market will grow 1.9 per cent to 126.7 billion euros in 2011. In 2012, turnover will grow by a further 2.2 per cent to 129.4 billion euros. BITKOM forecasts 10,000 jobs will be created in 2011, taking the total ICT-workforce to 853,000.

Germany moved up one place to sixth position



Source: TNS Infratest (2011); Previous year's figures in brackets

Fig. 1a: TNS benchmark – Average performance by country, 2010

South Korea world leader in the ranking for the second time ahead of the USA

The world's leading ICT locations have reaffirmed their position in the TNS benchmark. South Korea edged ahead of the USA in 2009 to take the lead in the rankings, and managed to defend this position in 2010. Average performance remained steady at 70 points. Among the 23 key indicators, South Korea was ranked first on seven occasions ("ICT expenditure as a proportion of GDP", "Maturity of the telecommunications market", "Internet advertising as a share of the advertising market", "ICT companies as a proportion of all companies", "Internet penetration in households", "E-Commerce users", "Quality of offered E-Government services").

The USA came in second just behind South Korea with an unchanged 69 points. It was ranked top ICT location in the TNS benchmark in terms of "ICT turnover as a share of the global ICT market" and "Internet host penetration".

The United Kingdom came in third behind the USA, trailing by six index points. It was ranked first in "E-Commerce turnover per Internet user". The United Kingdom's position remained unchanged compared with the previous year at 63 index points.

Denmark was once again ranked fourth with 59 index points, an improvement of one point. The country led the field with "Expenditure on ICT per capita".

Fifth place went to Japan, with performance unchanged at 58 index points. Japan was ranked first in "Mobile Internet use in the population", with a lead over Germany of two index points.

Germany: Improved performance in the categories "Market relevance" and "Infrastructure" contrasts with drop in rankings in "Applications"

The following picture emerges once the 23 key indicators are broken down into the categories "Market relevance", "Infrastructure" and "Applications":

- Germany scored 36 index points in the category **"Market relevance"**. Thanks to an improvement of one point, the country managed for the first time to match the average performance of the 15 ICT locations. Germany moved up one place in the rankings to tie for fifth with Sweden.

- Germany achieved above-average performance with 80 index points in the category **"Infrastructure"**. Despite losing two points, Germany managed to retain joint fifth place with Norway.

- In the category **"Applications"** Germany scored 72 index points, falling three places down the ranking, and taking it to eighth place.

2. Competitiveness of the ICT industries on the supply and demand side

The "Monitoring Report – Digital Germany 2011" analyses the **competitiveness** of the ICT locations with the aid of key indicators. The results on the **supply side** broke down as follows:

- **"ICT turnover as a share of the global ICT market"** (excluding consumer electronics) remained unchanged in Germany at 18 index points, equivalent to a global market share of 5.1 per cent and enabling Germany to remain the fourth-largest ICT location by turnover in the overall ranking – a position it shares with the United Kingdom. The USA remained the undisputed number one with ICT turnover of 705 billion euros and an ICT global market share of 29.1 per cent in 2010.

- German performance in the category **"ICT exports as a proportion of all exports"** (excluding ICT services and software) dropped by two points to 23 index points. Germany retook ninth place with 6.8 per cent on the back of 6.9 per cent in the previous year. For the crisis year of 2009, BITKOM figures reflected a 23 per cent drop in exports of ICT goods to 25.6 billion euros. In 2010, German export turnover picked up, growing 18.0 per cent, and with ICT exports totalling 30.3 billion euros. China remains the leader in terms of exports of ICT goods.

- The ranking of the German ICT industry fell by four points to 17 index points in relation to **"Growth in IT turnover"**. The German IT industry posted growth of 2.4 per cent and generated turnover worth 60.2 billion euros in 2010, putting it in eighth place, three places above its ranking in the previous year. **Germany's IT market** increased by 3.6 per cent to 62.4 billion euros in 2011, giving it a global market share of 6.5 per cent. The Indian market posted the highest growth in 2010, with turnover rising 18.2 per cent to 13.2 billion euros.

▸ Germany scored 48 index points, falling one spot to fifth place, in **"Maturity of the telecommunications market"**, an indicator calculated from landline penetration, mobile phone penetration and telecommunications expenditure as a proportion of GDP. Telecommunications expenditure as a proportion of GDP (excluding pay TV) remained static at 2.5 per cent. The same applies to mobile phone penetration at 127 per cent. Landline penetration by contrast fell by 2.3 percentage points to 55.4 per cent. A contraction of seven per cent with voice telephony to 12.3 billion euros and 11.4 billion euros is forecast for 2011 and 2012 respectively. These losses will, however, be more than offset by growth in turnover from mobile data services. In 2011 the associated turnover is set to increase by 14 per cent to 7.4 billion euros. In 2012 turnover will increase by ten per cent to 8.2 billion euros. South Korea achieved mobile phone penetration of 105 per cent, the highest landline penetration of 59.2 per cent, and the highest telecommunications expenditure as a proportion of GDP of 5.3 per cent. As such, South Korea managed to reassert its leading position.

▸ Germany maintained its third place in **"Internet advertising as a share of the advertising market"**, obtaining 29.0 per cent. Germany improved by one index point to 93 index points. In 2010, German Internet advertising turnover rose by twelve per cent to 3.6 billion euros. South Korea topped the rankings with an Internet advertising market share of 31 per cent, ahead of the United Kingdom at 29.3 per cent. The advertising market includes displays, banners, keyword marketing and mobile advertising.

▸ **"E-Commerce turnover"**, comprising turnover from products that Internet users order online but that are not necessarily paid via the Internet, saw Germany obtain ninth place, matching its ranking from the previous year, with E-commerce expenditure of 222 euros per Internet user. Average turnover per Internet user increased by eleven per cent. The United Kingdom managed to retain its top slot from the previous year, posting turnover of 518 euros per Internet user.

The results for the **demand side** break down as follows:

▸ In Germany **"Expenditure on ICT per capita"** (excluding consumer electronics) totalled 1,520 euros in 2010 – 1.3 per cent more than in the previous year. Thus the location falls from 10th place to 11th behind South Korea with per-capita expenditure of 1,598 euros and ahead of Spain with per capita expenditure of 1,141 euros. Expenditure on information and communication technology per capita in Denmark increased by 1.9 per cent in 2010 – namely 2,540 euros. This result placed Denmark top of the overall ranking in the TNS benchmark.

▸ German performance in terms of **"ICT expenditure as a proportion of GDP"** (excluding consumer electronics) improved by seven points to 49 index points, taking the country up one ranking place to tenth. ICT expenditure accounted for 4.9 per cent of gross domestic product in Germany – compared with 4.8 per cent of GDP in the previous year. The EU25 average is 5.3 per cent.

3. Broadband as a prerequisite and driver of economic growth

Broadband networks have become a permanent fixture of public infrastructure and are now just as important to the economy as roads, public transport networks, water and power supply. The expansion of a future-proof broadband network is absolutely crucial for tapping into economic growth potential and successfully rolling out innovative business models.

The following focuses on the availability and usage of landline and mobile broadband on the basis of several indicators.

▸ With landline broadband penetration in the population the German ICT industry tied for sixth place with Sweden with a penetration rate of 31.6 per cent – 83 per cent of the performance of the leading country Denmark of just under 38 per cent. Statistics from the European Commission reveal that Germany continues to comfortably exceed the average figure of all Member States of 25.6 per cent. The average maximum bandwidth of Internet connections was 17 Mbit / s in Germany, well below the OECD average of 37 Mbit / s. Broadband connections with at least one Mbit / s are available for 98.3 per cent of all households.

In 2010, virtually one in three German households had a connection with a download speed of over ten Mbit / s. In 2009 the same figure was just one in four.

According to the Federal Government's broadband strategy, 75 per cent of households should have connections with transmission speeds of at least 50 Mbit / s by 2014. By mid-2011 this figure rose to over 35 per cent. The amendment to the Telecommunications Act (TKG) envisaged nationwide coverage with 50 Mbit / s connections by 2015, and no later than 2018.

If a **Universal Service Ordinance** is implemented, gross domestic product will grow by 0.36 per cent annually to 8.2 billion euros within three years.

Landline providers are upgrading their networks with FTTH / FTTB (Fibre to the Home / Building) **fibre-optic links**. Germany brings up the rear of the ranking of the top ICT locations with a share of FTTH / B technology of all broadband connections of 0.4 per cent and 260,000 connections at the end of 2010. The OECD countries boast fibre-optic penetration of 12.3 per cent.

The falling penetration rates of landline broadband connections are partly due to substitution through **mobile broadband connections**. Germany is ranked 13th of the 15 countries analysed in the TNS benchmark with mobile broadband penetration of 26 per cent. In the OECD ranking of the 34 member states, Germany comes in 25th place.

▸ **Internet penetration in households.** Germany increased its Internet penetration rate in households by 3.4 percentage points to 82.5 per cent – down to seventh after losing its sixth place to Japan. The penetration rate of the world leader South Korea is 96.8 per cent. However, Germany lies well above the EU average of the EU27 countries of 70 per cent.

▸ **Mobile Internet use in the population.** Germany rose by four index points, coming in seventh in the ranking. The proportion of mobile Internet users in the population increased from 23.2 per cent to 28.4 per cent within a year.

In the EU27 countries, 34 per cent of mobile phone owners had mobile Internet access in 2011. In Germany the same figure was 32 per cent, while the world leader Sweden obtained 59 per cent.

According to the European Information Technology Observatory (EITO) turnover from mobile data services in Germany grew by 14 per cent to 7.4 billion euros in 2011. In the EU25 countries turnover increased by twelve per cent to 40 billion euros. By 2012 turnover will increase by another ten per cent. In the EU25 countries mobile data services will then generate 44 billion euros.

Smartphones account for a substantial proportion of these increases. 10.1 million handsets will be sold in 2011 – 36 per cent more than in the previous year. Turnover increased by 24 per cent to 2.1 billion euros in Germany (BITKOM).

520.000 mobile applications (apps) are available globally. According to BITKOM, 900 million apps were downloaded onto mobile phones in 2010 – an increase of 110 per cent. Turnover from downloading chargeable apps rose by 88 per cent to 357 million euros. 90 per cent of applications are free.

▸ **Mobile phone penetration in the population.** In Germany mobile phone penetration fell slightly for the first time in 2010 by 0.4 percentage points to 127 per cent and 109 million connections. Nonetheless, the country managed to move up the rankings from fifth to fourth place in the TNS benchmark. The Federal Network Agency cited the writing-off of inactive prepaid subscribers, especially at Deutsche Telekom, as the reason for the number of users levelling off at a high saturation level, in other words ultimately a measurement error. Each German citizen owns 1.3 SIM cards. World leader is Finland with 156.4 mobile contracts per hundred inhabitants.

The objectives of the broadband strategy can only be achieved if industry and government join forces. This strategy is based on five key pillars:

1. Leveraging synergies when setting up infrastructure;
2. A supporting frequency policy;
3. Financing programmes;
4. Growth-friendly regulation;
5. Creation of information transparency by means of improved public relations.

4. Focus on key cross-industry growth areas and industrial convergence areas

Cloud Computing will grow annually by 18 per cent up to 2020 – the annual growth rates are 8.5 per cent up to 2020 with Embedded Systems, and 8.9 per cent up to 2025 with IT Security

The areas Cloud Computing, Embedded Systems and IT Security constitute key **cross-industry growth areas**. The following sets out the key estimates of market potential.

▸ **Cloud Computing:** One of the key growth markets is the provisioning of IT services via the World Wide Web, in other words cloud computing.

According to Berlecon Research, the German market for cloud computing will grow from turnover of 650 million euros in 2010 to 20.4 billion euros in 2025 – equivalent to an annual growth rate of 26 per cent. This is well above the global trend. The proportion of cloud computing in relation to all IT expenditure will rise in the same period from 0.6 per cent to 20 per cent.

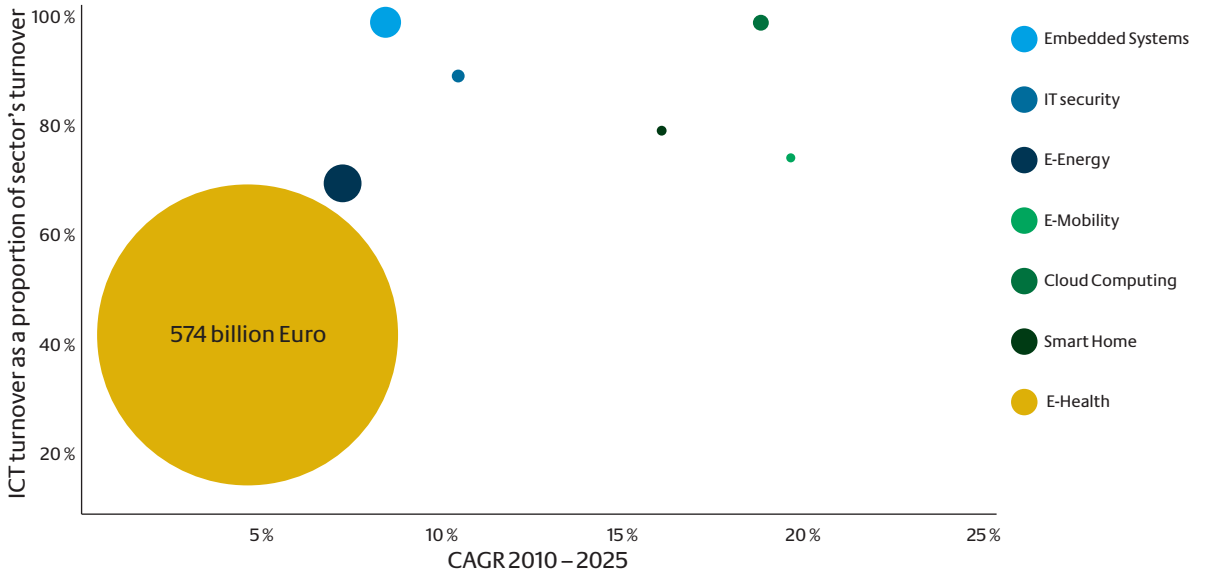
The Federal Ministry of Economics and Technology (BMWi) has launched the "Cloud Computing" action programme. The programme helps small and medium-sized users and providers offer Internet-based services and tap into promising business areas. Solutions for secure cloud computing are being developed and acceptance problems eliminated through the "Trusted Cloud" technology competition.

▸ **Embedded Systems:** The integration of ICT into products and services has become indispensable in many application industries. "Embedded ICT systems" are driving innovation, and are crucially important for Germany as a business location.

Turnover in Germany for embedded systems is estimated at 19 billion euros for 2011 (BITKOM). Annual growth of 8.5 per cent is predicted up to 2020, with turnover then reaching 42.4 billion euros and accounting for 15 per cent of all ICT turnover. According to ZVEI, the German electrical engineering and electronics industry association, the German market for embedded systems is the third-largest after the USA and Japan.

Providers of embedded systems in Germany employ 40,000 staff. Added to which are 250,000 employees in the application industries.

E-Mobility is the highest developing area with a compound annual growth rate (CAGR) of 20 percent



Source: TNS Infratest based on VDI / VDE Innovation + Technik GmbH: Technologische und wirtschaftliche Perspektiven Deutschlands durch die Konvergenz der elektronischen Medien, 2011; circle size corresponds with respective sector's turnover in 2025, in billion of euros

Fig. 1b: Fields of growth and industrial convergence until 2025

▸ **IT Security:** According to the findings of VDI / VDE Innovation und Technik GmbH, turnover in the German market for IT security will grow from 5.6 billion euros in 2010 by an annual 13.8 per cent to 10.7 billion euros by 2015, and by an annual 8.9 per cent to 25 billion euros by 2025. The share of turnover attributable to ICT applications will increase from 70 per cent in 2010, reaching 80 per cent in 2015, to 90 per cent in 2025, equivalent to 3.9 billion euros turnover in 2010, 8.6 billion euros in 2015 and 22.5 billion euros in 2025.

"Industrial convergence areas": In 15 years the turnover from E-Energy will triple, turnover from electric vehicles will increase fifteenfold, turnover from E-Health will double, while turnover in the smart home segment will rise ninefold.

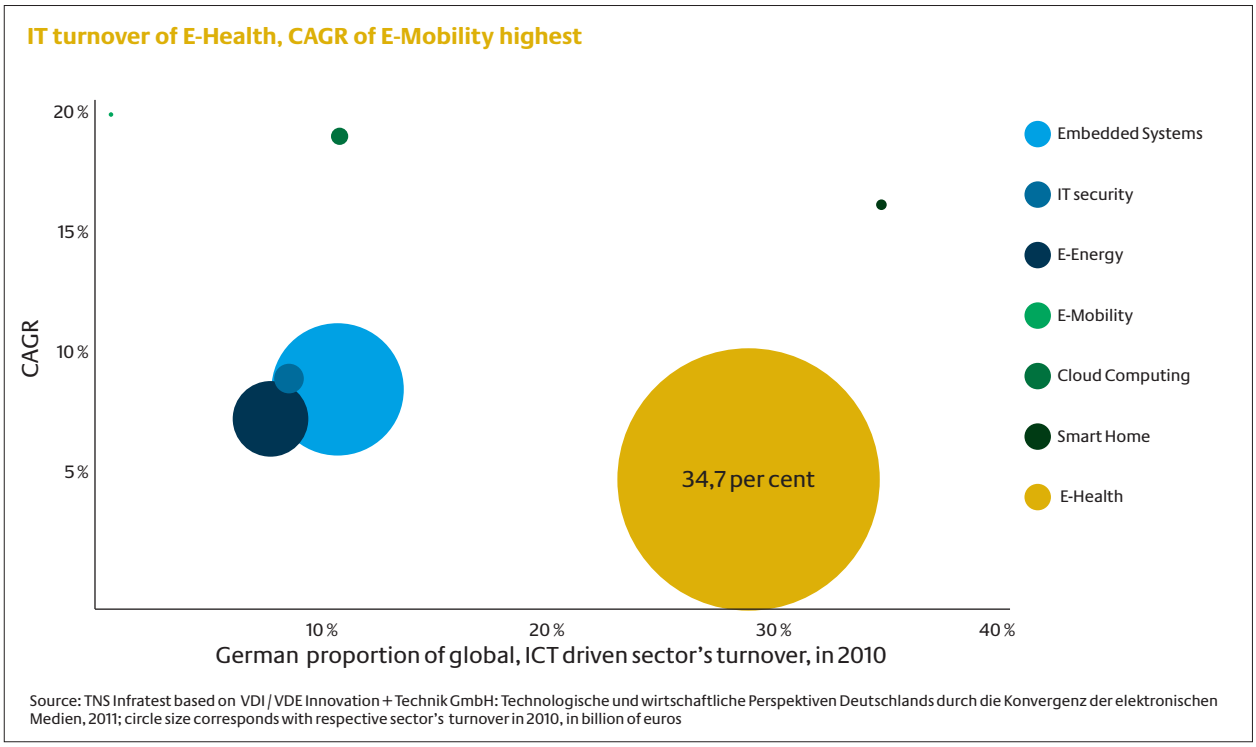
Software adds 'smart' functions to numerous technologies and enables industries to converge. The following sets out estimates of market potential for the key four ICT-based "industrial convergence areas": energy, transport and mobility, healthcare and environment, as well as life and home. Reference is made to the VDI / VDE study commissioned by the Federal Ministry of Economics and Technology (BMWi) "Germany's technological and economic prospects through the convergence of electronic media".

▸ **E-Energy:** Turnover in the German market for E-Energy will grow by six per cent annually from 25 billion euros in 2010 to 33.5 billion euros in 2015, and subsequently by eight per cent annually to 72.2 billion euros in 2025 – equivalent to turnover tripling in 15 years.

The share of turnover attributable to ICT applications of 40 per cent in 2010 will increase to over 50 per cent in 2015 and to 70 per cent in 2025, generating ten billion euros turnover for the ICT industry in 2010, 16.8 billion euros in 2015 and 50.5 billion euros in 2025.

▸ **E-Mobility:** Electromobility will facilitate environmentally friendly mobility like no other technology. It is very difficult at present to put an estimated figure on the market potential associated with a whole range of business options. However, a forecast for the submarket for electric vehicles in Germany between 2010 and 2025 has been put together.

According to this forecast, turnover in the German market for electric vehicles will rise by an



Source: TNS Infratest based on VDI / VDE Innovation + Technik GmbH: Technologische und wirtschaftliche Perspektiven Deutschlands durch die Konvergenz der elektronischen Medien, 2011; circle size corresponds with respective sector's turnover in 2010, in billion of euros

Fig. 1c: ICT turnover as a proportion of sector's turnover until 2025

annual 20.1 per cent from 1.2 billion euros in 2010 to three billion euros in 2015. Turnover will then increase by 19.6 per cent annually to 18 billion euros up to 2025 – effectively seeing turnover grow by a factor of 15.

The share of turnover attributable to ICT applications will increase from 50 per cent in 2010, reaching 60 per cent in 2015, to 75 per cent in 2025, i. e. 600 million euros in 2010, 1.8 billion euros in 2015 and 13.5 billion euros in 2025.

▸ **E-Health:** The German healthcare market generates turnover of 282 billion euros and constitutes the largest economy sector, accounting for 12.2 per cent of gross domestic product.

Turnover in the German healthcare market will grow by 5.2 per cent annually from 282 billion euros in 2010 to 364 billion euros in 2015, and subsequently by 4.6 per cent annually to 574 billion euros in 2025 – equivalent to turnover doubling within 15 years.

For the "Health and Life Style" submarket, turnover of 505 billion euros is forecast for 2025, compared with 69 billion euros for medical technology. As such, medical technology will increase its share of the healthcare market from just under eight per cent in 2010 to twelve per cent.

The share of turnover attributable to ICT applications will increase from 12.3 per cent in 2010, reaching 38.3 per cent in 2015, to 43 per cent in 2025, i.e. turnover totalling 253.8 billion euros in 2010, 327.8 billion euros in 2015 and 517.1 billion euros in 2025.

In the "Health and Life Style" submarket ICT accounts for ten per cent in 2010, 20 per cent in 2015 and 40 per cent in 2025, i.e. 26.0 billion euros in 2010, 66.4 billion euros in 2015 and 202.0 billion euros in 2025.

In the "medical technology" submarket ICT accounts for 40 per cent in 2010, 50 per cent in 2015 and 75 per cent in 2025, i. e. 8.8 billion euros in 2010, 16 billion euros in 2015 and 51.0 billion euros in 2025.

▸ **Smart Home:** Turnover in the German market for smart home will rise from two billion euros in 2010 by 2.8 per cent annually to 2.3 billion euros in 2015. Subsequently, the market volume is set to increase by 23.5 per cent annually to 19 billion euros in 2025.

The share of turnover attributable to ICT applications will increase from 70 per cent in 2010, reaching 75 per cent in 2015, to 80 per cent in 2025, i. e. ICT turnover of 1.4 billion euros in 2010, 1.7 billion euros in 2015 and 15.2 billion euros in 2025.

5. Research funding – an investment in the German ICT industry

State funding in strategic growth areas that are pivotal to application industries can provide a long-term boost to the performance of German R & D.

▸ In 2010 the German ICT industry obtained 30 ICT patents per one million inhabitants with the key indicator **"ICT patent applications"** – a total of 2,455 registrations. Germany retained its seventh place.

▸ Germany is ranked fifth in the international benchmark with a share of 3.85 per cent **ICT companies as a proportion of all companies** (with more than ten employees).

The number of company start-ups rose from 795,000 in 2008 to 936,000 in 2010 – an increase of 18 per cent in two years (KfW Start-up Monitor 2011). Some ten per cent, i. e. around 80,000 of the start-ups, are technology-based.

Experts recommend setting minimum quotas for funding initiatives aimed at small and medium-sized companies located in Germany.

6. Creation of trust in network and information security as a prerequisite for the evolvement of ICT potential

IDC has calculated on behalf of EMC year-on-year growth in data volume of 50 per cent to 1.2 zettabytes in 2010. Growing data volumes pose major challenges for copyright, data protection and networks.

▸ **Copyright:** The interests of originators, rights holders and users need to be reassessed in

light of the increasing usage of digital technologies when distributing content as images, sound and written material.

In 2010, 390 million euros were generated with downloads in Germany. 90 million files were transferred – an increase of 43 per cent. Turnover of 151 million euros was generated from audio files in 2010 – a third more than in the previous year.

- **Data protection:** The Federal Constitutional Court declared the private sphere and protection of personal data as basic rights. Data protection law needs updating in light of individuals voluntarily posting large amounts of personal data on social networks and a growing commercial interest in that data.

As part of the Federal Ministry of the Interior's "Red Line" legislative initiative the limits for using personal data are being defined and regulations set out irrespective of individual services and offerings. Germany's top data-protection tsar Peter Schaar criticised the lack of progress made with this initiative to date.

- **Network neutrality:** Network neutrality entails anti-discriminatory competition for data packets that is free from economic and political considerations in a bid to fully exploit available system bandwidth.

Network neutrality has recently been seen more emphatically as a legal, economic, but also socio-political problem. Particularly the huge increase in data volumes through innovative applications (e. g. streaming) calls for an expansion and / or better utilisation of existing infrastructure capacity.

7. Training and immigration policy to counteract structure-related skills shortage

Part of the existing skills shortage relates to the lack of upcoming talent. This situation jeopardises the innovative strength and performance of the German ICT industry. Greater endeavours need to be made to promote basic technical knowledge at schools and to re-orientate training and further education in the technical and natural science fields towards the requirements of businesses.

- **Training:** The "Global Information Technology Report 2010 - 2011" highlights a need to improve the quality of ICT training in Germany compared with the 14 ICT locations. Nonetheless, Germany managed to gain six places in the World Economic Forum's global ranking to come in 39th.

Germany secured its best ranking with an average score of 4.66 points on a scale from one (= worst) to seven (= best), trailing two points behind the top nation Singapore (score: 6.46 points).

- **Further education:** Further education costs in the ICT sector in Germany of 335 euros per day are higher than the 305 euros spent on further education in all sectors (source: DGFP Benchmark, 2010). However, the ICT sector invests more time in further education for its staff. Employees in the ICT industry receive an average of 4.5 days of further education a year. The overall economy spends just 2.5 days on further education per employee.

- **Skills shortage:** According to BITKOM, 843,000 persons were employed in the German ICT labour market in 2010 – a one-per cent year-on-year increase. Behind mechanical and plant engineering with a workforce of 911,000, the IT and telecom sector is the second largest employer in German industry. New skills jobs are being created, particularly through information and communication technology.

According to Fraunhofer ISI, the percentage of the ICT industry of all jobs will rise from 1.42 per cent in 2007 to 2.72 per cent in 2030. In the software and IT services segment, 452,000 jobs will be created by 2030.

The demographic shift has reached the labour market. According to figures from the Cologne Institute for Economic Research, the MINT segment has been hit hard by the skills shortage. In February 2011, there were 117,400 vacancies for skilled staff. The Federal Government predicts that the additional demand for skilled staff with MINT qualifications will increase to 1.8 million by 2020.

8. Eliminate barriers

Corporate use, private use and public authority use are analysed in detail below.

Corporate use

- **Purchases by companies via the Internet (E-Procurement).** In Germany the proportion of companies with ten or more staff that made purchases via the Internet fell by three percentage points. Germany fell from fourth to eighth place in the TNS benchmark by virtue of its 40 per cent E-Procurement usage. The world leader Norway obtained 57 per cent in 2010.

- **Internet use in companies.** Germany's performance dropped year-on-year by 0.02 points to 5.81 index points, falling one place in the rankings to eleventh. The world leader Sweden achieved an index value of 6.58, following an increase of 0.17 points.

Private use

- **Internet use in the population.** In Germany, Internet penetration increased by 2.6 percentage points to 81.9 per cent (ITU), enabling Germany to retain its eighth place at 88 index points. According to TNS Infratest (N)ONLINER Atlas, 3.3 per cent of German offliners are planning to use the Internet in 2012. Internet use in the population increased by 2.8 percentage points (ITU) in the 15 ICT locations. Internet use rose by 1.3 percentage points to 93.4 per cent with world leader Norway.

- **E-Commerce use.** In Germany, 75.5 per cent of surveyed Internet users confirmed making a purchase over the Internet at least once a month – three per cent more than in the previous year. At 84 index points Germany is ranked fourth in the TNS benchmark. For South Korea, the percentage figure of E-Commerce users of 89.5 per cent is the highest among the 15 benchmark countries. The same applies to its growth rate of 42 per cent.

- **Use of social networks.** 50.8 per cent of German Internet users participate in social networks, with the German index value rising by 13 points to 61 index points and seeing Germany ranked 13th in the TNS benchmark. India and China tied for first place at just under 83 per cent.

Use of public authority services

- **Quality of offered E-Government services.** The United Nations annually analyses government websites to establish whether certain services are available, their level of sophistication (from simple provision of information through to the complete processing of administrative processes), and an assessment of user-friendliness and accessibility. Germany came in 10th in the TNS benchmark with 83 index points, lagging 17 index points behind the leader South Korea with 100 points.

2.

Key findings: Expert workshop

II. Key findings: Expert workshop

Urgent need for action to promote the German ICT industry

At a workshop in November 2011, high-ranking ICT experts were asked to come up with recommendations that would help build on the strengths, eliminate the weaknesses, utilise the opportunities and minimise threats for the German ICT industry. The results are summarised in the following graphic and presentation of the discussion results.

The key findings set out below reflect the experts' opinions regarding which areas government should actively promote.

Expand existing location strengths

The German ICT industry maintains a global market share of over five per cent by turnover. The experts identified the following as outstanding strengths:

- Provision of industry-specific, customised enterprise solutions, especially through **innovative small and medium-sized ICT companies.** Highly complex ICT systems are being optimised while ensuring networkability, interoperability and connectivity, and tailored precisely to the customer's individual requirements.

- Usage and deployment of information and communication technology as **cross-functional technology**, especially as part of industry convergence. The classic industry boundaries are disappearing. Cross-industry forms of collaboration are increasingly being established. Small and medium-sized companies are also increasingly becoming an integral part of complex global value-creation networks. Industry and government need to pool their resources to cope with the **industrial structural revolution**. An important task is to utilise ICT to maintain the traditionally competitive German industrial sectors such as the automotive industry, mechanical engineering, energy, environment, healthcare and medical technology at the cutting edge of developments.

- **The leading international position of the German ICT industry with R & D** needs to be defended. This has been an important factor in Germany's ability to recover rapidly from the economic and financial crisis.

Elimination of weaknesses

Field of action "Skills development & training":

Structure training and immigration policy to combat skills shortage. Increase investment in education. Focus education policy initiatives on ICT.

- Experts believe one of the government's urgent tasks is to combat the structure-related **shortage of engineers and skilled staff**. This not only entails suitable training and further education initiatives, but also the controlled immigration of qualified staff from outside Germany without which the ICT location will not be able to survive. The location needs a "welcome culture".

- To structure the digital knowledge society, **education spending** needs to be increased to seven per cent of gross domestic product by 2015. The experts urge government to improve **media skills** within the population. Education policy initiatives need to be set up to teach basic ICT know-how.

Field of action "Applied R & D":

Introduce tax incentives to promote research. German companies to set international standards. Initiate funding programmes to convert innovations into marketable products.

- Germany should make **research expenditure tax-deductible** and focus on service / business model innovations. Greater incentives need to be attached to cooperation between companies and research.

- German companies should redouble their efforts to set **international standards**, and receive appropriate support from government. Whoever sets the standards, also determines the markets. Standardisation relates not only to setting technical standards but also to processes and workflows.

- The **invention / innovation gap** should be reduced, the conversion of research results into marketable products and services expedited. R & D projects should be supplemented with conversion aspects and an assessment of commercial market potential, and focus more closely on the requirements of prospective customers.

The German ICT industry on its way to becoming world-class

Field of action	Measures
EXPANSION OF EXISTING LOCATION STRENGTHS	
Location advantages	▸ Leverage strengths of the innovative small and medium-sized ICT companies ▸ Promote ICT as cross-functional technology in application industries ▸ Defend leading international position with R & D
ELIMINATION OF WEAKNESSES	
Skills development & training	▸ Eliminate ICT skills shortage ▸ Increase investment in education ▸ Improve media skills
Applied R & D	▸ Introduce fiscal incentives to promote research ▸ Provide assistance in setting (international) standards ▸ Close invention / innovation gap
Global player and entrepreneurship	▸ Develop companies with international standing ▸ Improve financing and provision of risk capital ▸ Promote internationalisation of innovative small and medium-sized ICT companies
MINIMISATION OF RISKS	
Trust and security in digital networks	▸ Amend data protection law ▸ Update copyright law
High dependence on the overall economy and state of the global economy	▸ Overcome euro crisis and global financial crisis
EXPLOITATION OF OPPORTUNITIES	
Digital infrastructures	▸ Implement German government's broadband strategy ▸ Provide planning reliability for high-speed networks ▸ Promote expansion of mobile broadband
Competitiveness	▸ Increase investment in R & D ▸ Focus research funding on ICT-based projects
Focus on promising growth areas	▸ Expand cross-industry growth areas ▸ Aim for world-class performance in industrial convergence areas

Summary of discussion results, TNS Infratest Business Intelligence, November 2011

Fig. 2a: Measures to bolster the German ICT industry according to the experts

Field of action "Global players and entrepreneurship":

Support innovative small and medium-sized ICT companies to move into international markets. Improve provision of risk capital.

▸ 97 per cent of German industrial companies are small and medium-sized companies. They tend to operate in German value chains. The industrial structural revolution demands **internationalisation of small and medium-sized companies** more than ever. The measures for promoting entrepreneurship and a start-up culture have proven ineffective in increasing the number of German global players. There is a lack of **funding options** for start-ups and tax incentives for the **provision of risk capital**. The "High-Tech Gründerfonds II" (seed capital fund) is to be regarded as ground-breaking.

3. Minimisation of risks

Field of action "Trust and security in digital networks":

Timely adjustment of the digital legal framework.

▸ Users must be able to carry out their transactions securely in the digital single market. **Data protection law** needs to be amended rapidly to reflect new developments. The protection of intellectual property will be compromised if the **copyright act** is not updated quickly. The government's task is to take clear decisions in relation to **network neutrality** to ensure this does happen.

Field of action "Heavy dependence on the overall economy and state of the global economy":

Stabilise development of the economic area in Europe.

▸ According to the experts, the ICT industry is heavily dependent on the overall economy and the state of the global economy, and especially on the **financial and euro crisis**.

4. Exploitation of opportunities

Field of action "Digital infrastructures":

Economic policy is network policy. Expand a high-performance network infrastructure as basis for local development.

▸ Experts believe one of the government's urgent tasks is to ensure internationally competitive infrastructures are put in place. Setting up a nationwide **broadband network** will require investment of at least 30 billion euros, but will create 250,000 new jobs industry-wide. Accordingly, implementation of the broadband strategy needs to be pushed ahead rapidly. High bandwidths, network stability and end-to-end network security must be ensured for B2B applications. Different tariffs need to be implemented to achieve this. The **creation of planning and legal certainty** is an urgent task for government. Government subsidies are required to expand the broadband network in rural areas. The experts predict that government will provide subsidies to expand **mobile broadband**.

Field of action "Competitiveness":

Increased investment in R & D. Funding of ICT-based R & D projects.

▸ Incentives should be created for the ICT industry to **boost investment in research and development. Public funding for research** should be expanded and refocused on ICT-based projects.

Field of action "Focus on promising growth areas":

Tailor-made funding programmes for cross-industry growth areas.

Government **funding of cross-industry growth areas** is seen as "very important". IT Security, Cloud Computing and Embedded Systems are very important for overall economic productivity growth and economic growth of the German ICT industry.

"ICT Security Made in Germany" should be used as the trademark of the German ICT industry. The experts urge government to strengthen the social acceptance of the issue of IT security by means of positive reporting among the general public. State and industry should increasingly invest in IT security.

The experts believe it is "very important" for government to support cloud computing. The required legal certainty with cloud computing can be leveraged as a competitive advantage. The "Trusted Cloud" technology programme is rated as ground-breaking.

The experts regard government funding of embedded systems as "very important". According to ZVEI, the German market for embedded systems is the third-largest after the USA and Japan.

Field of action "Focus on promising industrial convergence areas":

Promote new value-creation potential of all industrial convergence areas in the business web. Expedite growth with smart regulation.

The action programmes, initiatives, platforms, alliances, and round tables for information and knowledge sharing that have already been initiated in all **industrial convergence areas** are the right approach. The ICT technologies provide a substantial boost to growth in the industrial convergence areas: E-Energy, E-Mobility, smart home / smart building and E-Health.

The high pace of innovation in the industrial convergence areas and cross-industry growth areas calls for smart regulation. This may necessitate that legislation in these areas falls back on laying down guidelines and the specific provisions within these guidelines left to industry self-regulation.

At this juncture I would like to thank all the experts that have provided their input for the above findings.

Kind Regards

Dr. Sabine Graumann

Evaluation of cross-industry growth areas

Criteria	IT-Security			Embedded Systems			Cloud Computing		
	high	medium	low	high	medium	low	high	medium	low
Market relevance [1]		■		■				■	
Position of Germany in the international comparison [2]		■		■			■		
Compound annual growth potential [3]		■			■		■		

Source: TNS Infratest auf Basis von VDI / VDE Innovation + Technik GmbH: Technologische und wirtschaftliche Perspektiven Deutschlands durch die Konvergenz der elektronischen Medien, 2011
[1] Market relevance 2010: low < 1 bn €; medium 1,1 – 10 bn €; high > 10 bn €
[2] World market share: low < 5 %; medium 5 – 8 %; high > 10 %
[3] Compound annual growth potential: low < 5 %; medium 5,1 – 13 %; high > 13,1 %

Fig. 2b: Market relevance, global market share and growth potential in cross-industry areas by 2025

Evaluation of industrial convergence areas

Criteria	E-Energy			E-Health / Lifestyle			Electromobility / E-Mobility			Smart Home		
	high	medium	low	high	medium	low	high	medium	low	high	medium	low
Market relevance 2010 [1]	■			■					■			■
Position of Germany in the international comparison [2]		■		■					■	■		
Share of turnover attributable to ICT [3]		■				■		■		■		
Compound annual growth potential [4]		■				■	■			■		

Source: TNS Infratest auf Basis von VDI / VDE Innovation + Technik GmbH: Technologische und wirtschaftliche Perspektiven Deutschlands durch die Konvergenz der elektronischen Medien, 2011 und BITKOM 2010 / 2011
[1] Market relevance 2010: low < 1 bn €; medium 1,1 – 10 bn €; high > 10 bn €
[2] World market share: low < 5 %; medium 5 – 8 %; high > 10 %
[3] Share of turnover attributable to ICT: low < 40 %; medium 40 – 69 %; high > 69 %
[4] Compound annual growth potential: low < 5 %; medium 5,1 – 13 %; high > 13,1 %

Fig. 2c: Market relevance, global market shares, share and growth potential in industrial convergence areas by 2025

3.

Performance of the top ICT locations

3.1 The ICT location Germany in the international comparision

An international comparison of the German ICT industry

How competitive is the German ICT industry compared with its international rivals? How is the German ICT industry positioned in the global markets? What developments were apparent in the 15 top ICT nations in 2010? Are the conditions right and is there a cutting-edge infrastructure in the country for the German ICT industry to establish itself as world leader? To what extent are digital products and services used by companies, government agencies and private households?

The TNS benchmark, which is updated annually, answers these and other questions. The snapshot of the German and international ICT markets is put together by analysing the three categories "Market relevance", "Infrastructure" and "Applications".

No changes in the first four places in the overall ranking

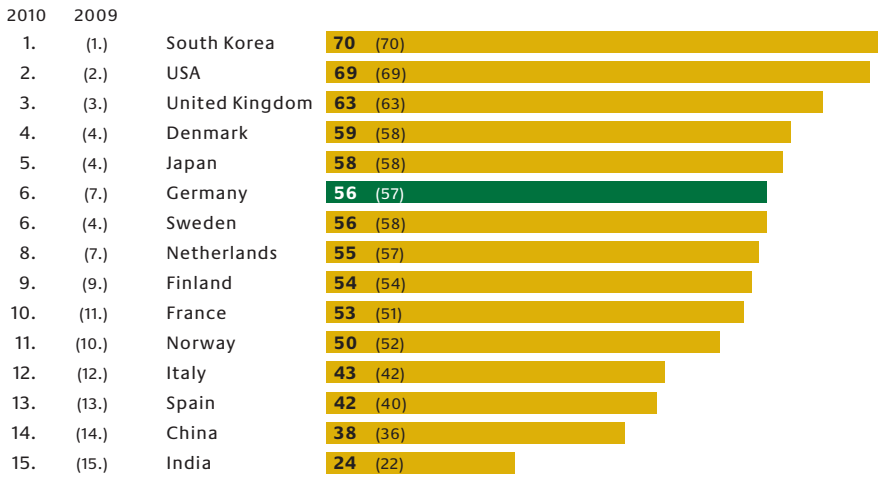
The world's top ICT nations have reasserted their position in the TNS benchmark. South Korea managed for the first time in 2009 to move past the USA to take the top spot in the ranking and defended this place in 2010. Performance remained stable at 70 points. The USA was ranked second with 69 points in 2010. Other studies too, such as "The World Competitiveness Scoreboard 2010" confirm that the East Asian countries are overtaking the USA.

The United Kingdom followed in third spot with 63 points, six points behind the USA in second place. Denmark followed in fourth place with 59 points.

Four of the monitored 15 countries saw their ranking fall. Japan, for instance, with 58 points and Sweden with 56 points fell from tied fourth place to fifth and sixth respectively. The Netherlands with 55 points fell from seventh to eighth place, while Norway with 50 points slipped down the rankings one place to eleventh.

In 2010 only two countries managed to improve their ranking, each moving up one place. Germany with 56 points moved up to sixth place, tying with Sweden. France was ranked tenth with 53 points, moving up two index points.

The position of Germany improved by one place to sixth in the TNS benchmark



Source: TNS Infratest (2011); Previous year's figures in brackets

Fig. 3.1a: TNS benchmark – average performance by country, 2010

Germany placed sixth in the overall ranking of the 15 ICT nations

The world leader South Korea also led the overall ranking in 2010 with 70 points. South Korea scooped first place on seven occasions in the 23 key indicators:

- Three times in the category "Market relevance": "ICT expenditure as a proportion of GDP", "Maturity of the telecommunications market" and "Internet advertising as a share of the advertising market".

- In the category "Infrastructure", South Korea was world leader in both "ICT companies as a proportion of all companies" and "Internet penetration in households".

- In the category "Applications", South Korea came in top slot with "E-Commerce users" and "Quality of offered E-Government services".

The USA came in second just behind South Korea with an unchanged 69 points. The USA took first place in "ICT turnover as a share of the global ICT market" and in "Internet host pene-tration" as the top ICT location in the TNS benchmark.

The United Kingdom came in third behind the USA, trailing by six index points. It took first place in "E-Commerce turnover per Internet user". The United Kingdom's performance has not changed compared with the previous year, scoring 63 index points.

Denmark moved up one point compared with the previous year, improving its performance to 59 index points. The country claimed first place in "Expenditure on ICT per capita", repeating its ranking from the previous year.

Fifth place went to Japan, with performance unchanged at 58 index points. Japan was ranked first in "Mobile Internet use in the population".

Germany and Sweden tied for sixth place in the ranking of the top 15 ICT locations, each gaining 56 index points. Although Germany's average performance slipped slightly by one point, Germany managed to improve its ranking from seventh to sixth – a result of Swedish performance falling by two points relative to the leader South Korea, thus forcing it two places down the ranking.

Germany failed to take the top slot in any of the 23 key indicators. Germany's best ranking was a third place in the key indicator "Internet advertising as a share of the advertising market". Repeating its ranking from last year, Sweden notched up two first places, namely with "ICT patent applications" and with "Internet use in companies".

France, Spain, emerging countries improved substantially

Country	2010 ranking	2009 ranking	Change in index
South Korea	1	1	±0
USA	2	2	±0
United Kingdom	3	3	±0
Denmark	4	4	+1
Japan	5	4	±0
Germany	**6**	**7**	**-1**
Sweden	6	4	-2
Netherlands	8	7	-2
Finland	9	9	±0
France	10	11	+2
Norway	11	10	-2
Italy	12	12	+1
Spain	13	13	+2
China	14	14	+2
India	15	15	+2

Source: TNS Infratest (2011)

Fig. 3.1b: TNS benchmark – ranking of ICT locations, 2009 / 2010

The Netherlands dropped two points to 55 index points, falling one place to eighth in the ranking of the top 15 ICT locations. However, the Netherlands took three first places in the category "Infrastructure", namely with the key indicators "Broadband connections in the population", "Computer penetration in households" and "SSL server penetration".

Finland held onto its ninth place in the overall ranking with an unchanged 54 index points, taking the top slot from Italy in 2010 with "Mobile phone penetration in the population".

France has improved substantially compared with the previous year. Thanks to an increase of two points to 53 index points, it moved up the overall ranking from eleventh to tenth place. This is particularly due to the substantial increase in ICT expenditure as a proportion of GDP, the relatively rapid expansion of the telecommunications infrastructure compared with other countries, and improvement with broadband penetration and computer penetration. Like Germany, the country failed to gain first place in any of the key indicators, however.

Compared with the previous year, Norway lost two points with a score of 50 index points – taking it one place down the ranking to eleventh. As with the previous year, the country took first place in the TNS benchmark with two key indicators from the category "Applications", namely with "Internet use in the population" and with "Purchases by companies via the Internet".

There were no changes in the bottom four places. Italy held onto twelfth place following an improvement of one index point to 43 points – essentially the result of higher ICT expenditure as a proportion of GDP. After Finland forced Italy into second place with "Mobile phone penetration in the population", Italy failed to gain first place in any of the key indicators.

Spain retained 13th place with 42 points despite improving its performance by two points. These improvements are attributable to increased ICT expenditure as a proportion of GDP and increased expenditure for online advertising and the greater use of social networks. Spain failed to gain a first place in any of the key indicators.

Despite each gaining two points, emerging economies China and India took the bottom two places in the ranking. China gained 38 and India 24 index points. India scored a higher index value in all three categories. China was ranked first in two key indicators – "ICT exports as a proportion of all exports" and "Use of social networks".

Bottom-placed India took first place in the key indicator "Growth in IT turnover" and tied for first place with China in "Use of social networks".

3.2 Germany's performance in the global benchmark

Germany ranked sixth among the top 15 ICT locations, in 2010. In the categories "Market relevance" and "Infrastructure" Germany improved by one place compared to the leading countries respectively. In both categories Germany ranks fifth. In the category "Applications" Germany fell four places from fourth to eighth. This was due to the loss of the leading position in the key indicator "E-Commerce use among Internet users" and the decrease in "Purchases by companies via the Internet" In these areas other benchmark countries grew at a faster pace than Germany compared to first-placed South Korea.

Germany's rankings were as follows:

- Third place: "Internet advertising as a share of the advertising market";
- Fourth place: "ICT turnover as a share of the global ICT market", "Mobile phone penetration in the population", "E-Commerce use among Internet users";
- Fifth place: "Maturity of the telecommunications market", "ICT companies as a proportion of all companies";
- Sixth place: "Broadband connections in the population"; "Computer penetration in households";
- Seventh place: "ICT patent applications", "Internet penetration in households", "Mobile Internet use in the population";
- Eighth place: "Growth in IT turnover", "Internet use in the population", "Purchases by companies via the Internet";
- Ninth place: "ICT exports as a proportion of all exports", "E-Commerce turnover", "Internet host penetration", "SSL server penetration";
- Tenth place: "ICT expenditure as a proportion of GDP", "Quality of offered E-Government services";
- Eleventh place: "Expenditure on ICT per capita", "Internet use in companies";
- 13th place: "Use of social networks".

Germany's performance deteriorated in ten key indicators and improved in eight key indicators

Germany ranks third once, fourth three times, fifth and sixth twice respectively, seventh and eighth three times respectively, ninth four times, tenth and eleventh twice respectively and 13th once.

Germany remained stable in five key indicators. In eight out of the 23 key indicators the German performance improved compared with the previous year, whereas it posted decreases in ten indicators.

Germany registered successes with **considerable improvements** of five index points and more in the following key indicators:

- "Use of social networks" rising 13 points, to 61 index points;
- "ICT expenditure as a proportion of GDP" rising seven points, to 49 index points;

Improvements of between one and four index points were registered in six key indicators:

- "Mobile Internet use in the population" rising four points, to 32 index points;
- "Internet penetration in households" rising three points, to 85 index points;
- "Maturity of the telecommunications market" rising three points, to 48 index points;
- "Internet use in the population" rising two points, to 88 index points;
- "Internet advertising as a share of the advertising market" rising one point, to 93 index points;
- "Broadband connections in the population" rising one point, to 83 index points.

"Germany is the fourth-largest nation in terms of ICT turnover in the TNS benchmark, but the German ICT market is growing slower than the world market. Even disregarding the backlog of the emerging markets in global growth, this finding could be considered to be alarming, because the current growth in the fast moving ICT world is an indicator of commitment to modernization and new technologies."

Anselm Speich,
Project Manager of Monitoring Report – Digital Germany,
TNS Infratest Forschung GmbH

Significant progresses in "ICT expenditure as a proportion of GDP" and "Use of social networks"

Fig. 3.2a: Performance of the German ICT economy, 2010

Germany's ICT performance remained **unchanged** in five key indicators:

- "Computer penetration in households" with 93 index points;
- "Quality of offered E-Government services" with 83 index points;
- "Expenditure on ICT per capita" with 60 index points;
- "ICT companies as a proportion of all companies" with 51 index points;
- "ICT turnover as a share of the global ICT market" with 18 index points.

Germany's performance deteriorated in ten key indicators. There were **dramatic losses** of nine index points and more in two key indicators from the category "Applications":

- "E-Commerce use among Internet users" dropping 16 points, to 84 index points – which also saw Germany lose its position as global leader in this key indicator;
- "Purchases by companies via the Internet" dropping nine points, to 70 index points;

Germany's performance showed a **significant deterioration** of between five and eight index points in three key indicators from the category "Infrastructure":

- "SSL server penetration" dropping seven points, to 38 index points;
- "Mobile phone penetration in the population" dropping six points, to 81 index points;
- "Internet host penetration" dropping five points, to 18 index points.

There were **minor deteriorations** of between one and four index points in five key indicators:

- "Growth in IT turnover" dropping four points, to 17 index points;
- "E-Commerce turnover" dropping three points, to 43 index points;
- "Internet use in companies" dropping two points, to 88 index points;
- "ICT exports as a proportion of all exports" dropping two points, to 23 index points;
- "ICT patent applications" dropping two points, to 19 index points.

4.
Country profiles of the 15 ICT locations

4.1 Country profile China

In 2010, China obtained 38 index points in the global benchmark and ranked 14th like in the previous year. The country came first in two key indicators: The "ICT exports as a proportion of all exports" and the "Use of social networks."

TNS benchmark "Market relevance" – 10th place →

In the category "Market relevance", China took 10th place in the TNS benchmark with 33 index points. As in 2009, the country was the global leader with "ICT exports". India took the lead from China with "Growth in IT turnover". Chinese performance with "E-Commerce turnover" and "ICT patent applications" is way below average, with a meagre one index point in each area.

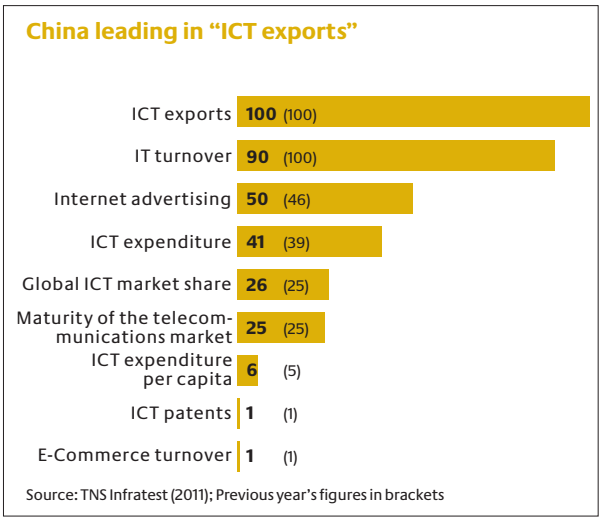


Abb. 4.1a: "Market relevance" China, 2010

TNS benchmark "Infrastructure" – 14 th place →

China obtained 32 index points in the category "Infrastructure", putting it 14th in the overall ranking. Its best ranking came courtesy of "ICT companies as a proportion of all companies" with 66 points – putting it in second place behind South Korea. Performance improved in three areas: "Broadband connections in the population" by four points, "Internet penetration in households" and "Mobile phone penetration in the population" by three points respectively. "SSL server penetration" obtained zero index points.

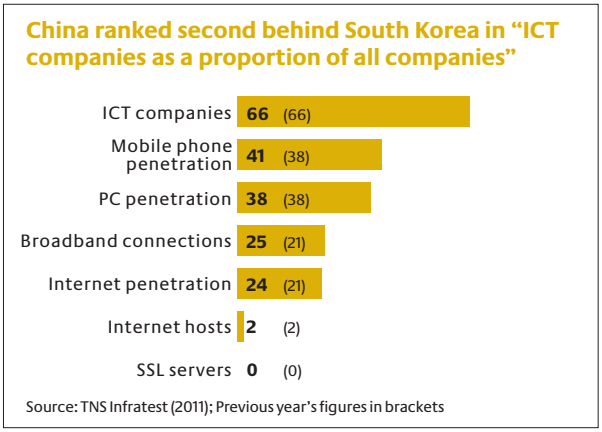


Abb. 4.1b: "Infrastructure" China, 2010

TNS benchmark "Applications" – 13th place ↑

In the category "Applications", Chinese performance moved up by eight to 55 index points, putting China in 13th place in the TNS benchmark. In "Use of social networks", China became – in a joint first place with India - world leader by obtaining 100 points, an increase of 32 compared with its 2009 performance. In "E-Commerce users" Chinese performance moved up by ten to 87 points and by eleven points in "Mobile Internet use". China managed to improve its performance in virtually all other key indicators.

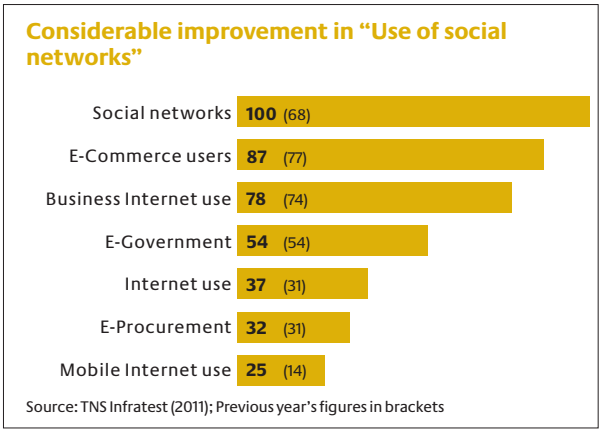


Abb. 4.1c: "Applications" China, 2010

4.2 Country profile Denmark

With 59 index points, Denmark took fourth place in the global ranking among the top 15 ICT nations. Denmark was the worldwide leader in one key indicator: the "Expenditure on ICT per capita."

TNS benchmark "Market relevance" – 9th place ↓

At 34 index points, Denmark lies towards the lower end of the mid-table in ninth place. Denmark took first place in "Expenditure on ICT per capita" in the ranking. While "ICT expenditure as a proportion of GDP" saw the greatest rise (up seven to 59 index points), performance dropped by 13 to 19 index points in "Growth in IT turnover". With an index value of two points "ICT turnover as a share of the global ICT market" is well below average.

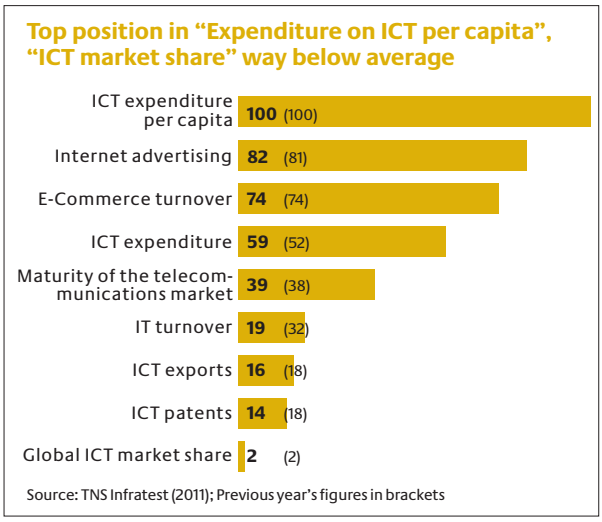


Abb. 4.2a: "Market relevance" Denmark, 2010

TNS benchmark "Infrastructure" – 1st place →

In the category "Infrastructure", Denmark defended its first place among the 15 ICT nations with 88 index points, ahead of Finland and the Netherlands (86 index points). Danish performance was above average in five out of seven key indicators. With broadband penetration (98 points), Denmark lost the top slot to the Netherlands. With "Mobile phone penetration" performance dropped by five index points and with "Internet host penetration" by six index points.

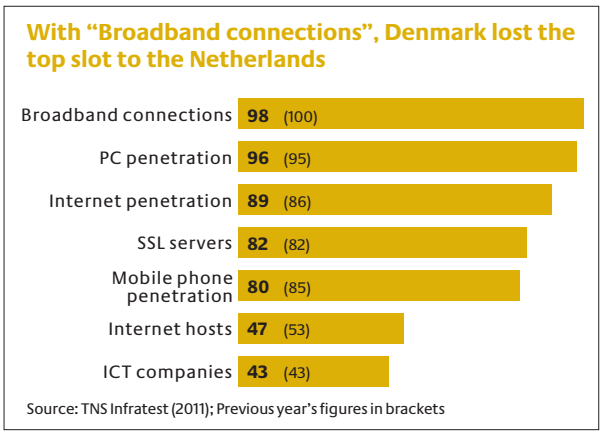


Abb. 4.2b: "Infrastructure" Denmark, 2010

TNS benchmark "Applications" – 4th place ↑

79 index points in the category "Applications" translated into fourth place in the TNS benchmark – an improvement of four ranking places. "Mobile Internet use in the population" rose by 44 to 53 index points – a particularly noteworthy result. This is the highest gain in index points across all the countries analysed by the TNS benchmark. Denmark lost top spot to China in "Use of social networks".

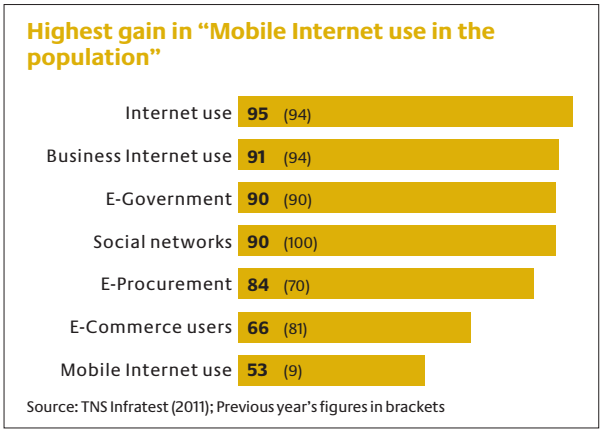


Abb. 4.2c: "Applications" Denmark, 2010

4.3 Country profile Finland

Finland positioned itself in ninth place in the overall benchmark of the 15 top ICT countries, with an index value of 54 points. Finland was the globally leading ICT location in one key indicator, the "Mobile phone penetration in the population."

TNS benchmark "Market relevance" – 7th place ↓

In the category "Market relevance" Finland fell by one place to seventh, obtaining an index value of 35 points. This result can be explained primarily by the loss of first place in "ICT patent applications" (minus 19 points to 81 index points), as well as through the loss of ten points to 54 index points in "E-Commerce turnover", and 17 points to 43 points in "ICT exports as a proportion of all exports".

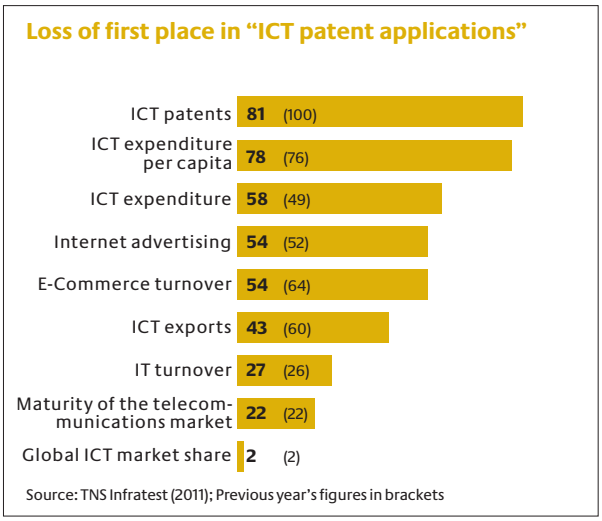


Abb. 4.3a: "Market relevance" Finland, 2010

TNS benchmark "Infrastructure" – 2nd place ↑

Scoring 86 index points, Finland tied for second place with the Netherlands in the category "Infrastructure". In 2010, Finland took first place in "Mobile phone penetration in the population". Finland also scored above-average values in all the indicators. Finnish performance dropped with "Internet host penetration" from 59 to 53 index points.

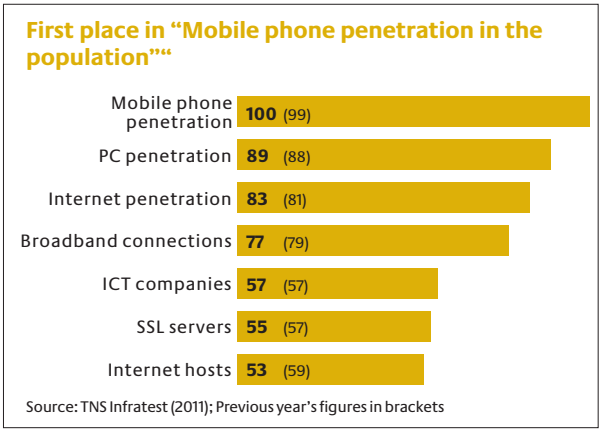


Abb. 4.3b: "Infrastructure" Finland, 2010

TNS benchmark "Applications" – 11th place →

Finland held onto the 11th place in the TNS benchmark with "Applications", scoring an unchanged 61 index points. While "Use of social networks" rose nine points to 50 index points and "Mobile Internet use in the population" likewise rose nine to 24 points, "E-Commerce users" dropped by twelve points to 46 index points.

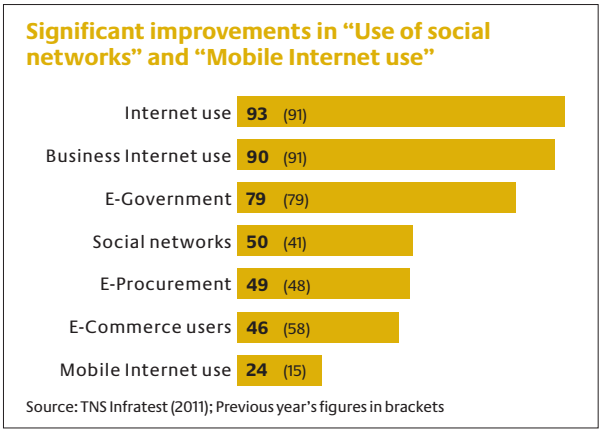


Abb. 4.3c: "Applications" Finland, 2010

4.4 Country profile France

France ranked tenth in the TNS benchmark, in 2010. With an index value of 53 points, the country saw a rise on the previous year by one rank and two index points. France improved by one rank in the categories "Market relevance", "Infrastructure" and "Applications" respectively. Nonetheless France could not achieve the top position in any of the key indicators.

TNS benchmark "Market relevance" – 7th place ↑

France scored 35 index points with "Market relevance", putting it in joint seventh place with Finland in the ranking. France rose by eight points to 53 index points in "ICT expenditure as a proportion of GDP" and by seven points to 51 index points and "Maturity of the telecommunications market". The French ICT industry performed less well in "E-Commerce turnover", falling six points to 57 index points, and in "ICT patent applications" dropping to 18 index points.

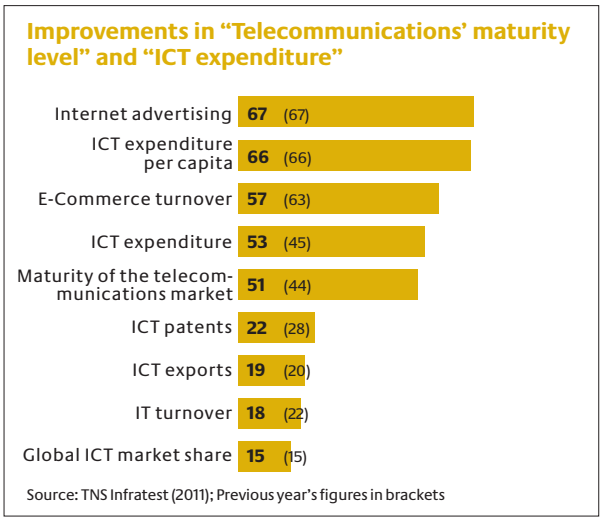


Abb. 4.4a: "Market relevance" France, 2010

TNS benchmark "Infrastructure" – 9th place ↑

France scored 74 index points in the category "Infrastructure", giving it ninth place in the benchmark of the 15 ICT nations – taking it one place up the ranking. France performed above average in "Broadband connections in the population", obtaining 89 index points. With "Internet penetration in households", the country moved up ten points to 76 index points, and seven points with "Computer penetration in households".

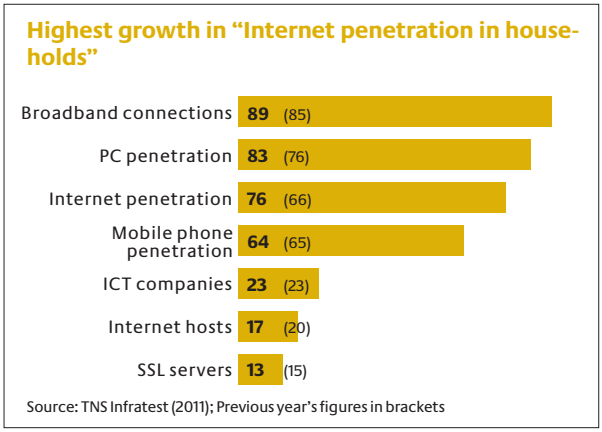


Abb. 4.4b: "Infrastructure" France, 2010

TNS benchmark "Applications" – 9th place ↑

With 66 index points, France gained two points, rising to ninth place. France managed to increase its ranking in four out of seven key indicators. This increase is particularly noticeable in "Use of social networks" with an increase of 19 points to 76 index points. "E-Commerce users" saw a drop of seven points to 72 index points and "Purchases by companies via the Internet" (E-Procurement) fell six points to 33 index points, in contrast to a rise of eight points to 86 index points in "Internet use in the population".

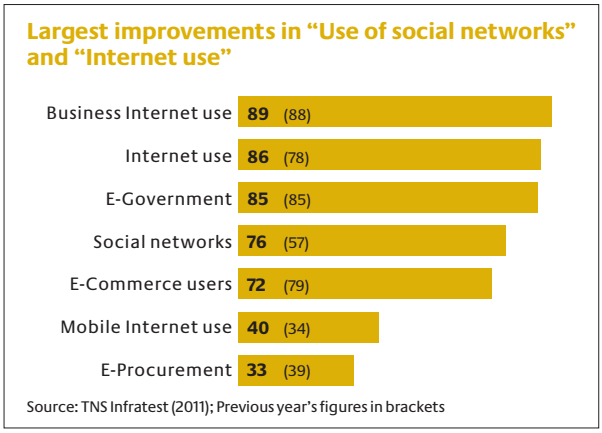


Abb. 4.4c: "Applications" France, 2010

4.5 Country profile Germany

Germany and Sweden were jointly ranked sixth among the top 15 ICT locations with 56 index points respectively. Germany managed to move up the ranking from seventh to sixth place. Germany failed to take a first or second place in any of the 23 indicators.

TNS benchmark "Market relevance" – 5th place ↑

Germany managed to move ahead of Finland and France to take fifth place in the category "Market relevance" with 36 index points. "ICT expenditure as a proportion of GDP" saw the largest improvement in performance, with the score rising seven to 49 index points. Performance dropped in four key indicators, rose in three key indicators, and remained static in two.

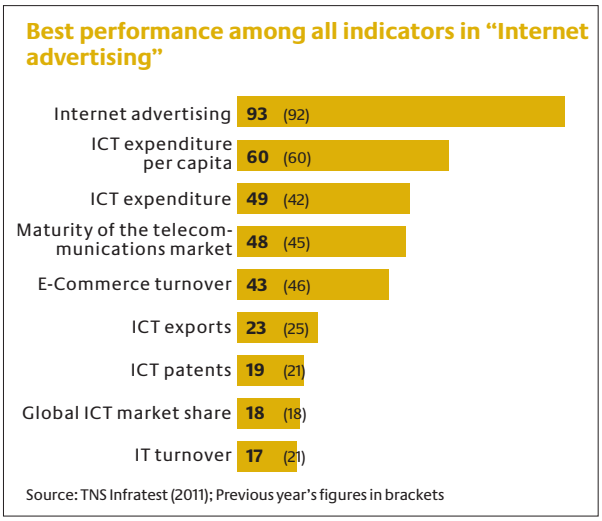


Abb. 4.5a: "Market relevance" Germany, 2010

TNS benchmark "Infrastructure" – 5th place →

Germany remained unchanged at 80 index points in the category "Infrastructure", tying with the United Kingdom and Norway for fifth place in the ranking. The German location managed to achieve above-average results in four key indicators: "Computer penetration in households" with 93 points, "Internet penetration in households" with 85 index points, "Broadband connections in the population" with 83 index points and "Mobile phone penetration in the population" with 81 index points. German performance dropped in three key indicators: falling seven to 38 points in "SSL server penetration", losing five to obtain 18 points in "Internet hosts" and dropping six to 81 in "Mobile phone penetration".

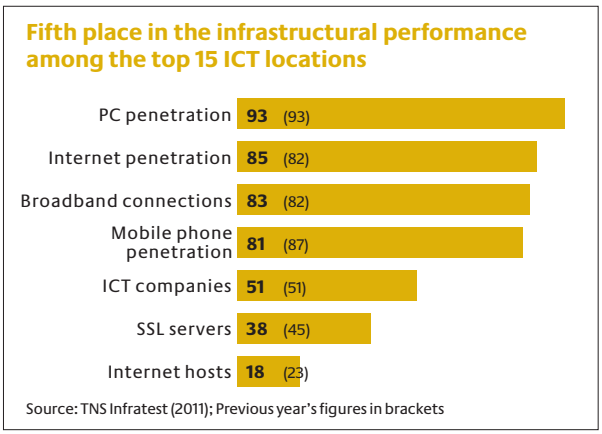


Abb. 4.5b: "Infrastructure" Germany, 2010

TNS benchmark "Applications" – 8th place ↓

In the category "Applications", Germany dropped three ranking places by losing three points, leaving it in eighth place. Reasons for this impaired ranking include a drop of 16 to 84 index points with performance in "E-Commerce users" and a drop of nine points to 70 index points in "Purchases by companies via the Internet" (E-Procurement). "Use of social networks" rose from 48 to 61 index points.

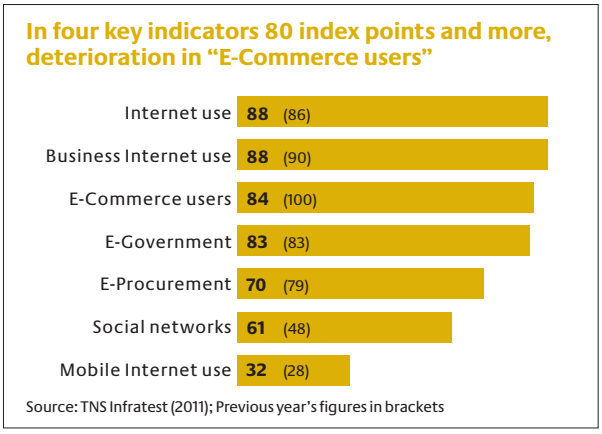


Abb. 4.5c: "Applications" Germany, 2010

4.6 Country profile India

India, again, came last in the TNS benchmark of the 15 top ICT nations. With an index value of 25 points the Indian ICT industry performed well below average, although the index value was improved by two points. India repeatedly held the top position in two key indicators: "Growth in IT turnover" and "Use of social networks."

TNS benchmark "Market relevance" – 14th place ↑

In the category "Market relevance", India's average performance is 21 index points – a gain of one ranking place, allowing the country to tie for 14th place with Italy. India is best-in-class with "Growth in IT turnover", managing to post a 24 index point increase in this key indicator. The values also rose by four and eight index points respectively with "ICT expenditure as a proportion of GDP" and "ICT exports as a proportion of all exports".

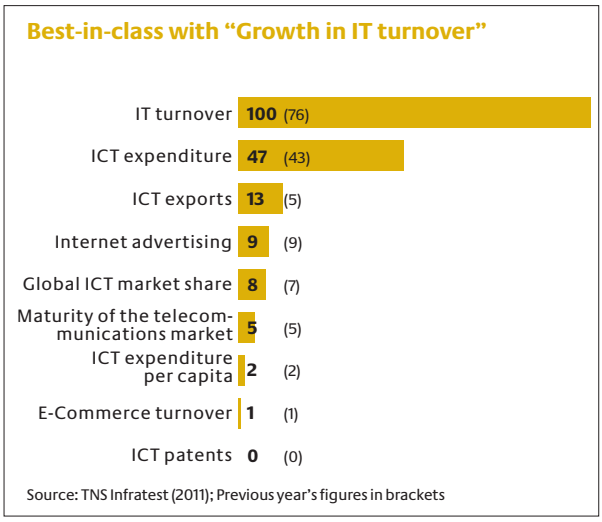


Abb. 4.6a: "Market relevance" India, 2010

TNS benchmark "Infrastructure" – 15th place →

With 18 index points in the category "Infrastructure", India is well behind all the other countries analysed by the TNS benchmark. India once again came in bottom of the ranking, lagging 14 points behind China, which took 14th place. "Internet host penetration" dropped slightly by one point. India posted the highest rise of nine points to 39 index points in "Mobile phone penetration in the population".

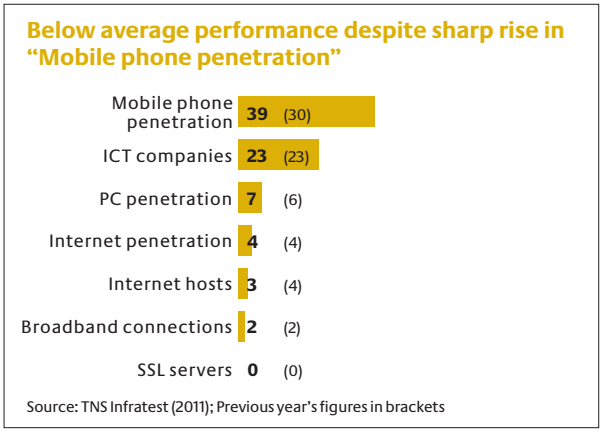


Abb. 4.6b: "Infrastructure" India, 2010

TNS benchmark "Applications" – 15th place →

With an index value of 37, India rose two points compared with the previous year. Nonetheless, the country still came in last place again. Indian performance is still well below the average of the 15 ICT nations. An above-average rise of 17 points was achieved in "Use of social networks". India was able for the first time to gain first place in this indicator, tied with China.

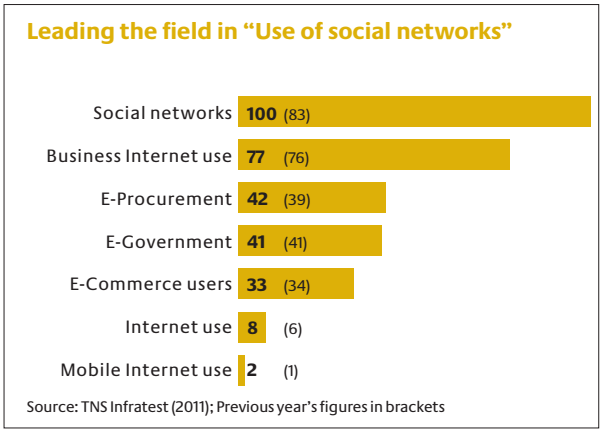


Abb. 4.6c: "Applications" India, 2010

4.7 Country profile Italy

Italy obtained 43 index points, ranking twelfth ahead of Spain and China, in 2010. The Italian ICT performance was below average. Having lost the global leadership in mobile phone penetration to Finland, Italy could not achieve the top position in any of the key indicators.

TNS benchmark "Market relevance" – 14th place →

Italy tied with India for penultimate place in the category "Market relevance" with an index value of 21. As such, Italy is well below the average of all the ICT nations analysed by the TNS benchmark of 36 index points. The sharpest drop was seen in "Growth in IT turnover", falling ten points to four index points. ICT expenditure rose by six points.

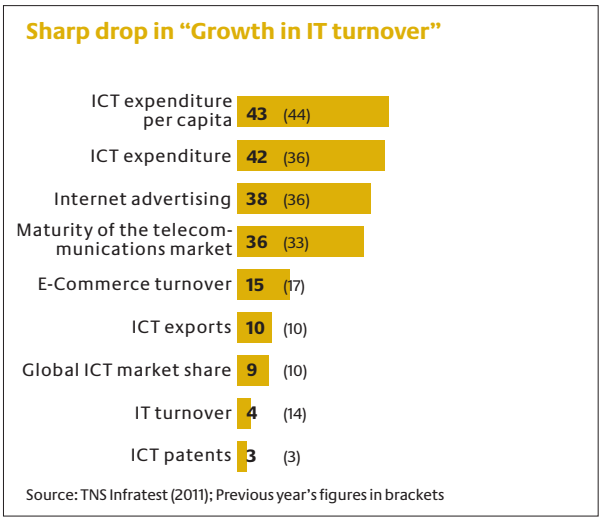


Abb. 4.7a: "Market relevance" Italy, 2010

TNS benchmark "Infrastructure" – 10th place ↓

Italy lost four index points in the category "Infrastructure", falling to tenth place in the 15 ICT locations. The country posted its highest loss of 13 points to 87 index points in "Mobile phone penetration in the population", knocking it off its first place. "Internet host penetration" also fell seven points to 40 index points.

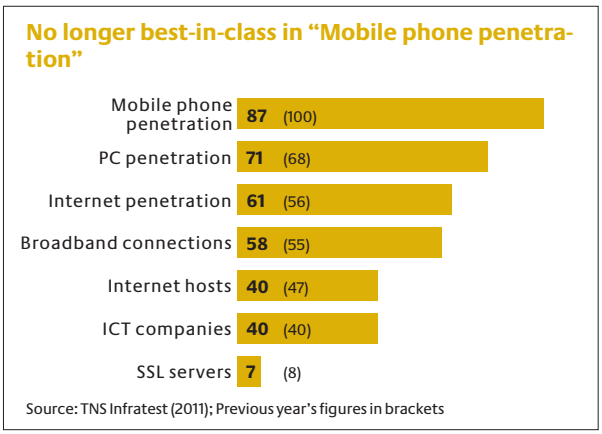


Abb. 4.7b: "Infrastructure" Italy, 2010

TNS benchmark "Applications" – 12th place →

In the category "Applications", Italy obtained 60 index points, taking twelfth place in the ranking. Although the index value rose by six points compared with 2009, the country did not manage to move up the ranking. All key indicators in the category improved; one remained static. Italy posted an increase of 31 points in "Use of social networks".

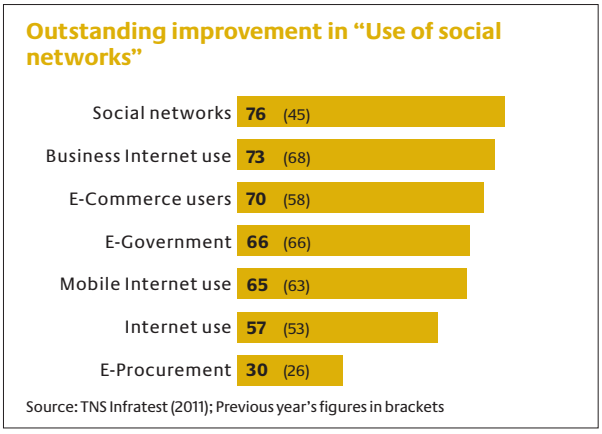


Abb. 4.7c: "Applications" Italy, 2010

4.8 Country profile Japan

Japan remained constant in the TNS benchmark at an average index value of 58 points, but dropped one rank to fifth place. The country was positioned just ahead of Germany and Sweden and behind Denmark. Japan came first in the key indicator "Mobile Internet use in the population."

TNS benchmark "Market relevance" – 4th place →

In the category "Market relevance", Japan obtained an index value of 42, giving it fourth place in the overall ranking. Even though Japan did not manage to secure first place in any key indicator, the index values of two key indicators are above Japanese overall average of 58 points. The rise with "Growth in IT turnover" from zero to 15 index points is noteworthy.

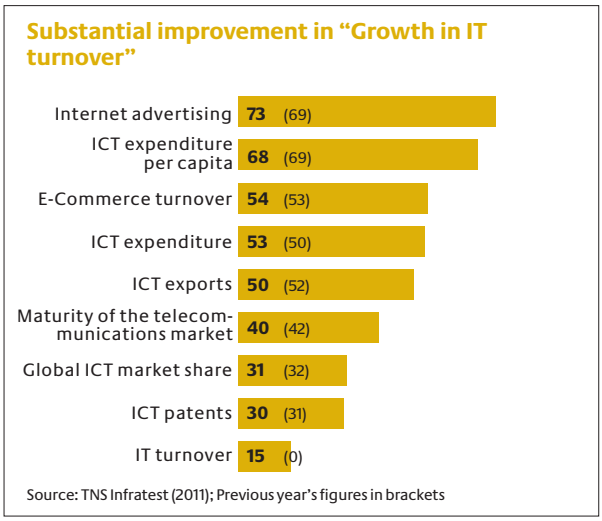


Abb. 4.8a: "Market relevance" Japan, 2010

TNS benchmark "Infrastructure" – 11th place ↑

Japan moved up the index two points to 66 index points, putting it in 11th place and moving past the USA. Nonetheless, Japan is below the average of 69 points of the 15 analysed countries. While Japanese performance remained static in three key indicators, and rose by two points in another, "SSL server penetration" fell by eight points to 29 index points. By contrast, "Broadband connections in the population" rose by four points to 71 index points.

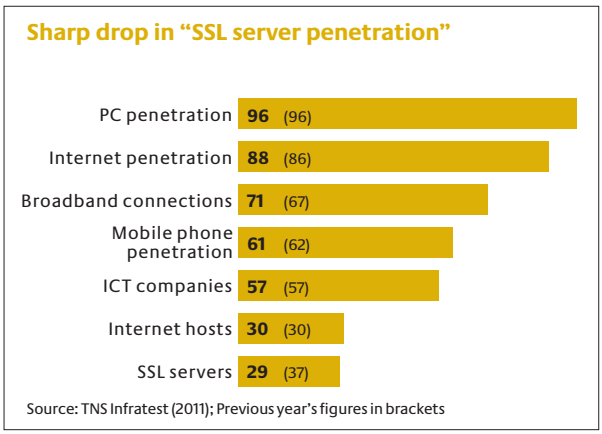


Abb. 4.8b: "Infrastructure" Japan, 2010

TNS benchmark "Applications" – 2nd place →

Japan did lose four index points and obtained 81 points, yet managed to hold onto second place, tying with the United Kingdom. Japan still needs ten index points if it is to keep up with first-placed South Korea. Japan also led the field with "Mobile Internet use in the population" in 2010. "E-Commerce users" dropped dramatically, with the country falling 25 points to 63 index points in this key indicator.

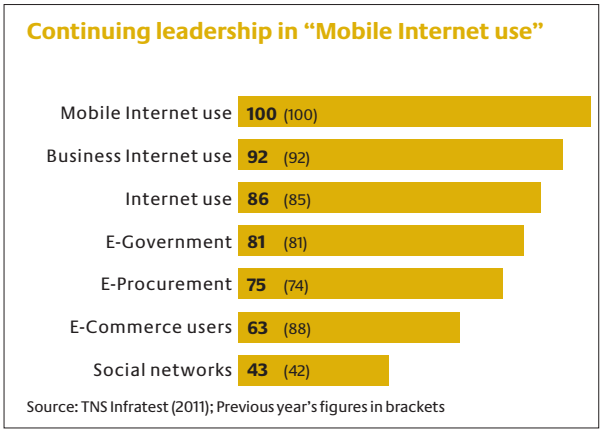


Abb. 4.8c: "Applications" Japan, 2010

4.9 Country profile Netherlands

With 55 index points, the ICT competitiveness of the Netherlands was higher than the global average of 53 points. Overall, the Netherlands ranked eighth in the TNS benchmark. The Netherlands was leading in three key indicators: "Computer penetration in households", "Broadband connections in the population" and "SSL server penetration."

TNS benchmark "Market relevance" – 10th place →

In the category "Market relevance", the Netherlands once again obtained an index value of 33, holding onto its 10th place. With "ICT patent applications", the index value fell sharply by 24 points to 44 index points. The country posted its worst values for "ICT turnover as a share of the global ICT market" with five index points and "Growth in IT turnover" with zero index points.

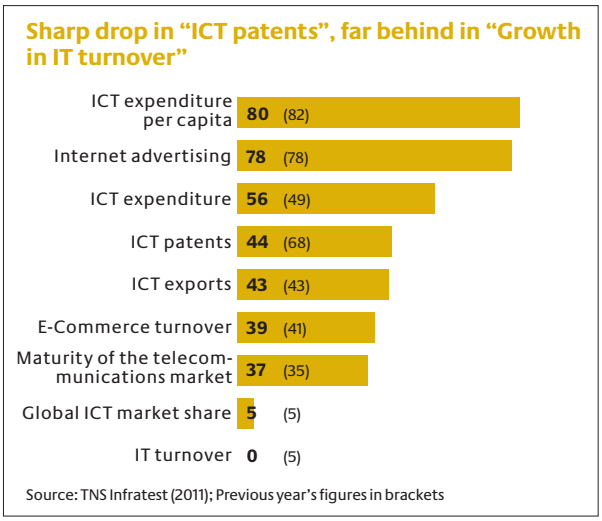


Abb. 4.9a: "Market relevance" Netherlands, 2010

TNS benchmark "Infrastructure" – 2nd place →

In the category "Infrastructure", the Netherlands tied with Finland in second place, having dropped four points to 86 index points. The country obtained first place in "Computer penetration in households", and also moved into the top spot with "Broadband connections in the population" and "SSL server penetration" in 2010. "Mobile phone penetration in the population" fell, by contrast, by 14 points to 88 index points because markets in other countries are still not saturated in this segment.

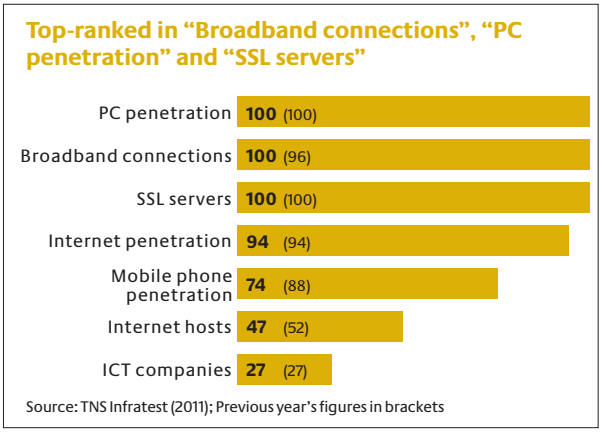


Abb. 4.9b: "Infrastructure" Netherlands, 2010

TNS benchmark "Applications" – 9th place →

In the category "Applications", the Netherlands achieved 66 index points and ninth place in the benchmark. In 2009 the figure was 70 index points. While "Internet use in the population" remained unchanged at 97 points, performance in four key indicators fell. The sharpest drops were in "Use of social networks by Internet users" (15 points to 62 index points) and with "Purchases by companies via the Internet" (E-Procurement) (twelve points to 56 index points).

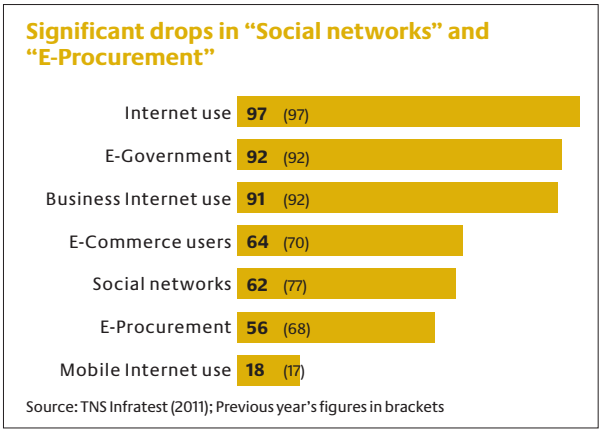


Abb. 4.9c: "Applications" Netherlands, 2010

4.10 Country profile Norway

With 50 index points Norway ranked eleventh in the TNS benchmark of the 15 ICT locations, and scored below average in the benchmark. The Norwegian ICT industry was leading in two key indicators. This was the case with the "Internet use in the population" and "Purchases by companies via the Internet."

TNS benchmark "Market relevance" – 13th place ↓

Norway's performance in the category "Market relevance" fell from 24 to 22 index points, causing it to lose one ranking place to take it down to 13th. With "Growth in IT turnover", Norway posted a dramatic drop of 28 points to eight index points. IT turnover grew at a slower pace than in other countries. With 97 index points Norway comes in just behind world leader Denmark with the key indicator "Expenditure on ICT per capita."

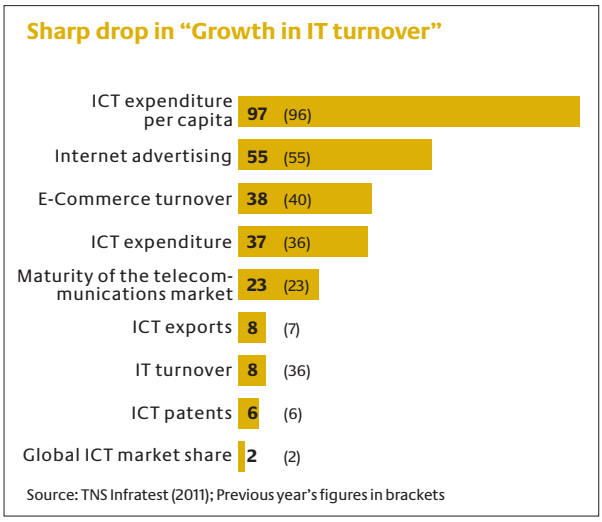


Abb. 4.10a: "Market relevance" Norway, 2010

TNS benchmark "Infrastructure" – 5th place →

Norway remained unchanged with 80 index points in the category "Infrastructure", taking fifth place in the ranking. Nonetheless, Norway's index score dropped two points. The index rose by two points to 99 index points in "Computer penetration in households". Only the Netherlands managed to outperform Norway. Performance fell by four points in two key indicators: "Internet host penetration" down to 41 index points and "Mobile phone penetration in the population" falling to 72 index points.

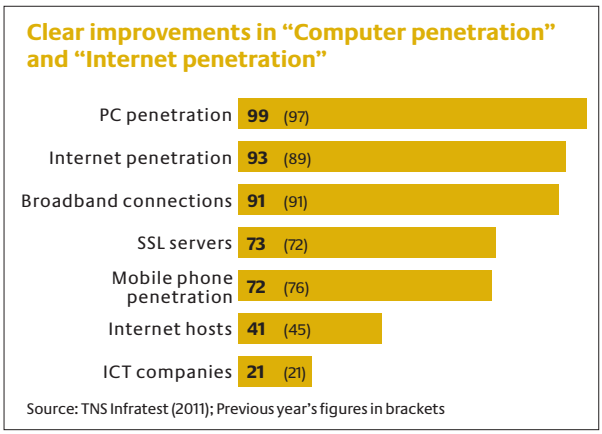


Abb. 4.10b: "Infrastructure" Norway, 2010

TNS benchmark "Applications" – 5th place ↓

76 index points gave Norway fifth place in the category "Applications", seeing it drop two places compared with the previous year. Norway remained world leader in "Internet use in the population" and in "Purchases by companies via the Internet" (E-Procurement). "Mobile Internet use" rose six points to 13 index points. Norway's performance saw its sharpest fall in "E-Commerce users", with a drop of eight index points.

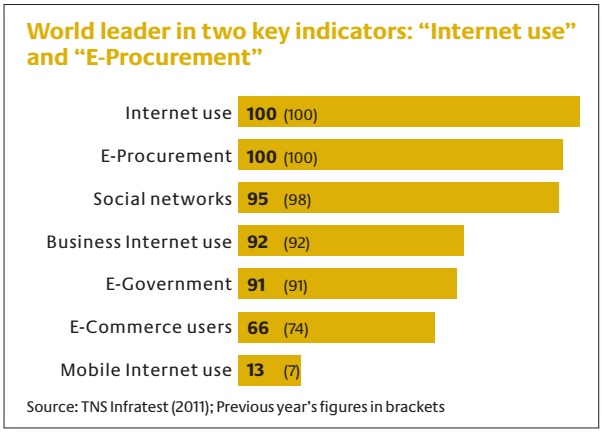


Abb. 4.10c: "Applications" Norway, 2010

4.11 Country profile South Korea

With an average performance of 70 index points, South Korea achieved the top spot in the country ranking. South Korea came first in seven key indicators: "Internet advertising as a share of the advertising market", "ICT expenditure as a proportion of GDP", "Maturity of the telecommunications market", "Internet penetration in households", "ICT companies as a proportion of all companies", "Quality of offered E-Government services" and "E-Commerce users."

TNS benchmark "Market relevance" – 2nd place →

In the category "Market relevance", South Korea obtained 54 index points, allowing it to remain on second place, behind the USA. South Korea managed to hold onto its first place in the ranking in three key indicators: "Internet advertising as a share of the advertising market", "ICT expenditure as a proportion of GDP" and "Maturity of the telecommunications market". South Korean performance fell dramatically by 19 points in "Growth in IT turnover" and "ICT exports as a proportion of all exports", dropping to 39 index points and 76 index points respectively.

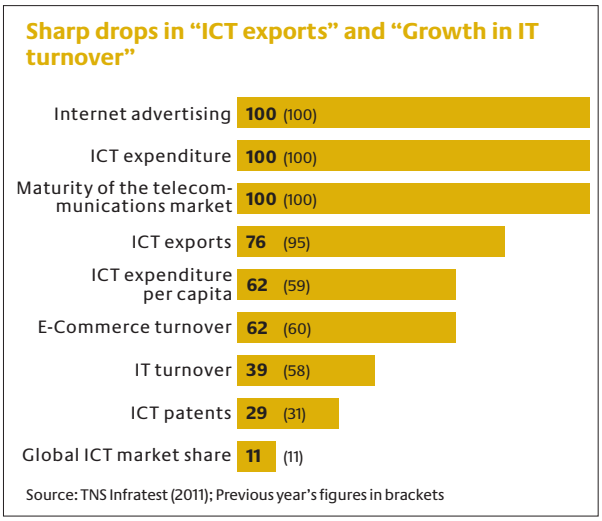


Abb. 4.11a: "Market relevance" South Korea, 2010

TNS benchmark "Infrastructure" – 4th place ↑

South Korea took fourth place in the ranking in the category "Infrastructure" with 81 index points. South Korea led the field in "Internet penetration in households" and "ICT companies as a proportion of all companies". Performance fell from 66 to 55 index points in "SSL server penetration". With zero points for "Internet host penetration", South Korea, repeating its score from the previous year, posted the lowest value of all the countries included in the TNS benchmark.

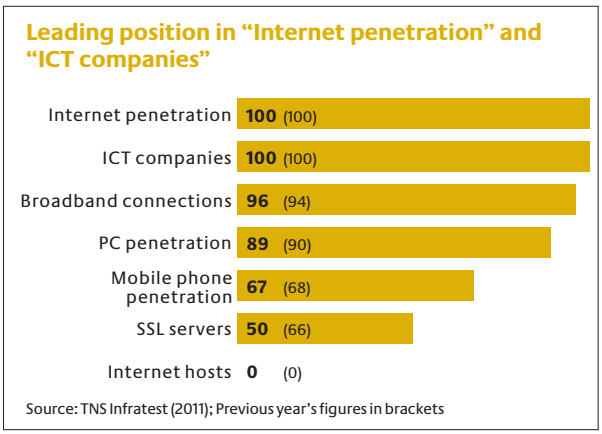


Abb. 4.11b: "Infrastructure" South Korea, 2010

TNS benchmark "Applications" – 1st place →

91 index points in the category "Applications" gave South Korea first place in the overall ranking. The United Kingdom obtained 81 index points to take second place. South Korean performance is well above the average in all key indicators. In addition to two first places in the ranking, South Korea substantially improved its performance in "E-Commerce users" by 14 points to take first place. "Use of social networks" increased by ten points to 70 index points.

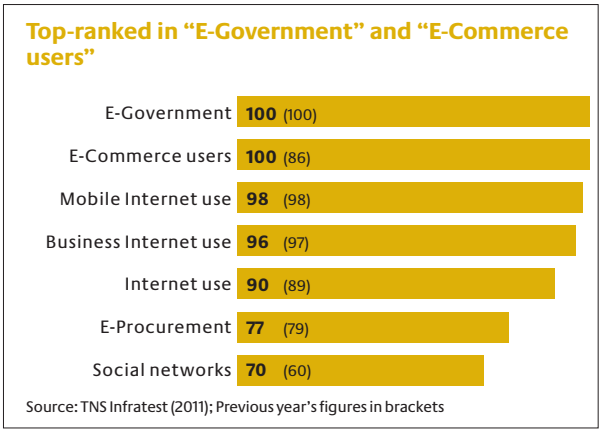


Abb.4.11c: "Applications" South Korea, 2010

4.12 Country profile Spain

The Spanish performance of 42 index points was well below the average compared to the other 14 ICT benchmark countries in the year 2010. Although Spain improved in some key indicators, it could not obtain a top position in any of them. Spain ranked 13th.

TNS benchmark "Market relevance" – 12th place ↑

Spain took 12th place in the overall ranking with 25 index points in the category "Market relevance" – a rise of one place and two index points. Nonetheless, Spain only performed well with "Internet advertising as a share of the advertising market", posting an increase of ten points to 70 index points. Spain comes in below the average in all other key indicators, even though ICT expenditure in particular managed to increase substantially.

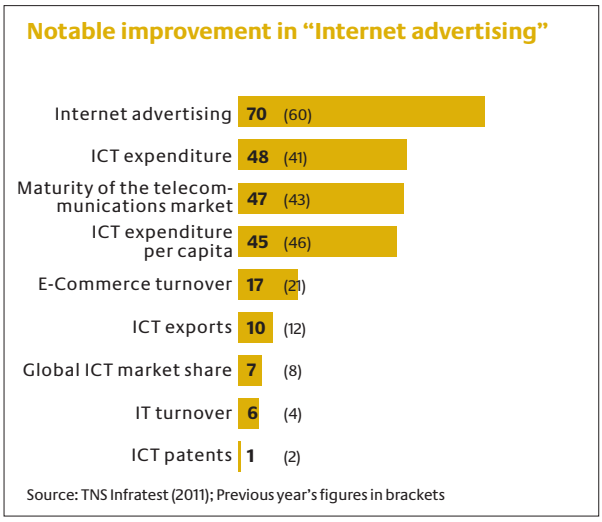


Abb. 4.12a: "Market relevance" Spain, 2010

TNS benchmark "Infrastructure" – 13th place →

In the category "Infrastructure", Spain achieved 62 index points, allowing it to retain 13th place. "Mobile phone penetration in the population" fell sharpest compared with the previous year, dropping six points to 71 index points. Spain posted its sharpest rise with "Internet penetration in households", moving up five to 61 index points.

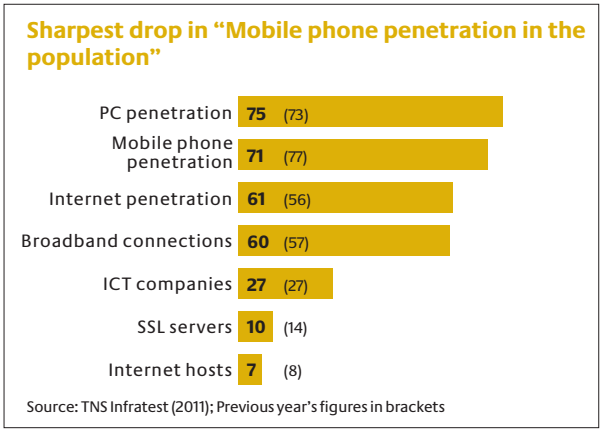


Abb. 4.12b: "Infrastructure" Spain, 2010

TNS benchmark "Applications" – 14th place ↓

Spain's performance was only good enough for 14th place despite an increase of four points to 54 index points in the category "Applications". In 2009, the country managed to gain 13th place. The clearest improvement in performance was seen in "Use of social networks", rising 20 points to 81 index points. Although Spain did not lose ground in any key indicator, it grew at a slower pace than the competition.

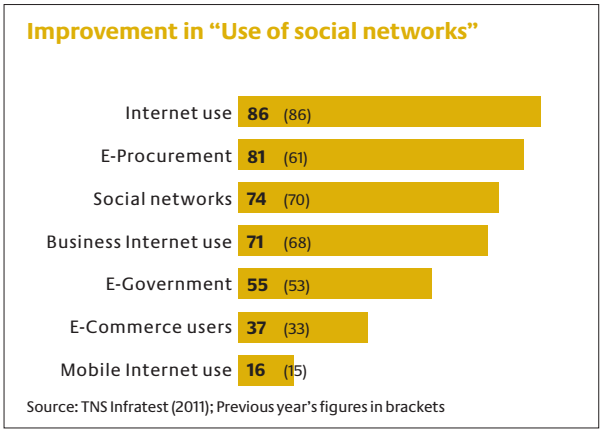


Abb. 4.12c: "Applications" Spain, 2010

4.13 Country profile Sweden

With 56 index points, Sweden, jointly with Germany, ranked sixth in the overall benchmark of the 15 ICT countries. This meant a decline from the previous year by two ranks. The country was leading in two key indicators: "ICT patent applications" and "Internet use in companies."

TNS benchmark "Market relevance" – 5th place →

Sweden's performance in the category "Market relevance" fell by one point to 36 index points, allowing it to hold onto fifth place in the overall ranking. Sweden also took first place this year with "ICT patent applications". Swedish performance fell dramatically by 19 points in the key indicator "Growth in IT turnover". No or only slight changes were seen with the other key indicators.

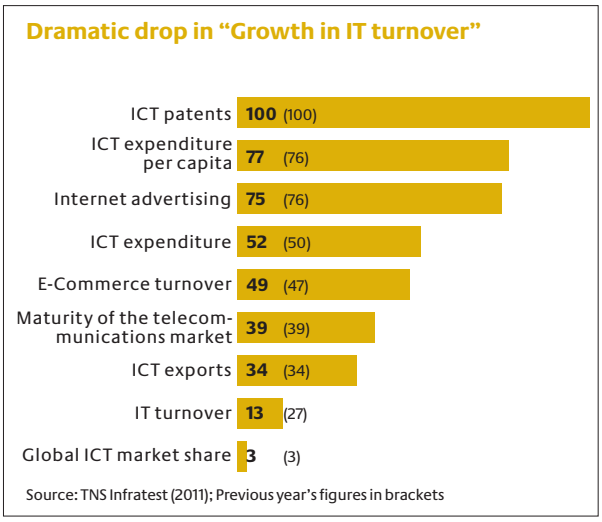


Abb. 4.13a: "Market relevance" Sweden, 2010

TNS benchmark "Infrastructure" – 8th place →

In the category "Infrastructure" Sweden obtained 77 index points, placing it in eighth spot. Swedish performance rose with "Computer penetration in households" and "Internet penetration in households" by one index point in each case. "SSL server penetration" saw the sharpest fall of five points to 56 index points.

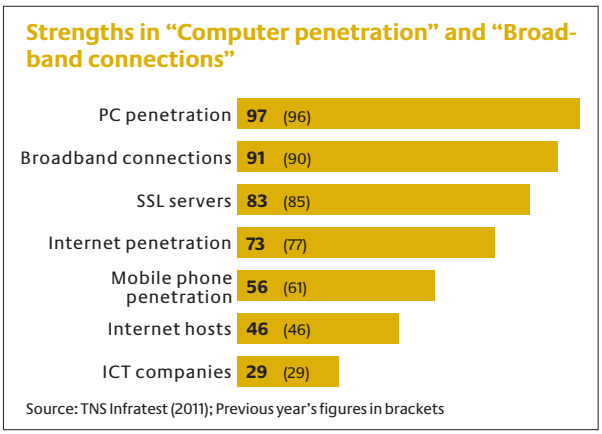


Abb. 4.13b: "Infrastructure" Sweden, 2010

TNS benchmark "Applications" – 5th place ↓

In the category "Applications", Sweden took fifth place in the overall ranking by turning in an above-average performance of 76 index points. With "Internet use in companies", for instance, Sweden managed to take first place. The index value for "Use of social networks" saw the sharpest rise of 14 points. The country dropped nine points to 66 index points in "E-Commerce users".

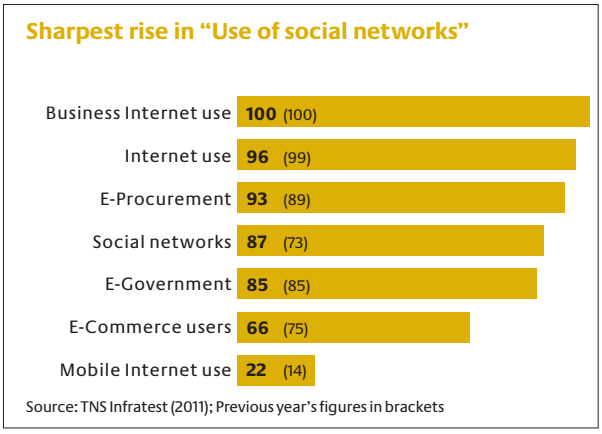


Abb. 4.13c: "Applications" Sweden, 2010

4.14 Country profile United Kingdom

With 63 index points, the UK remained stable in the third place of the TNS benchmark. The difference of six points to the second-placed United States did not change in 2010. The United Kingdom ranked first in one key indicator: the "E-commerce turnover."

TNS benchmark "Market relevance" – 3rd place →

The United Kingdom took third place in "Market relevance" by racking up an unchanged 46 index points. While performance with most key indicators flattened out, "Growth in IT turnover" fell sharply by 28 points to seven index points. The country rose seven points in "ICT expenditure as a proportion of GDP". The United Kingdom managed to add four points in "Maturity of the telecommunications market". This year too, the United Kingdom managed to take first place in "E-Commerce turnover".

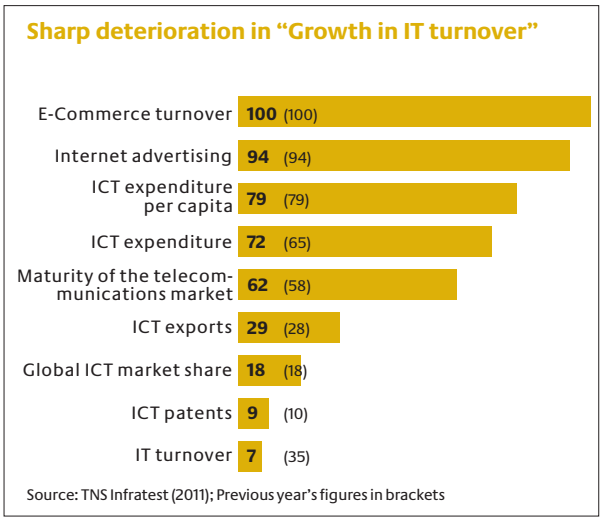


Abb. 4.14a: "Market relevance" United Kingdom, 2010

TNS benchmark "Infrastructure" – 5th place ↓

With 80 index points in the category "Infrastructure", the United Kingdom tied for fifth place with Germany – a drop of three points and one ranking place. This drop can be explained by the worse British performance with "SSL server penetration". The performance of the country fell in this key indicator by 14 points to 61 index points.

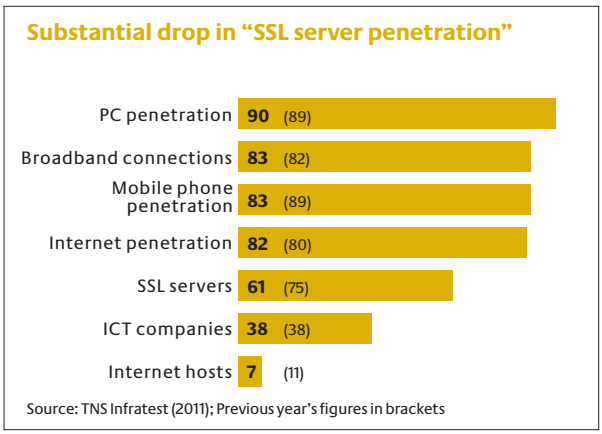


Abb. 4.14b: "Infrastructure" United Kingdom, 2010

TNS benchmark "Applications" – 2nd place ↑

The picture is however totally different in the category "Applications". The index value rose in this area by six to 81 points, enabling the United Kingdom to tie for second place with Japan, and improving its performance by three ranking places. Although Great Britain did not manage to gain a first place in "Applications", the country achieved good above-average values in all key indicators. The increases of 25 points to 79 index points in "Purchases by companies via the Internet" (E-Procurement) and of eleven points in "Use of social networks" to 84 points were significant.

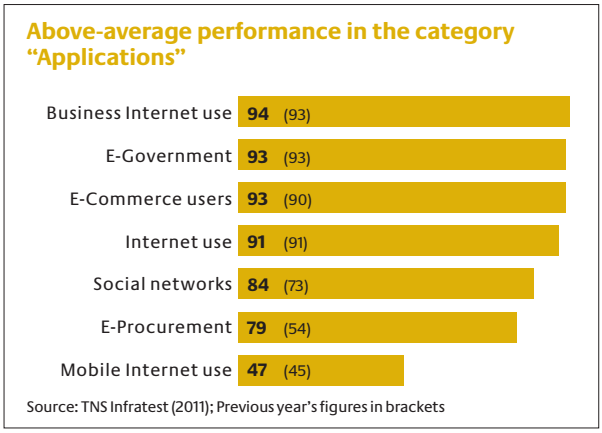


Abb. 4.14c: "Applications" United Kingdom, 2010

4.15 Country profile USA

The USA remained unchanged in the TNS benchmark at an average performance of 69 index points. Behind South Korea the USA was ranked second. The difference to the world market leader amounted to one index point. The USA came first in two key indicators: the "ICT turnover as a share of the global ICT market" and the "Internet host penetration".

TNS benchmark "Market relevance" – 1st place →

In the category "Market relevance", the USA managed to defend its first place vis-à-vis South Korea with an index value of 69 points. The USA managed to hold onto its first place in "ICT turnover as a share of the global ICT market". "ICT expenditure as a proportion of GDP" saw the sharpest rise, moving up seven points to 63 index points. The sharpest drop was seen with "Growth in IT turnover", falling five points to 27 index points.

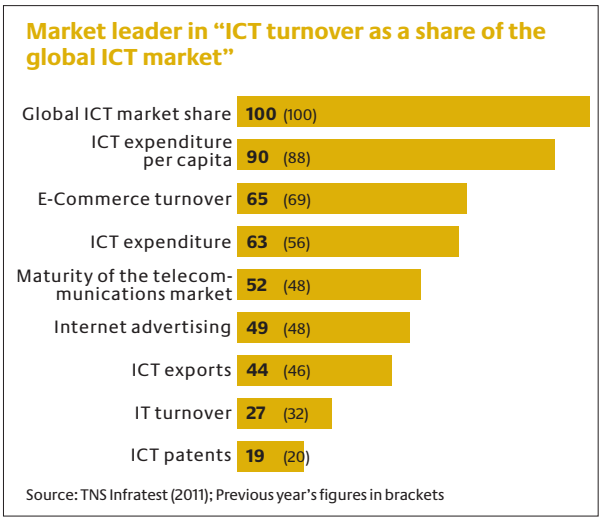


Abb. 4.15a: "Market relevance" USA, 2010

TNS benchmark "Infrastructure" – 12th place ↓

64 index points in the category "Infrastructure" gave the USA twelfth place in the overall ranking – a drop of three index points and one ranking place. Adding to its top slot in 2009, the USA took first place with "Internet host penetration". US performance dropped by 24 points to 63 index points in "SSL server penetration".

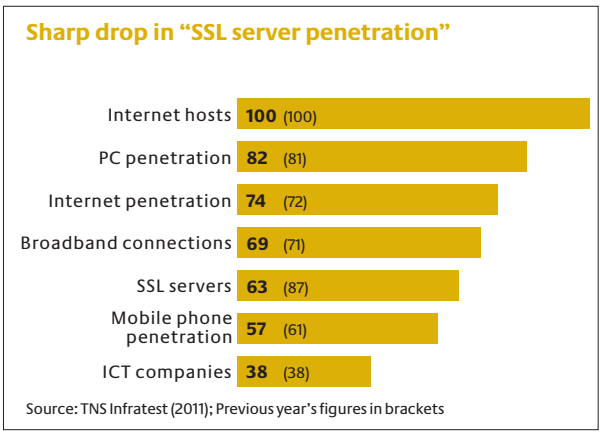


Abb. 4.15b: "Infrastructure" USA, 2010

TNS benchmark "Applications" – 7th place →

With an index value of 75 points, the USA held onto seventh place in the country ranking, just behind Sweden and Denmark, despite managing to improve performance by two index points compared with the previous year. For instance, the USA saw its sharpest increase in the key indicator "Use of social networks", managing to move up 18 points to 81 index points. The USA lost first place to Norway in "Purchases by companies via the Internet" (E-Procurement) and "Internet use in companies".

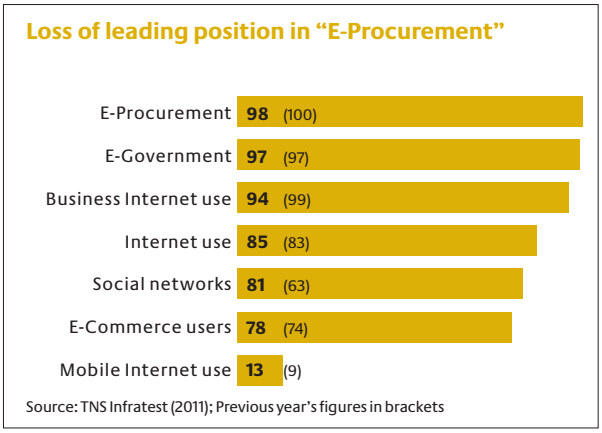


Abb. 4.15c: "Applications" USA, 2010

5.
Methodology

5. Methodology

The "International Comparison of the Status and Prospects of the German Information and Communication Industry 2009 - 2011", commissioned by the Federal Ministry of Economics and Technology, builds on the TNS Infratest reports produced since 2000 as part of the "Monitoring the Information and Communication Industry" project. It enables companies, economic policy and science to draw on figures and analyses relating to the German ICT industry that provide a longer-term comparison. The "Monitoring Report – Digital Germany 2011" uses a consistent approach to provide a global benchmark comparison of the German ICT industry with the 14 leading ICT countries for 2010.

1. Quantitative report

The "Monitoring Report – Digital Germany" analyses the performance of the German ICT industry and compares it with Germany's main competitive countries in Europe and Asia and with the USA.

In order to calculate the performance of all 15 countries in a comparable manner, "key indicators" were used to position Germany in relation to the 14 most important ICT countries in a quantified "status report".

Selection of countries

Countries were selected on the basis of a survey of experts conducted by TNS Infratest in October 2008 (cf. 4th ePerformance Report 2008, pages 41 - 46). In response to the question "From which countries / regions will German ICT face the greatest competition in the next few years to the end of 2013?" the following countries were regarded as being by far the most important ICT nations, and were therefore selected for the benchmark.

- The USA, which was in pole position in the TNS benchmark of the top 15 ICT nations until 2008.

- In addition to the five European countries with the largest populations (Germany, the United Kingdom, France, Spain and Italy), Norway, Denmark, Sweden, Finland and the Netherlands were included in the TNS benchmark as the leading European ICT locations.

- The ICT developments in Japan, South Korea, China and India were chosen to represent the Asia-Pacific region.

Selection and type of indicators

Agreement on the key indicators to be used in the benchmark was reached at an expert workshop. A total of 23 key indicators was identified.

The criteria used in selecting them were relevance, validity and coverage of the problem areas selected, together with the regional and temporal comparability of data. The requirements for high validity and availability of data, which were to some extent contradictory, had to be balanced against one another when making the decisions.

"Key indicators" are indicators for which directly comparable data are available for all 15 of the selected benchmark countries for the relevant period. Those 23 key indicators were classified into three categories: "Market relevance", "Infrastructure" and "Applications".

Categories "Market relevance", "Infrastructure" and "Applications"

The positioning and assessment of the ICT markets were performed using the three categories "Market relevance", "Infrastructure" and "Applications".

The performance of the 15 leading ICT nations in the category "Market relevance" was measured in a global comparison on the basis of nine key indicators. The performance in the categories "Infrastructure" and "Applications" was measured on the basis of seven key indicators respectively (see Fig. 5a).

Sources

As far as possible the calculation of the key indicators was based on a single source in order to ensure a uniform methodology and data consistency. Any discrepancy between the source-material used is indicated in the respective chapters.

2. Calculation of benchmarks

Indexing of individual indicators – evaluation methodology

A quantitative global comparison of the performance of the German information and communication industry is carried out for all 23 key indicators.

To enable comparison of data from a wide variety of sources measured in different units, index values were calculated for each of the key indicators. In each case the current performance of the "best-in-class country" formed the yardstick for comparison, and was given the maximum index value of 100. The other countries included in the comparison obtained index values of less than 100 according to the gap between them and the global leader. The benchmark of key indicators always includes a comparison with the previous year, so that developments in performance can be assessed in an historical comparison.

There are no previous year's figures available for the key indicators "ICT companies as a proportion of all companies" and "Quality of offered E-Government services".

In the "Monitoring Report – Digital Germany 2010" some of the previous year's figures were adjusted in order to ensure comparability with the key indicators included in the 2011 wave.

Indexing on the level of

- **"ICT performance of countries" and**
- **"ICT performance of categories"**

A procedure was developed allowing a country benchmark to be carried out for regions on the basis of clearly describable mean index values. Mean values were calculated for the 23 key indicators. This is possible because annual data would be available for the entire duration of the research project for all the ICT nations included in the benchmark.

Category I "Market relevance"		Category II "Infrastructure"		Category III "Applications"	
Key indicator	**Source**	**Key indicator**	**Source**	**Key indicator**	**Source**
ICT turnover as a share of the global ICT market	EITO, Korea Association for ICT Promotion	ICT companies as a proportion of all companies	D & B	Internet use in the population	ITU
ICT exports as a proportion of all exports	World Bank	Broadband connections in the population	ITU	Mobile Internet use in the population	PwC
ICT expenditure as a proportion of GDP	EITO, IMF, KISDI	Computer penetration in households	ITU	Use of social networks	Universal McCann, Statistics Finland
Expenditure on ICT per capita	EITO, IMF, Korea Association for ICT Promotion	Internet penetration in households	ITU	E-Commerce use among Internet users	TNS
Growth in IT turnover	EITO, KISDI	Internet hosts penetration	CIA, ITU	Purchases by companies via the Internet	Eurostat
ICT patent applications	EPO	SSL server penetration	World Bank	Internet use in companies	WEF
Maturity of the telecommunications market	ITU, EITO	Mobile phone penetration in the population	ITU	Quality of offered E-Government services	UN
Internet advertising as a share of the advertising market	PwC				
E-Commerce turnover	Euromonitor International				

Fig. 5a: Overview "key indicators"

As the values for the key indicators are standardized by the indexing performed (index of best in-class country in the benchmark = 100 index points), and as they are cardinal in nature (index 50 is half as good as index 100), they can be aggregated as weighted mean values. In this way an index can be calculated for the overall performance of an industry in the ICT sector. Mean values were also calculated for the categories "Market relevance", "Infrastructure" and "Applications".

When aggregating the 23 key indicators to produce a national average or index for a category, weightings were applied to reflect the relative importance of the individual key indicators.

One major advantage of the system developed is that it is possible to incorporate or remove additional key indicators as required without compromising temporal comparability.

3. Workshop "ICT location Germany – Assessing and Focusing", 3 November 2011, Berlin

The objectives of the workshop consisted of four steps:

1. Verifying the benchmark results of the "Monitoring Report – Digital Germany 2011";

2. Identifying fields of action and measures on the basis of the benchmark results;

3. Identifying fields of action and measures in line with the IT summit's motto "networked – mobile – smart";

4. Prioritizing all fields of action by leverage effect and urgency of their implementation for the politics.

39 high-ranking ICT experts from associations and the political, economic and scientific arenas took part in lively and critical debates, with the aim of compiling an appraisal and initial policy recommendations for the ICT location Germany. These recommendations were elaborated up in three rounds of discussions stimulated by introductory presentations by TNS Infratest Business Intelligence, the Federal Ministry of Economics and Technology, LMU Munich and Detecon International GmbH.

At the end of the workshop sessions all participants were asked in a questionnaire survey - using a three-point scale (response alternatives: high, medium, low) - to evaluate the leverage effect of political measures and the prioritization of implementation by politics (response options: very important, important, not important) for the compiled policy recommendations, the potential industry growth areas and the ICT convergence fields.

The workshop was attended by the representatives from 18 provider and user companies and the representatives from 15 associations, management consultancies and public bodies, including company chairpersons, managing directors and presidents of ICT industry associations. The workshop was chaired by Bernd-Wolfgang Weismann from the Federal Ministry of Economics and Technology.

Participants, 3 November 2011 at the Federal Ministry of Economics and Technology:

Mina **Ahmadi**, Federal Ministry of Health

Bernd **Becker**, EuroCloud Deutschland_eco e. V.

Peter J. **Bisa**, Tactum GmbH

Hans-Peter **Bursig**, ZVEI – Zentralverband Elektrotechnik- und Elektronikindustrie e. V.

Heinrich Wilhelm **Dalke**, Philips GmbH

Dr Michael **Eggers**, Bundesverband mittelständische Wirtschaft Unternehmerverband Deutschland e. V.

Dr Frank **Försterling**, Continental Automotive GmbH

Dr Tobias **Fritsch**, Allianz Managed Operations & Services SE

Frank **Giessen**, Symantec (Germany) GmbH

Dr Waldemar **Grudzien**, Bundesverband deutscher Banken e. V.

Dr Oliver **Grün**, Bundesverband IT Mittelstand e. V.

Lena **Herrling**, Bundesverband Digitale Wirtschaft e. V.

Carsten **Kestermann**, Software AG

Mario **Klass**, TUI Germany GmbH

Thomas **Knebel**, Federal Ministry of Economics and Technology

Dr Hermann **Kruse**, DB Mobility Logistics AG

Dr Wolfgang **Kubink**, Deutsche Telekom AG

Ulrike **Lepper**, Bundesverband Breitbandkommunikation e. V.

Jan **Möller**, Federal Ministry of the Interior

Thomas **Mosch**, Bundesverband Informationswirtschaft, Telekommunikation und Neue Medien e. V.

Helmuth **Pallien**, Federal Ministry of Economics and Technology

Dr-Ing Hans-Joachim **Popp**, Deutsches Zentrum für Luft- und Raumfahrt e. V.

Torsten **Prill**, Freie Universität Berlin

Dr Ulrich **Sandl**, Federal Ministry of Economics and Technology

Hans-Joachim **Schemel**, Federal Ministry of Economics and Technology

Dr Maximilian **Schenk**, VZnet Netzwerke Ltd.

Dr Thomas **Schnieders**, Otto GmbH & Co. KG

Andreas **Schröder**, Vodafone D2 GmbH

Hannes **Schwaderer**, Intel GmbH

Hannah **Seiffert**, eco Verband der deutschen Internetwirtschaft e. V.

Frank P. **Sempert**, Saugatuck Technology

Sven **Siering**, Deutsche Postbank AG

Dirk **Wittkopp**, IBM Germany Research & Development GmbH

Moderators and lecturers

Dr Sabine **Graumann**, TNS Infratest Forschung GmbH

Prof. Dr Thomas **Hess**, LMU – Ludwigs-Maximilians-Universität München

Dr Arnulf **Heuermann**, Detecon International GmbH

Anselm **Speich**, TNS Infratest Forschung GmbH

Bernd-Wolfgang **Weismann**, Federal Ministry of Economics and Technology

Protokollanten

Dr Sabine **Graumann**, TNS Infratest Forschung GmbH

Anselm **Speich**, TNS Infratest Forschung GmbH

Tobias **Weber**, TNS Infratest Forschung GmbH

Currency conversion rates

All currency conversions were based on the official exchange rate mid-year in 2010 as determined by the European Central Bank.

1 Euro entspricht:

US-Dollar	1,3257
Korean Won	1531,82
Swedish Krona	9,5373
Japanese Yen	116,24
Danish Krone	7,4473
British Pound	0,85784
Indian Rupee	60,5878
Norwegian Krone	8,0043
Chinese Yuan	8,9712

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