

## Gauging the Networked Readiness of Nations: Findings from the Networked Readiness Index 2008–2009

IRENE MIA, World Economic Forum

SOUMITRA DUTTA, INSEAD

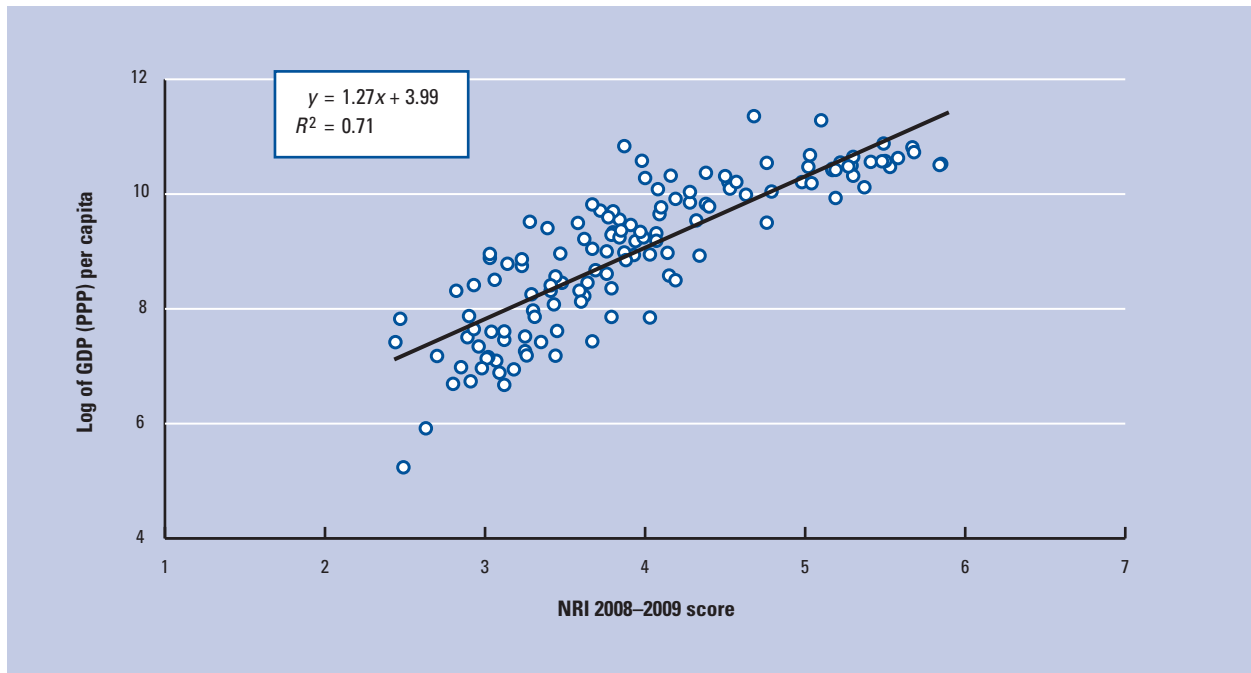
THIERRY GEIGER, World Economic Forum

As this eighth edition of *The Global Information Technology Report* (GITR) goes to press in early 2009, economies around the world are reeling from the impact of the global economic crisis. What started out as a subprime housing crisis in the United States has snowballed into a global contagion that is driving a large number of developed economies into recession and significantly retarding the rapid growth rates seen over the last years in emerging markets. Government leaders around the world are rethinking their approaches to the regulation of financial markets and are busy crafting packages to prevent other sectors of their economies from being impacted adversely by the recessionary contagion. The focus worldwide is on stabilizing the global economy and on jumpstarting growth.

The information and communication technologies (ICT) industry is not immune to the crisis. IDC, an IT consultancy, has predicted that global technology spending will grow by 2.9 percent year-on-year in 2009, lower than the previously forecasted 4.9 percent.<sup>1</sup> Leading technology firms are also feeling the crisis. At the time of writing, Intel had slashed its fourth quarter revenue forecast by more than US\$1 billion. However, the news is not all bleak for the technology space. While the US economy is expected to shrink in 2009, technology spending in the United States is forecasted to grow by 0.9 percent (as compared with the previously forecasted 4.2 percent). Despite slowdowns in sales in many technology products, the sales of global mobile phones are expected to grow by 6 percent in 2009, according to forecasts by Gartner Inc. (as compared with previous forecasts of 16 percent growth),<sup>2</sup> and the popularity of social networking sites is growing steadily. When the financial crisis hit hard in September 2008, LinkedIn's membership shot up by 25 percent in a single month, to 28 million. As the economic crisis deepened, the site's sign-ups were clocking at the amazing rate of one new member every second.

There are two underlying reasons why the technology sector, while suffering because of the overall economic challenges, is showing such signs of resilience. One is that technology is evolving continuously and, despite economic uncertainty over the coming years, progress in most areas of ICT capabilities continues at a blistering pace. For example, the price of personal computers is falling rapidly and the emergence of a whole new class of laptops, priced as low as US\$100 to US\$300 is enabling large segments of the population of emerging countries to now get access to affordable computing. Software capabilities are improving steadily, and they account to a large degree for the growth in popularity of social networking platforms and other Web 2.0 services.

The second reason is related to the fact that both public- and private-sector leaders now fully accept the important role of ICT in stimulating growth and enabling the development of economies by significantly

**Figure 1: Networked readiness and GDP per capita, 2007**

Source: World Economic Forum; IMF, 2008.

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increasing productivity across sectors and industries. Many economies have been able to leverage the extraordinary power of ICT as a driver of change, modernization, and competitiveness (see Figure 1). Previous editions of the GTR have featured detailed case studies on how countries such as Korea, Singapore, Israel, Finland, and Estonia have made important advances in their global competitiveness by positioning ICT at the heart of their national innovation and development strategies. Even in emerging markets in Africa, Latin America, and Asia, access to ICT has boosted information availability, transformed social interactions, and contributed to poverty reduction and improving the life of everyday citizens.

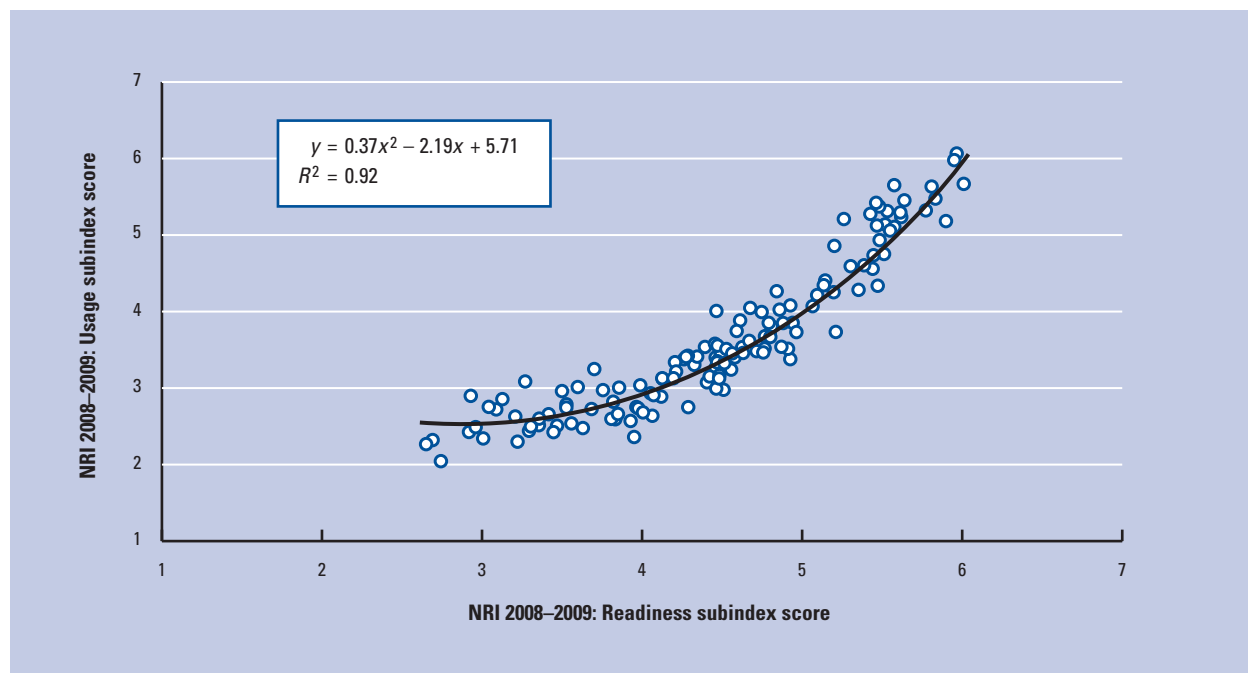
Innovation and technological readiness have featured prominently in the World Economic Forum (the Forum)'s three-decade-long research work as important competitiveness enablers for countries at all levels of development. In particular, the Forum has embarked, in partnership with INSEAD since 2002, in a research project aimed at assessing the impact of innovation—notably ICT—on national growth and development, using, as its main methodology tool, the Networked Readiness Index (NRI). The findings of the NRI have been included in the GTR series, published annually since 2001 and covering this year a record number of 134 economies worldwide, representing over 98 percent of global GDP. The NRI establishes an international framework where the factors enabling economies to leverage ICT for increased competitiveness are clearly

identified and against which countries can benchmark their performances over time and with respect to one another.<sup>3</sup> Over the years, the *Report* has become a highly respected platform for private–public dialogue on the best policies and actions to further ICT readiness, contributing to raising general awareness on the key role of innovation and ICT prowess for national competitiveness and sustained growth.

Coming in the midst of global contagion and a world mired in a major slowdown, the *Report* stands as a reminder for leaders in both the public and private sectors not to lose focus on an important enabler of growth and competitiveness—ICT. The next months, or perhaps the next couple of years, are going to be challenging for both developed and developing economies. Many traditional policies and approaches will be questioned and challenged. However, ICT will continue to provide opportunities for innovation and productivity improvements. Economies that will continue to invest wisely in these new opportunities will be the ones not only able to weather the current storm best, but to come out the strongest when the downturn subsides.

The remainder of this chapter presents the findings of the NRI for 2008–09 by region, with a particular focus on the top ranked economies, together with the underlying Networked Readiness Framework and methodology used in this year's edition.

Figure 2: ICT readiness and usage



Source: World Economic Forum.

### The Networked Readiness Index 2008–2009: The framework and the methodology

The NRI 2008–2009 rests on the theoretical framework introduced in the 2002–03 edition and developed by INSEAD.<sup>4</sup> The Networked Readiness Framework assesses the extent to which different economies benefit from the latest ICT advances, based on three main principles, as follows:

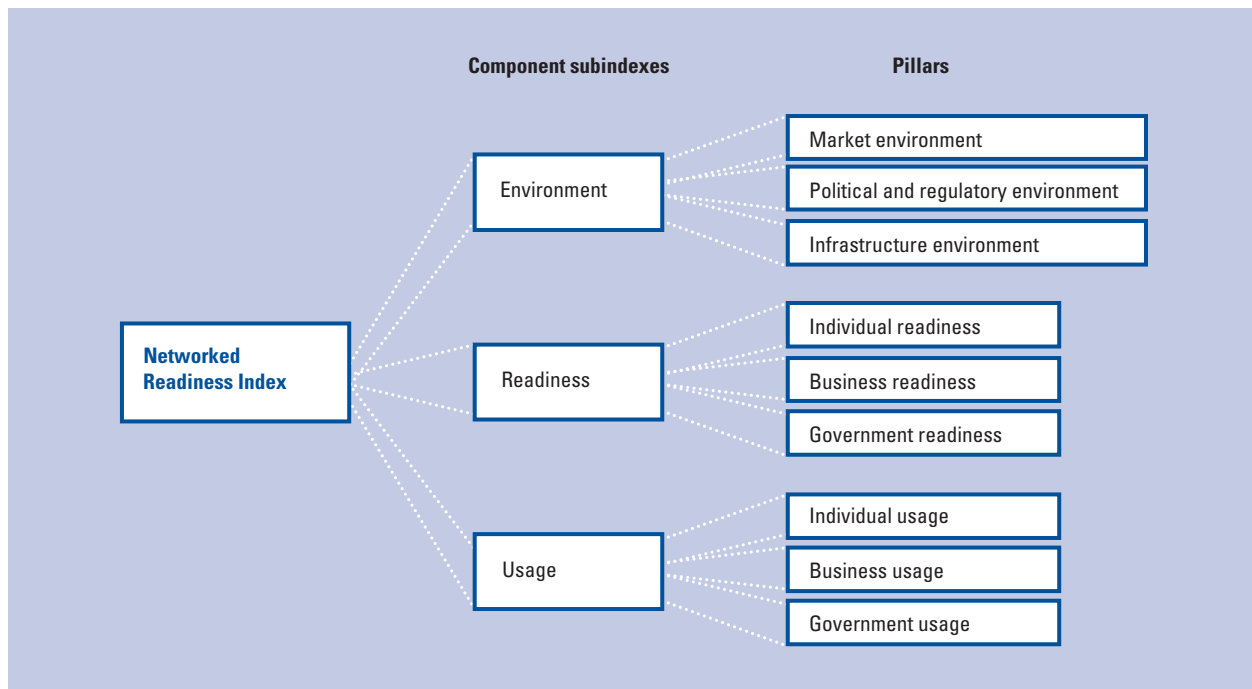
1. **Environment as crucial enabler of networked readiness.** An ICT-conducive environment is a key prerequisite for national stakeholders in a given country to leverage ICT for enhanced growth. In this sense, an effort should be made by the government and any other relevant actors to put in place the appropriate market, regulatory, and ICT environment.
2. **A multi-stakeholder effort is required.** Although the government has a natural leadership role to play when it comes to establishing an ICT- and innovation-friendly environment and to putting ICT penetration at the center of the national agenda, a multi-stakeholder effort—involving the government, the business sector and civil society—is required to achieve ICT prowess. The recent development history of countries as diverse as Korea, Israel, Estonia, and Singapore shows that a farsighted government with a clear vision coupled with active engagement of the

private sector can be very powerful. In all these countries, an effective multi-stakeholder effort led to leapfrogging stages of development, to a structural transformation of the economy, and to increased growth prospects.

3. **ICT readiness facilitates ICT usage.** A society whose stakeholders are better prepared and show a greater interest toward ICT advances will be likely to use it more effectively and extensively. That is, government, business, and individual readiness is reflected in higher ICT use, as confirmed by the strong correlation between the readiness and usage subindexes of the NRI (see Figure 2).

Figure 3 depicts the Networked Readiness Framework, broken down along its three dimensions: environment, readiness, and usage. The environment component is in turn broken down along market, regulatory, and infrastructure lines, while the latter two are broken down along the readiness and usage, respectively, of the three key stakeholder groups—that is, individuals, businesses, and government.

The framework just described converts into the NRI, composed of three subindexes, gauging respectively

**Figure 3: The Networked Readiness Index 2008–2009: The framework**

Source: World Economic Forum.

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ICT environment, readiness, and usage, for a total of 9 pillars and 68 variables, as follows:

1. Environment subindex
  - market environment
  - political and regulatory environment
  - infrastructure environment
2. Readiness subindex
  - individual readiness
  - business readiness
  - government readiness
3. Usage subindex
  - individual usage
  - business usage
  - government usage

Although the 68 variables are the same as last year, the number and nature of variables included in the Index have varied to some extent over the years, to take into account the newest developments in the ICT sector and ensure that the NRI was capturing at any time the relevant determinants of networked readiness. However, the Networked Readiness Framework, kept constant since 2002, guarantees the overall comparability of the NRI results over time.

In the calculation of the global NRI score, all three subindexes are given the same weight, while each subindex is a simple average of the composing pillars.

This reflects the assumption that all Index components provide a similar contribution to the overall networked readiness of a country. See the Appendix at the end of the chapter for a more detailed description on the composition and computation of the NRI 2008–2009.

A brief description of the different composing elements (at the subindex and pillar level) of the NRI follows.

### Environment subindex

As pointed out above, ICT prowess cannot develop in a vacuum; for social actors to be able to fully exploit ICT potential and nurture their country's overall competitiveness, appropriate market, regulatory, and infrastructure environments must be established. The environment subindex gauges the friendliness of a country's environment for ICT development by taking into consideration a total of 30 variables, grouped into three different pillars relating to the market, regulatory, and hard and soft infrastructure dimensions.

The *market environment pillar* (14 variables) captures the ICT conduciveness of the business environment in a country. Aspects such as the availability of appropriate financing sources (notably venture capital), the extent of business sophistication (as captured by the cluster development and high-tech exports), and innovation potential (measured by the number of utility patents), together with the ease of doing business (including the presence of red tape and fiscal charges), the freedom of exchanging information over the Internet (proxied by

the freedom of the press), and the accessibility of digital content are taken into account.

The *political and regulatory environment pillar* (9 variables) examines the quality of the national legal framework with particular regard to ICT development. In this sense, general elements having to do with the protection afforded to property rights, independence of the judiciary, and efficiency of the law-making process are taken into account, as well as ICT-specific aspects such as the development of ICT laws and the extent to which intellectual property—key to generating innovation—is protected.

The *infrastructure environment pillar* (7 variables) measures the extent to which national infrastructure encourages ICT development and diffusion. *Infrastructure*, in our definition, includes both hard elements—such as the number of telephone lines and secure Internet servers, and electricity production—as well as softer ones related to the quality of the human resources in a given country. With regard to the latter, quantitative measures, such as tertiary enrollment rates and education expenditures, are combined with a qualitative assessment of the scientific research institutions and the availability of scientists and engineers.

### Readiness subindex

The second underpinning of the Networked Readiness Framework relates to the extent to which a country's main stakeholders are interested and prepared to use technology—notably ICT—in their daily activities. Accordingly, the readiness subindex, with a total of 23 variables, measures elements of individual and business readiness, including the existence of appropriate human skills for using ICT and the affordability of ICT, as well as government readiness, reflected notably in the latter's prioritization of ICT in the national agenda.

In this sense, the *individual readiness pillar* (9 variables) measures citizens' preparedness to use ICT through a range of variables, including the quality of the educational system (with a focus on math and science education), the availability of Internet access in schools, residential telephone connection charges, broadband and telephone subscription charges, and the cost of mobile telephone calls.

The *business readiness pillar* (10 variables) examines the extent to which companies are disposed and ready to incorporate ICT in their operations and processes, taking into account particularly the quality of on-the-job training, spending on R&D, the collaboration between academia and industry (central to generating applied innovation and to nurturing cluster creation and development), the quantity and quality of suppliers in the economy, and the affordability of ICT for business.

The *government readiness pillar* (4 variables), in turn, attempts to capture government's vision and prioritization of ICT in the national agenda and competitiveness strategy, including the extent to which public procurement

of high-tech products is used as a tool to promote efficiency and innovation.

### Usage subindex

The last component of the NRI gauges the actual usage of ICT by a country's main stakeholders, with a particular focus on the impact of ICT in terms of efficiency and productivity gains.

The *individual usage pillar* (5 variables) measures ICT penetration and diffusion at the individual level, through the number of mobile telephone and broadband Internet subscribers, Internet users and personal computers (PCs) and Internet bandwidth.

The *business usage pillar* (5 variables) assesses the degree to which businesses generate and absorb technology, looking at variables such as the prevalence of foreign technology licensing and the capacity for innovation, together with the availability and usage of fixed telephone lines for business and Internet use by businesses in their daily transactions and operations.

Finally, the *government usage pillar* (5 variables) analyzes the implementation of the vision captured by the government readiness pillar described above. In this sense, government's success in promoting ICT penetration and the development and quality of e-government services are assessed, as well as the government's own ICT usage and the extent to which this has led to productivity and efficiency gains.

As one can see from the description above, the NRI and its composing subindexes, pillars and variables offer an extremely useful and detailed instrument for policy makers, allowing them to identify areas of weakness which need to be addressed in view of improving national networked readiness.

### Computation methodology and data

In line with the methodology used in the previous editions of the *Report* and in the Forum's competitiveness work, the NRI 2008–2009 is composed of a mixture of hard and survey data capturing both quantitative and qualitative determinants of a country's networked readiness. In this regard, as shown in Figure 4, 27 out of the 68 composing variables are hard, quantitative data, collected from international organizations such as the International Telecommunication Union (ITU), the United Nations, and the World Bank. Internationally collected and validated data ensure data comparability across countries.

The remaining 41 variables gauge dimensions that are more qualitative in nature or for which there are no hard data available for a large number of countries but that are nonetheless crucial in capturing national networked readiness. These data come from the Executive Opinion Survey (the Survey), which the Forum administered to over 12,000 business leaders across 134 economies in 2008 (see Box 1 for details about the Survey methodology). Examples include

### Box 1: The Executive Opinion Survey

Two types of data enter the Networked Readiness Index (NRI). Out of the 68 variables composing the NRI, 27 variables, or 40 percent, are *hard data*. Hard data are obtained from international organizations (e.g., the International Telecommunication Union, the World Bank). Such data provide an objective measure of a quantity (e.g., number of PCs, number of procedures required to start a business), complemented, if necessary, by national sources. The remaining indicators come from the Executive Opinion Survey (the Survey) carried out annually by the World Economic Forum.

The aim of the Survey is to capture the qualitative dimension of specific aspects of competitiveness and networked readiness, as well as to provide comparable data on issues for which there are no existing hard data indicators. This highly specialized survey is conducted annually by the World Economic Forum in all 134 countries covered by the *Report* this year. Business leaders are asked to assess specific aspects of the business environment in the country in which they operate. For each question, respondents are asked to give their opinion about the situation in their country of residence, compared with a global norm. To conduct the Survey in each country, the World Economic Forum relies on a network of 150 Partner Institutes. Typically, the Partner Institutes are recognized economics departments of national universities, independent research institutes, or business organizations.

To ensure that the sample is selected consistently around the world, a detailed set of guidelines has been developed by the Forum for the Partner Institutes to target top management business executives, with a particular focus on surveying the most sizeable employers. In addition to relying on Partner Institutes to collect surveys in their respective countries, the Forum's member and partner companies are also invited to participate in the Survey. Sample sizes vary according to the size of the economy. In 2008, a record total of 12,297 responses were included, up from 11,406 in 2007.

Once the data are received, they are subjected to a rigorous quality control process. Following a careful verification of the Survey dataset, individual responses to each question are then aggregated at the country level and combined with results of the previous year following a weighted moving average approach. The weighting scheme is composed of two overlapping elements: on one hand, we ensure that we sufficiently take into account all individual responses by placing more weight on the larger of the two samples of responses; at the same time, we apply a discount factor to the previous year's results, thereby placing more weight on the most recent responses.

The final country scores thus obtained are used in the computation of the NRI and other benchmarking indexes developed by the World Economic Forum. For more information about the Survey's process and methodology, refer to Browne et al. 2008.

dimensions relating to the transparency of the legal framework, the quality of education, together with the government's vision for ICT and the extent to which this is prioritized in the national agenda. For all these dimensions, since no hard data are available, the Survey represents an invaluable source of information and insight.

The inclusion of new countries in the NRI every year is driven by the Survey coverage and the hard data availability. Figure 5 shows the evolution of the NRI and the Survey's coverage from the GITR series' inception. The *Report* features a record number of seven new economies this year, namely Brunei Darussalam, Côte d'Ivoire, Ghana, Malawi, Montenegro, Serbia, and Timor-Leste. The latter three could not have been included in the *Report* until this year, despite having been covered by the Survey for a number of years, for lack of a sufficient number of hard data.

As mentioned earlier, variables included in the NRI may experience some variation from year to year, given the dynamism of the ICT sector and the need to update the NRI accordingly.<sup>5</sup> For this reason, some time-sensitive variables included in past editions that have not been recently updated by relevant international institutions may need to be dropped by the NRI structure and calculation on any given year. The NRI 2008–2009 represents an exception to the above trend, since it includes the same variables used in the 2007–08 computation, updated with the most recent data.

### The NRI 2008–2009 rankings

This section will highlight the main findings of the NRI 2008–2009, with a particular emphasis on the top 10 performing countries as well as selected economies in the following regions: Europe, Latin America and the Caribbean, Asia and the Pacific, Middle East and North Africa (MENA), and sub-Saharan Africa.<sup>6</sup>

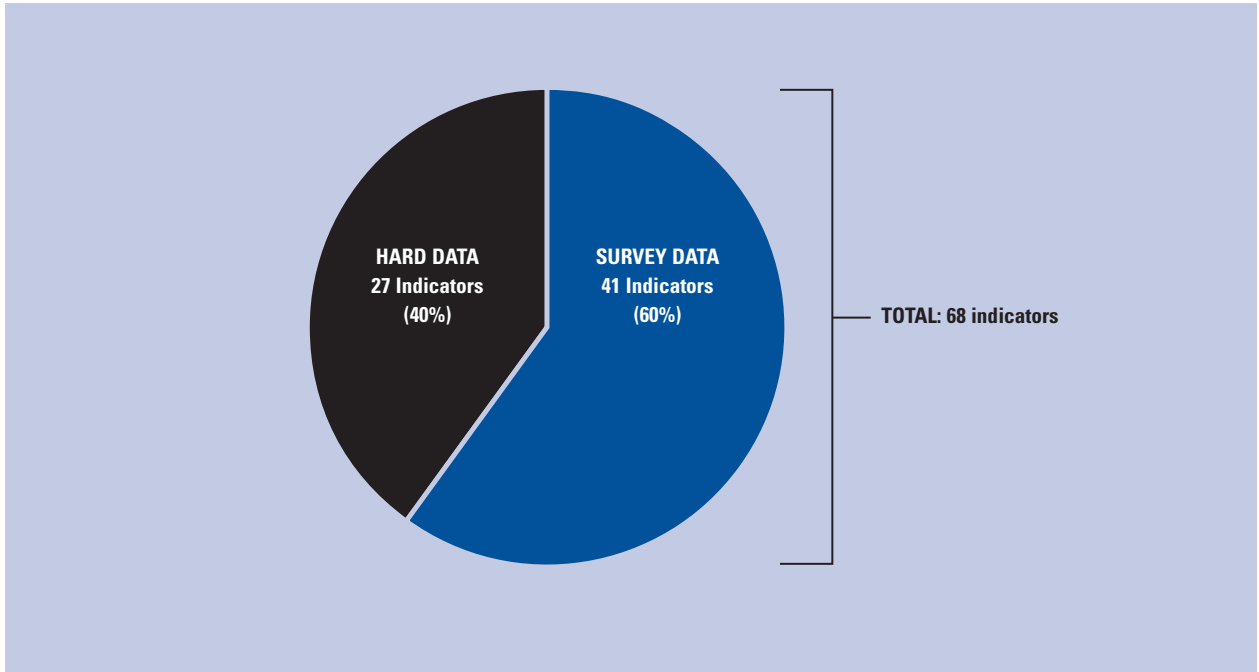
Table 1 displays the NRI rankings and scores for 2008–09 with 2007–08 comparisons, while Tables 2, 3, and 4 show the rankings and scores for the three subindexes and nine pillars composing the NRI. Tables 5 and 6, in turn, provide a more detailed analysis on the most networked economies in the world.

### Top 10

As Table 1 shows, Denmark and Sweden continue to be assessed as the world's most networked economies for the third consecutive year. The two countries' ICT pre-eminence rests on similar bases, notably an early and continuous focus on education and innovation as well as a prominent place given to ICT penetration and diffusion in the national agenda as an enabler of general competitiveness.

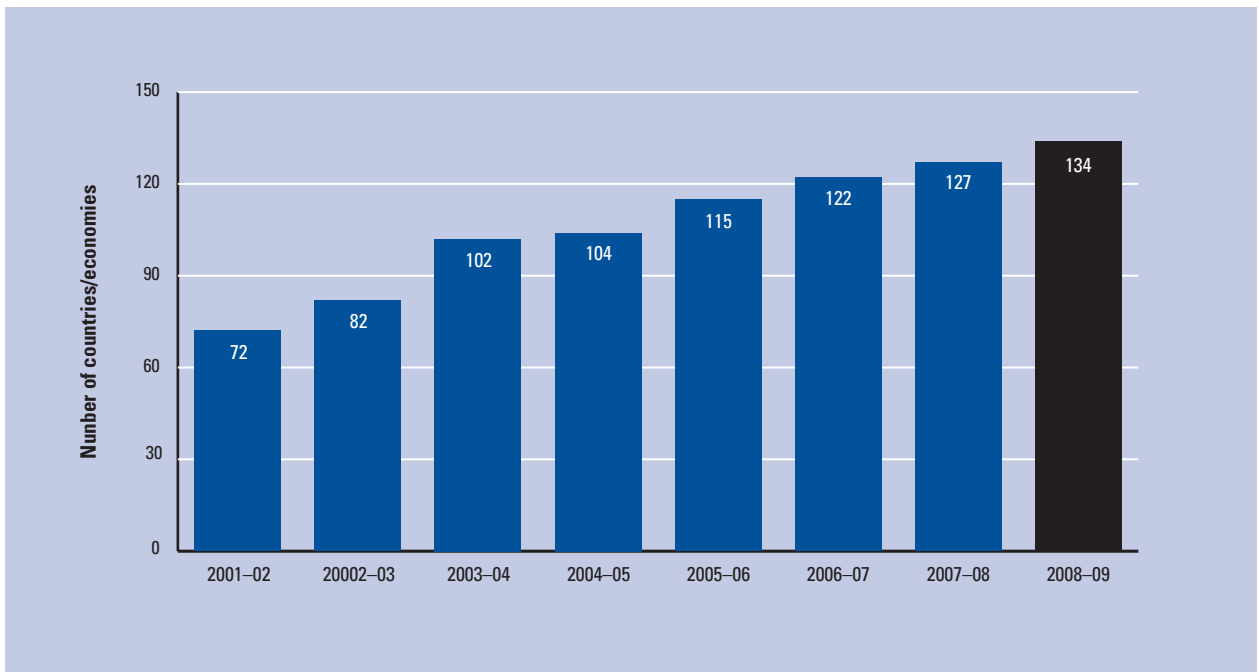
The rankings of 2008–09 confirm **Denmark's** superior capacity to leverage ICT for overall national

**Figure 4: Hard and Survey data composition of the NRI**



Source: World Economic Forum.

**Figure 5: Evolution of the NRI's coverage**



Source: World Economic Forum.

Table 1: The Networked Readiness Index 2008–2009 and 2007–2008

Country/Economy	NRI 2008–2009		NRI 2008–2009 rank among 2007 countries	NRI 2007–2008		Country/Economy	NRI 2008–2009		NRI 2008–2009 rank among 2007 countries	NRI 2007–2008	
	Rank	Score		Rank	Score		Rank	Score		Rank	Score
Denmark	1	5.85	1	1	5.78	Bulgaria	68	3.80	67	68	3.71
Sweden	2	5.84	2	2	5.72	Poland	69	3.80	68	62	3.81
United States	3	5.68	3	4	5.49	Vietnam	70	3.79	69	73	3.67
Singapore	4	5.67	4	5	5.49	Montenegro	71	3.79	n/a	n/a	n/a
Switzerland	5	5.58	5	3	5.53	Sri Lanka	72	3.79	70	79	3.58
Finland	6	5.53	6	6	5.47	Kazakhstan	73	3.79	71	71	3.68
Iceland	7	5.50	7	8	5.44	Russian Federation	74	3.77	72	72	3.68
Norway	8	5.49	8	10	5.38	Dominican Republic	75	3.76	73	75	3.66
Netherlands	9	5.48	9	7	5.44	Egypt	76	3.76	74	63	3.74
Canada	10	5.41	10	13	5.30	Botswana	77	3.72	75	78	3.59
Korea, Rep.	11	5.37	11	9	5.43	El Salvador	78	3.69	76	66	3.72
Hong Kong SAR	12	5.30	12	11	5.31	Macedonia, FYR	79	3.67	77	83	3.49
Taiwan, China	13	5.30	13	17	5.18	Senegal	80	3.67	78	85	3.46
Australia	14	5.29	14	14	5.28	Trinidad and Tobago	81	3.67	79	82	3.55
United Kingdom	15	5.27	15	12	5.30	Guatemala	82	3.64	80	80	3.58
Austria	16	5.22	16	15	5.22	Indonesia	83	3.62	81	76	3.60
Japan	17	5.19	17	19	5.14	Serbia	84	3.62	n/a	n/a	n/a
Estonia	18	5.19	18	20	5.12	Philippines	85	3.60	82	81	3.56
France	19	5.17	19	21	5.11	Morocco	86	3.59	83	74	3.67
Germany	20	5.17	20	16	5.19	Argentina	87	3.58	84	77	3.59
Luxembourg	21	5.10	21	24	4.94	Georgia	88	3.48	85	91	3.34
New Zealand	22	5.04	22	22	5.02	Peru	89	3.47	86	84	3.46
Ireland	23	5.03	23	23	5.02	Nigeria	90	3.45	87	94	3.32
Belgium	24	5.02	24	25	4.92	Gambia, The	91	3.44	88	101	3.17
Israel	25	4.98	25	18	5.18	Namibia	92	3.44	89	93	3.33
Malta	26	4.79	26	27	4.61	Mongolia	93	3.43	90	87	3.43
United Arab Emirates	27	4.76	27	29	4.55	Syria	94	3.41	91	110	3.06
Malaysia	28	4.76	28	26	4.82	Honduras	95	3.41	92	90	3.35
Qatar	29	4.68	29	32	4.42	Venezuela	96	3.39	93	86	3.44
Portugal	30	4.63	30	28	4.60	Kenya	97	3.35	94	92	3.34
Slovenia	31	4.57	31	30	4.47	Pakistan	98	3.31	95	89	3.37
Czech Republic	32	4.53	32	36	4.33	Moldova	99	3.30	96	96	3.21
Cyprus	33	4.52	33	41	4.23	Guyana	100	3.29	97	102	3.16
Spain	34	4.50	34	31	4.47	Libya	101	3.28	98	105	3.10
Lithuania	35	4.40	35	33	4.41	Zambia	102	3.26	99	112	3.02
Barbados	36	4.38	36	38	4.26	Ghana	103	3.25	n/a	n/a	n/a
Bahrain	37	4.38	37	45	4.13	Tajikistan	104	3.25	100	98	3.18
Tunisia	38	4.34	38	35	4.33	Albania	105	3.23	101	108	3.06
Chile	39	4.32	39	34	4.35	Bosnia and Herzegovina	106	3.23	102	95	3.22
Saudi Arabia	40	4.28	40	48	4.07	Mali	107	3.18	103	99	3.17
Hungary	41	4.28	41	37	4.28	Algeria	108	3.14	104	88	3.38
Puerto Rico	42	4.23	42	39	4.25	Mauritania	109	3.12	105	97	3.21
Slovak Republic	43	4.19	43	43	4.17	Malawi	110	3.12	n/a	n/a	n/a
Jordan	44	4.19	44	47	4.08	Côte d'Ivoire	111	3.12	n/a	n/a	n/a
Italy	45	4.16	45	42	4.21	Madagascar	112	3.09	106	104	3.12
China	46	4.15	46	57	3.90	Burkina Faso	113	3.07	107	103	3.12
Thailand	47	4.14	47	40	4.25	Armenia	114	3.06	108	106	3.10
Latvia	48	4.10	48	44	4.14	Kyrgyz Republic	115	3.04	109	114	2.99
Croatia	49	4.09	49	49	4.06	Ecuador	116	3.03	110	107	3.09
Oman	50	4.08	50	53	3.97	Suriname	117	3.03	111	117	2.91
Mauritius	51	4.07	51	54	3.96	Lesotho	118	3.02	112	122	2.79
South Africa	52	4.07	52	51	4.05	Tanzania	119	3.01	113	100	3.17
Jamaica	53	4.03	53	46	4.09	Uganda	120	2.98	114	109	3.06
India	54	4.03	54	50	4.06	Benin	121	2.96	115	113	3.01
Greece	55	4.00	55	56	3.94	Paraguay	122	2.93	116	120	2.87
Costa Rica	56	3.99	56	60	3.87	Cameroon	123	2.93	117	118	2.89
Kuwait	57	3.98	57	52	4.01	Mozambique	124	2.91	118	121	2.82
Romania	58	3.97	58	61	3.86	Nicaragua	125	2.90	119	116	2.95
Brazil	59	3.94	59	59	3.87	Cambodia	126	2.89	120	115	2.96
Azerbaijan	60	3.93	60	67	3.72	Nepal	127	2.85	121	119	2.88
Turkey	61	3.91	61	55	3.96	Bolivia	128	2.82	122	111	3.05
Ukraine	62	3.88	62	70	3.69	Ethiopia	129	2.80	123	123	2.77
Brunei Darussalam	63	3.87	n/a	n/a	n/a	Bangladesh	130	2.70	124	124	2.65
Colombia	64	3.87	63	69	3.71	Burundi	131	2.63	125	126	2.46
Uruguay	65	3.85	64	65	3.72	Zimbabwe	132	2.49	126	125	2.50
Panama	66	3.84	65	64	3.74	Timor-Leste	133	2.47	n/a	n/a	n/a
Mexico	67	3.84	66	58	3.90	Chad	134	2.44	127	127	2.40

(Cont'd.)

Table 2: Environment component subindex

ENVIRONMENT SUBINDEX			Market environment		Political and regulatory environment		Infrastructure environment	
Rank	Country/Economy	Score	Rank	Score	Rank	Score	Rank	Score
1	Iceland	5.64	11	5.10	10	5.80	1	6.02
2	Sweden	5.59	10	5.11	5	5.92	2	5.73
3	United States	5.59	2	5.59	19	5.45	3	5.72
4	Denmark	5.51	9	5.14	2	6.03	6	5.35
5	Finland	5.51	6	5.35	3	5.97	7	5.20
6	Switzerland	5.44	4	5.43	7	5.85	9	5.05
7	Norway	5.39	19	4.90	6	5.87	5	5.40
8	Canada	5.39	15	5.07	17	5.52	4	5.57
9	Singapore	5.34	3	5.58	1	6.30	23	4.13
10	Australia	5.22	22	4.79	9	5.81	8	5.06
11	Netherlands	5.20	8	5.15	12	5.78	14	4.68
12	United Kingdom	5.12	13	5.09	20	5.45	12	4.82
13	Germany	5.09	20	4.88	8	5.83	15	4.56
14	Ireland	5.09	7	5.16	15	5.53	16	4.56
15	New Zealand	5.07	30	4.59	14	5.58	10	5.02
16	Hong Kong SAR	5.03	1	5.61	11	5.79	37	3.68
17	Korea, Rep.	5.02	14	5.08	23	5.20	13	4.79
18	Austria	4.99	23	4.77	4	5.93	21	4.28
19	Taiwan, China	4.98	5	5.43	43	4.54	11	4.96
20	Japan	4.97	12	5.10	18	5.52	20	4.29
21	France	4.91	25	4.72	16	5.53	18	4.48
22	Luxembourg	4.82	16	5.02	13	5.59	29	3.84
23	Belgium	4.79	28	4.69	22	5.24	19	4.44
24	Israel	4.75	17	5.00	34	4.74	17	4.51
25	Estonia	4.71	21	4.85	21	5.26	26	4.01
26	Malaysia	4.46	18	4.92	24	5.17	48	3.29
27	Malta	4.46	32	4.47	28	4.99	28	3.91
28	Cyprus	4.42	41	4.31	27	4.99	27	3.95
29	Qatar	4.41	26	4.72	33	4.74	35	3.76
30	Portugal	4.34	37	4.41	30	4.85	34	3.76
31	Barbados	4.34	71	3.90	25	5.09	25	4.02
32	United Arab Emirates	4.29	24	4.74	39	4.62	40	3.52
33	Puerto Rico	4.25	31	4.49	31	4.75	42	3.51
34	Slovenia	4.23	43	4.19	51	4.32	22	4.18
35	Spain	4.20	46	4.16	40	4.60	31	3.83
36	Czech Republic	4.13	40	4.32	52	4.30	33	3.78
37	Bahrain	4.12	27	4.71	49	4.37	49	3.28
38	Saudi Arabia	4.11	38	4.35	42	4.55	44	3.44
39	South Africa	4.11	33	4.44	26	5.04	69	2.83
40	Lithuania	4.10	48	4.14	41	4.57	39	3.58
41	Hungary	4.09	44	4.17	50	4.33	32	3.78
42	Chile	4.08	35	4.43	35	4.74	57	3.07
43	Tunisia	4.08	47	4.16	29	4.88	51	3.20
44	Kuwait	4.02	34	4.44	58	4.19	45	3.44
45	Greece	4.01	79	3.79	61	4.13	24	4.10
46	Mauritius	3.98	29	4.65	38	4.62	79	2.68
47	Latvia	3.98	49	4.12	46	4.45	47	3.36
48	Jordan	3.94	51	4.12	36	4.70	59	3.01
49	Thailand	3.94	36	4.42	48	4.43	60	2.97
50	Slovak Republic	3.91	39	4.33	60	4.17	50	3.23
51	Oman	3.84	42	4.31	44	4.52	78	2.69
52	Montenegro	3.83	67	3.93	89	3.72	30	3.84
53	Italy	3.75	75	3.85	92	3.71	36	3.70
54	Croatia	3.75	77	3.82	67	4.04	46	3.39
55	China	3.74	59	4.01	45	4.50	74	2.71
56	Turkey	3.70	66	3.97	56	4.20	62	2.94
57	Panama	3.70	45	4.17	66	4.05	68	2.87
58	Botswana	3.68	70	3.91	47	4.44	77	2.70
59	Namibia	3.67	73	3.89	32	4.74	101	2.39
60	India	3.67	50	4.12	57	4.19	76	2.70
61	Costa Rica	3.67	58	4.02	80	3.85	55	3.13
62	Russian Federation	3.65	96	3.58	85	3.76	38	3.63
63	Kazakhstan	3.63	85	3.73	70	4.02	54	3.15
64	Egypt	3.63	60	4.00	62	4.12	70	2.78
65	Jamaica	3.63	65	3.97	55	4.21	75	2.71
66	Romania	3.63	72	3.90	68	4.04	61	2.95
67	Azerbaijan	3.62	63	3.97	54	4.22	81	2.66
68	Poland	3.60	87	3.71	100	3.59	41	3.51
69	Ukraine	3.59	90	3.60	95	3.67	43	3.50
70	Sri Lanka	3.55	61	4.00	71	4.00	83	2.66
71	Bulgaria	3.55	81	3.77	93	3.69	52	3.18
72	Vietnam	3.54	86	3.72	53	4.23	82	2.66
73	Uruguay	3.53	102	3.52	59	4.18	67	2.88
74	Morocco	3.53	57	4.03	74	3.93	88	2.62
75	Mexico	3.48	74	3.88	84	3.77	71	2.78
76	Macedonia, FYR	3.44	83	3.75	97	3.64	63	2.92
77	Georgia	3.42	53	4.07	91	3.71	96	2.49
78	Colombia	3.41	93	3.59	79	3.87	72	2.77
79	Serbia	3.40	114	3.38	98	3.64	53	3.17
80	Trinidad and Tobago	3.39	69	3.91	118	3.36	66	2.89
81	Indonesia	3.39	55	4.05	83	3.80	103	2.31
82	Gambia, The	3.38	92	3.59	37	4.65	129	1.90
83	Zambia	3.37	76	3.84	63	4.07	110	2.21
84	Philippines	3.37	52	4.09	87	3.74	106	2.26
85	Dominican Republic	3.36	64	3.97	75	3.90	108	2.22
86	Ghana	3.35	82	3.75	65	4.06	107	2.25
87	Brazil	3.34	119	3.28	82	3.81	65	2.91
88	Nigeria	3.33	68	3.91	64	4.06	118	2.01
89	Senegal	3.32	62	3.99	101	3.59	100	2.40
90	Kenya	3.32	91	3.60	88	3.74	85	2.63
91	Brunei Darussalam	3.32	106	3.45	78	3.87	84	2.65
92	El Salvador	3.31	56	4.04	86	3.75	112	2.15
93	Mongolia	3.31	89	3.63	102	3.56	73	2.74
94	Moldova	3.28	118	3.29	76	3.89	80	2.67
95	Malawi	3.24	94	3.59	73	3.93	111	2.21
96	Tajikistan	3.23	125	3.10	69	4.02	91	2.57
97	Honduras	3.23	78	3.80	94	3.67	109	2.22
98	Burkina Faso	3.22	95	3.59	72	3.95	114	2.12
99	Guatemala	3.21	54	4.05	104	3.52	117	2.05
100	Lesotho	3.20	100	3.55	110	3.44	89	2.60
101	Syria	3.18	101	3.53	103	3.53	97	2.48
102	Mali	3.18	103	3.51	77	3.88	113	2.14
103	Guyana	3.16	108	3.44	112	3.42	87	2.62
104	Libya	3.16	129	3.02	113	3.42	58	3.03
105	Kyrgyz Republic	3.16	115	3.37	106	3.50	90	2.60
106	Peru	3.15	88	3.69	108	3.45	104	2.29
107	Argentina	3.12	128	3.04	120	3.21	56	3.12
108	Uganda	3.11	111	3.41	96	3.66	105	2.27
109	Armenia	3.09	120	3.27	116	3.39	86	2.62
110	Benin	3.07	113	3.38	90	3.72	115	2.12
111	Tanzania	3.07	107	3.45	81	3.81	123	1.96
112	Pakistan	3.07	84	3.75	107	3.46	121	1.99
113	Côte d'Ivoire	3.03	104	3.46	124	3.11	95	2.52
114	Nepal	3.03	80	3.77	115	3.41	127	1.91
115	Madagascar	2.99	99	3.55	111	3.43	122	1.98
116	Bosnia and Herzegovina	2.98	122	3.18	122	3.20	92	2.57
117	Albania	2.98	110	3.42	114	3.42	116	2.09
118	Mozambique	2.95	116	3.35	99	3.59	128	1.91
119	Ethiopia	2.94	117	3.33	105	3.51	120	1.99
120	Algeria	2.93	127	3.04	121	3.20	93	2.56
121	Paraguay	2.93	97	3.57	131	2.77	98	2.43
122	Mauritania	2.91	98	3.57	109	3.44	133	1.71
123	Nicaragua	2.89	109	3.42	119	3.24	119	2.01
124	Venezuela	2.84	133	2.67	127	2.94	64	2.92
125	Cambodia	2.83	112	3.40	117	3.38	132	1.71
126	Suriname	2.77	123	3.16	133	2.74	99	2.43
127	Bangladesh	2.76	105	3.46	130	2.86	124	1.96
128	Bolivia	2.74	130	2.80	129	2.87	94	2.54
129	Cameroon	2.71	126	3.09	123	3.19	130	1.85
130	Zimbabwe	2.69	132	2.69	125	3.02	102	2.36
131	Ecuador	2.67	124	3.12	126	2.96	126	1.94
132	Burundi	2.55	131	2.77	128	2.94	125	1.95
133	Timor-Leste	2.48	121	3.24	134	2.47	131	1.74
134	Chad	2.31	134	2.54	132	2.75	134	1.63

(Cont'd.)

Table 3: Readiness component subindex

READINESS SUBINDEX		Individual readiness		Business readiness		Government readiness		
Rank	Country/Economy	Score	Rank	Score	Rank	Score	Rank	Score
1	Singapore	6.01	2	6.50	10	5.62	1	5.92
2	Denmark	5.97	4	6.32	6	5.72	2	5.85
3	Sweden	5.95	8	6.26	2	5.86	3	5.72
4	Finland	5.90	1	6.54	5	5.78	8	5.38
5	Switzerland	5.83	3	6.43	1	6.00	17	5.07
6	United States	5.81	14	6.14	3	5.83	6	5.46
7	Korea, Rep.	5.77	11	6.22	16	5.40	4	5.70
8	Norway	5.64	17	6.09	18	5.33	5	5.49
9	Iceland	5.62	6	6.30	20	5.27	11	5.28
10	Taiwan, China	5.61	12	6.22	14	5.49	14	5.14
11	Austria	5.58	10	6.24	12	5.55	24	4.94
12	Netherlands	5.58	15	6.11	8	5.63	23	4.98
13	France	5.55	16	6.11	13	5.51	19	5.03
14	Canada	5.53	9	6.26	19	5.31	20	5.03
15	Australia	5.52	13	6.18	22	5.24	15	5.14
16	Belgium	5.51	5	6.32	7	5.67	35	4.55
17	Germany	5.48	25	5.97	4	5.78	30	4.70
18	Estonia	5.48	19	6.06	32	4.94	7	5.44
19	Malaysia	5.47	26	5.97	21	5.25	12	5.20
20	Japan	5.47	31	5.90	11	5.60	25	4.90
21	Hong Kong SAR	5.46	7	6.27	26	5.09	21	5.02
22	Israel	5.45	34	5.80	15	5.42	16	5.11
23	Ireland	5.44	21	6.04	9	5.63	31	4.66
24	United Kingdom	5.43	24	6.02	17	5.38	26	4.88
25	United Arab Emirates	5.39	32	5.89	33	4.94	9	5.33
26	Qatar	5.35	20	6.05	30	5.01	22	4.99
27	Malta	5.30	28	5.95	47	4.64	10	5.32
28	Luxembourg	5.26	27	5.95	39	4.78	18	5.05
29	Tunisia	5.21	29	5.94	35	4.91	27	4.78
30	New Zealand	5.20	22	6.04	31	4.98	32	4.59
31	Czech Republic	5.20	23	6.02	23	5.15	43	4.42
32	Portugal	5.14	48	5.55	41	4.72	13	5.16
33	Slovenia	5.14	30	5.94	29	5.02	41	4.45
34	Spain	5.09	37	5.66	24	5.12	37	4.50
35	Cyprus	5.07	18	6.07	50	4.57	34	4.56
36	China	4.96	38	5.66	44	4.65	33	4.58
37	Barbados	4.94	33	5.84	56	4.50	38	4.48
38	Bahrain	4.93	35	5.70	62	4.32	28	4.75
39	Costa Rica	4.93	44	5.57	34	4.91	48	4.30
40	India	4.91	45	5.57	27	5.05	57	4.12
41	Saudi Arabia	4.88	79	5.06	28	5.04	36	4.55
42	Oman	4.87	49	5.54	48	4.60	39	4.47
43	Chile	4.86	58	5.45	42	4.71	42	4.42
44	Lithuania	4.84	36	5.67	51	4.56	49	4.29
45	Jordan	4.81	53	5.52	76	4.19	29	4.72
46	Thailand	4.80	54	5.52	43	4.67	53	4.22
47	Croatia	4.80	41	5.62	45	4.64	56	4.13
48	Slovak Republic	4.79	39	5.65	40	4.74	66	3.98
49	Puerto Rico	4.77	60	5.42	25	5.12	84	3.77
50	Brunei Darussalam	4.77	40	5.64	67	4.27	45	4.38
51	Mauritius	4.76	50	5.53	59	4.40	46	4.34
52	Hungary	4.75	42	5.58	46	4.64	60	4.03
53	Colombia	4.71	63	5.37	55	4.50	50	4.28
54	Italy	4.68	57	5.47	38	4.78	83	3.77
55	Romania	4.67	46	5.55	58	4.47	64	3.99
56	South Africa	4.63	80	5.02	36	4.88	63	3.99
57	Azerbaijan	4.63	78	5.06	61	4.36	40	4.46
58	Brazil	4.61	81	5.02	37	4.83	65	3.98
59	Latvia	4.59	55	5.52	60	4.38	76	3.88
60	Greece	4.58	56	5.49	68	4.27	67	3.97
61	Uruguay	4.56	65	5.35	78	4.18	54	4.16
62	Poland	4.56	43	5.57	52	4.56	103	3.54
63	Ukraine	4.53	51	5.52	80	4.16	74	3.90
64	Vietnam	4.51	86	4.88	73	4.25	44	4.42
65	Indonesia	4.51	52	5.52	49	4.58	111	3.43
66	Kuwait	4.49	62	5.37	64	4.30	80	3.80
67	Russian Federation	4.48	61	5.39	69	4.26	81	3.79
68	Trinidad and Tobago	4.48	47	5.55	74	4.24	94	3.65
69	Turkey	4.47	64	5.35	63	4.31	87	3.75
70	Panama	4.47	69	5.19	75	4.21	61	4.01
71	Sri Lanka	4.47	76	5.09	86	4.10	52	4.22
72	Jamaica	4.46	71	5.14	65	4.29	69	3.97
73	Serbia	4.46	59	5.44	77	4.18	85	3.77
74	Bulgaria	4.46	66	5.34	85	4.11	72	3.93
75	Kazakhstan	4.46	94	4.73	54	4.51	55	4.14
76	Mexico	4.46	74	5.12	72	4.26	62	3.99
77	Macedonia, FYR	4.42	70	5.14	81	4.16	68	3.97
78	Botswana	4.41	67	5.31	96	3.94	70	3.97
79	Dominican Republic	4.39	87	4.87	89	4.00	47	4.31
80	El Salvador	4.34	82	4.99	82	4.14	75	3.90
81	Argentina	4.33	68	5.25	57	4.48	117	3.25
82	Syria	4.29	75	5.11	87	4.06	91	3.70
83	Guatemala	4.29	89	4.81	71	4.26	82	3.79
84	Senegal	4.27	99	4.59	66	4.28	71	3.95
85	Egypt	4.26	97	4.66	100	3.86	51	4.27
86	Philippines	4.21	83	4.98	97	3.91	88	3.75
87	Montenegro	4.21	88	4.81	91	3.98	78	3.83
88	Venezuela	4.20	72	5.13	88	4.01	109	3.44
89	Morocco	4.13	85	4.89	92	3.96	102	3.54
90	Peru	4.13	95	4.68	84	4.11	98	3.59
91	Georgia	4.12	77	5.08	115	3.45	77	3.83
92	Mongolia	4.07	96	4.68	112	3.46	59	4.07
93	Guyana	4.06	93	4.77	99	3.86	100	3.56
94	Honduras	4.05	98	4.66	93	3.95	101	3.56
95	Libya	4.01	92	4.77	103	3.78	108	3.46
96	Nigeria	3.99	104	4.21	53	4.53	120	3.22
97	Bosnia and Herzegovina	3.98	73	5.13	108	3.58	122	3.22
98	Albania	3.96	91	4.79	118	3.34	86	3.77
99	Suriname	3.95	84	4.92	70	4.26	133	2.67
100	Algeria	3.93	100	4.51	101	3.84	110	3.44
101	Pakistan	3.86	111	3.79	83	4.14	95	3.64
102	Tajikistan	3.85	103	4.21	107	3.60	90	3.73
103	Ecuador	3.83	90	4.81	105	3.72	127	2.97
104	Namibia	3.82	101	4.35	98	3.88	121	3.22
105	Ghana	3.81	110	3.82	90	3.99	96	3.62
106	Kenya	3.76	117	3.36	79	4.16	89	3.75
107	Gambia, The	3.70	122	3.05	94	3.95	58	4.11
108	Zambia	3.68	107	3.97	102	3.79	115	3.29
109	Malawi	3.63	119	3.29	95	3.94	93	3.65
110	Moldova	3.60	106	3.98	121	3.22	97	3.59
111	Armenia	3.56	109	3.88	111	3.52	116	3.27
112	Côte d'Ivoire	3.53	113	3.61	104	3.74	118	3.23
113	Madagascar	3.53	118	3.31	114	3.45	79	3.82
114	Mauritania	3.50	120	3.27	106	3.67	99	3.56
115	Kyrgyz Republic	3.47	105	4.17	128	3.16	124	3.07
116	Paraguay	3.45	102	4.23	117	3.34	131	2.78
117	Cameroon	3.42	115	3.48	110	3.54	119	3.23
118	Tanzania	3.36	121	3.14	113	3.46	107	3.47
119	Lesotho	3.36	114	3.55	126	3.17	113	3.34
120	Nicaragua	3.31	108	3.89	132	2.93	123	3.10
121	Bolivia	3.29	112	3.75	116	3.34	130	2.79
122	Mali	3.27	126	2.70	123	3.20	73	3.91
123	Nepal	3.22	116	3.43	120	3.23	126	3.01
124	Cambodia	3.21	123	2.93	122	3.22	106	3.47
125	Burkina Faso	3.13	133	2.34	109	3.55	105	3.49
126	Benin	3.09	127	2.58	127	3.16	104	3.53
127	Mozambique	3.04	129	2.53	124	3.20	112	3.39
128	Bangladesh	3.01	124	2.88	129	3.09	125	3.06
129	Ethiopia	2.96	128	2.57	131	3.01	114	3.30
130	Uganda	2.93	134	1.95	125	3.19	92	3.65
131	Burundi	2.92	125	2.80	130	3.03	129	2.92
132	Zimbabwe	2.74	130	2.49	119	3.31	134	2.44
133	Chad	2.69	131	2.47	133	2.85	132	2.75
134	Timor-Leste	2.65	132	2.36	134	2.64	128	2.96

(Cont'd.)

Table 4: Usage component subindex

USAGE SUBINDEX			Individual usage		Business usage		Government usage	
Rank	Country/Economy	Score	Rank	Score	Rank	Score	Rank	Score
1	Denmark	6.07	3	5.96	2	6.15	1	6.09
2	Sweden	5.98	2	6.06	1	6.15	6	5.72
3	Singapore	5.67	7	5.21	13	5.77	2	6.02
4	Netherlands	5.65	1	6.39	14	5.74	22	4.82
5	United States	5.63	10	5.05	5	6.06	5	5.79
6	Switzerland	5.48	6	5.29	3	6.11	17	5.02
7	Norway	5.45	8	5.18	10	5.85	12	5.33
8	Hong Kong SAR	5.42	9	5.17	20	5.46	7	5.64
9	Estonia	5.37	14	4.83	24	5.29	3	6.00
10	Korea, Rep.	5.32	20	4.31	16	5.70	4	5.95
11	Canada	5.31	12	4.93	12	5.77	13	5.23
12	Taiwan, China	5.30	15	4.60	15	5.74	8	5.55
13	United Kingdom	5.28	5	5.45	17	5.65	26	4.73
14	Iceland	5.24	11	4.94	8	5.91	21	4.86
15	Luxembourg	5.21	4	5.69	23	5.29	27	4.64
16	Finland	5.18	16	4.59	7	6.04	19	4.92
17	Australia	5.14	18	4.47	21	5.40	9	5.55
18	Japan	5.12	13	4.85	4	6.09	34	4.43
19	Austria	5.11	21	4.26	9	5.87	14	5.18
20	France	5.06	23	4.13	18	5.65	10	5.40
21	Germany	4.93	17	4.51	6	6.04	43	4.25
22	New Zealand	4.86	22	4.25	26	5.23	15	5.09
23	Belgium	4.75	19	4.37	19	5.55	40	4.34
24	Israel	4.74	28	3.67	11	5.78	24	4.75
25	United Arab Emirates	4.60	31	3.57	27	5.18	16	5.06
26	Malta	4.59	33	3.47	37	4.95	11	5.37
27	Ireland	4.56	24	3.95	29	5.14	28	4.59
28	Portugal	4.41	41	3.07	28	5.17	18	4.98
29	Slovenia	4.34	27	3.68	35	4.98	38	4.37
30	Malaysia	4.34	45	2.86	25	5.26	20	4.89
31	Qatar	4.28	38	3.26	41	4.86	25	4.73
32	Lithuania	4.27	32	3.51	47	4.74	30	4.55
33	Czech Republic	4.25	25	3.91	22	5.32	77	3.53
34	Spain	4.22	30	3.57	42	4.85	44	4.23
35	Bahrain	4.08	44	2.90	45	4.77	29	4.58
36	Cyprus	4.07	37	3.28	40	4.86	49	4.07
37	Italy	4.05	26	3.84	56	4.61	68	3.69
38	Chile	4.03	49	2.49	31	5.06	31	4.53
39	Jamaica	4.01	29	3.67	63	4.49	57	3.86
40	Hungary	3.99	34	3.44	51	4.69	58	3.86
41	Brazil	3.88	62	2.12	32	5.06	32	4.47
42	Barbados	3.85	35	3.38	60	4.54	71	3.65
43	Slovak Republic	3.85	36	3.33	38	4.91	94	3.31
44	Saudi Arabia	3.85	53	2.38	39	4.87	42	4.30
45	Jordan	3.81	73	1.93	33	5.02	33	4.46
46	Latvia	3.75	39	3.18	62	4.49	74	3.57
47	Tunisia	3.73	75	1.87	36	4.97	39	4.36
48	China	3.73	83	1.73	50	4.69	23	4.77
49	Croatia	3.71	42	3.01	57	4.57	75	3.55
50	Puerto Rico	3.68	65	2.05	34	5.02	55	3.97
51	Thailand	3.67	69	1.98	49	4.70	41	4.32
52	Romania	3.62	40	3.16	78	4.28	84	3.42
53	Mexico	3.58	66	2.04	76	4.31	36	4.39
54	Turkey	3.56	61	2.13	48	4.74	60	3.79
55	Oman	3.54	70	1.97	66	4.44	45	4.21
56	Dominican Republic	3.54	85	1.70	59	4.54	37	4.38
57	Azerbaijan	3.53	94	1.57	55	4.61	35	4.42
58	Brunei Darussalam	3.52	54	2.38	67	4.41	65	3.76
59	India	3.51	114	1.26	30	5.09	47	4.19
60	Ukraine	3.51	59	2.22	71	4.35	56	3.96
61	Colombia	3.48	67	2.03	70	4.36	50	4.06
62	Mauritius	3.47	60	2.15	64	4.46	59	3.79
63	South Africa	3.46	78	1.83	46	4.76	61	3.79
64	Uruguay	3.45	55	2.36	74	4.32	69	3.68
65	Kuwait	3.42	51	2.41	54	4.63	97	3.23
66	Guatemala	3.42	86	1.69	44	4.80	63	3.78
67	El Salvador	3.41	76	1.87	72	4.34	51	4.03
68	Senegal	3.41	104	1.35	52	4.67	46	4.21
69	Greece	3.40	48	2.51	77	4.28	85	3.41
70	Bulgaria	3.40	47	2.74	94	3.97	80	3.50
71	Costa Rica	3.38	63	2.10	79	4.26	64	3.77
72	Egypt	3.38	98	1.49	53	4.64	53	4.00
73	Panama	3.35	79	1.80	58	4.57	70	3.68
74	Montenegro	3.34	43	2.96	97	3.94	101	3.11
75	Sri Lanka	3.34	103	1.39	43	4.84	62	3.78
76	Vietnam	3.33	90	1.62	80	4.23	48	4.12
77	Argentina	3.30	52	2.38	85	4.18	91	3.35
78	Kazakhstan	3.26	68	2.01	92	4.05	66	3.73
79	Gambia, The	3.25	101	1.42	73	4.32	52	4.01
80	Poland	3.24	46	2.79	69	4.36	127	2.57
81	Philippines	3.22	91	1.61	61	4.53	79	3.51
82	Russian Federation	3.17	56	2.33	81	4.23	111	2.95
83	Macedonia, FYR	3.15	50	2.42	109	3.69	93	3.34
84	Venezuela	3.13	64	2.08	98	3.92	87	3.39
85	Peru	3.13	72	1.95	91	4.09	92	3.35
86	Trinidad and Tobago	3.13	57	2.24	89	4.10	107	3.04
87	Morocco	3.12	77	1.85	83	4.21	95	3.30
88	Mali	3.09	123	1.15	88	4.12	54	3.99
89	Botswana	3.08	89	1.65	93	3.98	72	3.60
90	Nigeria	3.04	112	1.28	68	4.39	83	3.45
91	Moldova	3.01	80	1.80	87	4.14	103	3.10
92	Pakistan	3.01	93	1.59	86	4.16	96	3.27
93	Serbia	2.99	58	2.23	113	3.57	98	3.19
94	Indonesia	2.98	107	1.34	65	4.44	99	3.15
95	Kenya	2.97	109	1.33	82	4.23	88	3.37
96	Mauritania	2.96	105	1.35	96	3.96	73	3.58
97	Honduras	2.93	111	1.28	90	4.10	86	3.41
98	Mongolia	2.91	97	1.52	106	3.71	81	3.50
99	Uganda	2.90	119	1.19	95	3.97	76	3.54
100	Georgia	2.89	100	1.46	101	3.85	90	3.36
101	Burkina Faso	2.86	127	1.08	104	3.79	67	3.70
102	Namibia	2.82	95	1.57	84	4.19	124	2.70
103	Côte d'Ivoire	2.79	110	1.29	75	4.31	121	2.76
104	Mozambique	2.75	125	1.12	110	3.67	82	3.47
105	Albania	2.75	82	1.74	120	3.46	106	3.06
106	Syria	2.75	96	1.54	99	3.89	116	2.83
107	Madagascar	2.74	126	1.08	103	3.79	89	3.36
108	Bosnia and Herzegovina	2.74	71	1.95	108	3.70	129	2.56
109	Zambia	2.73	116	1.21	100	3.87	104	3.10
110	Benin	2.72	121	1.16	118	3.49	78	3.51
111	Libya	2.68	92	1.59	115	3.51	110	2.95
112	Tajikistan	2.66	132	1.04	102	3.84	102	3.11
113	Cameroon	2.66	117	1.20	107	3.70	105	3.07
114	Guyana	2.64	88	1.65	121	3.46	119	2.81
115	Cambodia	2.63	124	1.12	112	3.61	100	3.15
116	Tanzania	2.60	122	1.15	105	3.72	112	2.93
117	Ghana	2.60	115	1.26	114	3.56	108	2.97
118	Ecuador	2.59	74	1.92	128	3.29	128	2.56
119	Algeria	2.57	81	1.74	129	3.22	122	2.75
120	Armenia	2.54	108	1.33	111	3.63	125	2.66
121	Lesotho	2.52	118	1.19	117	3.49	115	2.86
122	Kyrgyz Republic	2.51	99	1.49	123	3.43	126	2.61
123	Nicaragua	2.50	106	1.35	122	3.44	123	2.71
124	Ethiopia	2.49	134	1.01	116	3.50	109	2.96
125	Malawi	2.48	129	1.06	119	3.46	114	2.91
126	Bolivia	2.44	102	1.41	132	3.09	117	2.83
127	Burundi	2.43	133	1.03	125	3.33	113	2.92
128	Paraguay	2.42	87	1.67	130	3.12	132	2.49
129	Suriname	2.36	84	1.71	127	3.31	133	2.06
130	Bangladesh	2.34	120	1.17	126	3.32	130	2.53
131	Chad	2.32	128	1.06	131	3.11	120	2.79
132	Nepal	2.30	131	1.04	124	3.37	131	2.49
133	Timor-Leste	2.27	130	1.05	133	2.94	118	2.81
134	Zimbabwe	2.04	113	1.27	134	2.87	134	2.00

(Cont'd.)

**Table 5: Top performer on each pillar of the Networked Readiness Index 2008–2009**

Country/Economy	Overall GCI	Number of times ranked in top 3	Market environment	Regulatory environment	Infrastructure environment	Individual readiness	Business readiness	Government readiness	Individual usage	Business usage	Government usage
Denmark	1	5	—	2	—	—	—	2	3	2	1
Sweden	2	5	—	—	2	—	2	3	2	1	—
United States	3	3	2	—	3	—	3	—	—	—	—
Singapore	4	5	3	1	—	2	—	1	—	—	2
Switzerland	5	3	—	—	—	3	1	—	—	3	—
Iceland	7	1	—	—	1	—	—	—	—	—	—
Finland	6	2	—	3	—	1	—	—	—	—	—
Netherlands	9	1	—	—	—	—	—	—	1	—	—
Hong Kong SAR	12	1	1	—	—	—	—	—	—	—	—
Estonia	18	1	—	—	—	—	—	—	—	—	3

**Table 6: Evolution of the Networked Readiness Index since 2001–02**

Country	2008–09	2007–08	2006–07	2005–06	2004–05	2003–04	2002–03	2001–02
(Number of economies)	134	127	122	115	104	102	82	72
Denmark	1	1	1	3	4	5	8	7
Sweden	2	2	2	8	6	4	4	4
United States	3	4	7	1	5	1	2	1
Singapore	4	5	3	2	1	2	3	8
Switzerland	5	3	5	9	9	7	13	16
Finland	6	6	4	5	3	3	1	3
Iceland	7	8	8	4	2	10	5	2
Norway	8	10	10	13	13	8	17	5
Netherlands	9	7	6	12	16	13	11	6
Canada	10	13	11	6	10	6	6	12

competitiveness: the country has ranked consistently in first place since 2006 (continuously improving its score), culminating an upward trend observed since 2003, as shown in Table 6. The country posts an outstanding showing across the board, ranking 4th, 2nd, and 1st in the environment, readiness, and usage components, respectively. This highlights the importance of a supportive environment and of a multi-stakeholder effort to achieve networked readiness prowess. In particular, the government's clear and consistent vision on the importance of ICT diffusion (2nd and 1st, respectively, in government readiness and usage)<sup>7</sup> reflects in an extremely ICT friendly regulatory environment (2nd), with the world's most-developed ICT legislation; it has also helped in achieving among the highest penetration rates worldwide. Denmark continues to display the highest Internet bandwidth (346 mB/s per 10,000 population) and broadband Internet penetration rates (36.3 subscribers per 100 population) in the sample, together with extensive ICT usage by companies in their business transactions (5th). Other notable competitive advantages helping the country to fully leverage technology have to do with more general aspects, such as the well-functioning and developed internal market—which provided the national high-tech industry with a large domestic

demand in its early stage—and the excellent educational system (6th) coupled with a close collaboration between academia and industry (7th), and the Danish people's taste and talent for developing, pioneering, and using new technologies and applications.

The other **Nordic countries** continue to feature prominently in the NRI 2008–2009 rankings, with Sweden, Finland, Iceland, and Norway at 2nd, 6th, 7th, and 8th position, respectively. The strong education fundamentals and high levels of technological readiness and innovation shared by these countries represent bases for their overall competitiveness;<sup>8</sup> they will no doubt be of assistance to Iceland in particular in overcoming the present severe economic crisis.

Amidst the current major recession, the **United States** continues to deliver a convincing performance in networked readiness, climbing one position to an outstanding 3rd place. Among the country's most notable competitive strengths are its highly ICT-conducive environment (3rd), displaying an outstandingly efficient market environment (2nd in the world) as well as top-class ICT-related infrastructure (3rd). In particular, the large pool of scientists and engineers (6th) and the best-ranked research institutions in the sample equip the country with the necessary infrastructure for technology

absorption and development. This, coupled with well-developed clusters (2nd), results in an extremely ICT-ready (3rd and 5th, respectively, for business readiness and usage) and innovative business sector, heavily exporting high-tech products (12th, with 21 percent of total exports) to the international market. The country remains one of the world's main innovation powerhouses, as highlighted by its 2nd position for the number of utility patents (263.7 per million population).

On a less positive note, the relatively mediocre rankings registered for the burden of government regulation (50th) and tax rate (68th, 42.3 percent of total profits), among others, point to the presence of red tape and inefficiencies in the country's business environment. The quality of the general regulatory framework, at 19th, is another area of concern, notably with regard to the effectiveness of law making (33rd), the efficiency of the legal framework to settle disputes (28th), the protection of property rights (26th), and the independence of the judiciary (23rd).

**Singapore** leads Asia once again in networked readiness at 4th place, one position up from last year, thanks to important strengths such as the world's most ICT-conducive market and regulatory environment and exceptional levels of government readiness (1st in the sample) and usage (2nd). Singapore's astonishing growth into a vibrant high-tech economy in the space of a few decades has much to do with the government's savvy promotion of ICT readiness as a key element of its competitiveness strategy, coupled with a continued focus on education and innovation and important private-public partnerships.<sup>9</sup>

**Switzerland** is still among the top-ranked economies in the world, but drops two places to 5th. The country's success rests on its extremely ICT-supportive market environment (4th) as well as top-notch educational system, especially for math and science (5th), and research institutions (2nd), resulting in a high degree of innovation (6th for the number of utility patents, at 137.1 per million population) and a very networked civil society. In this respect, Switzerland is quite an unusual case within the most successful countries in the sample: the country's ICT excellence seems to be the result of the interest and usage of the business sector and ordinary citizens rather than of a precise government vision and strategy. The country displays the highest and third-best levels of business and individual readiness, respectively, out of the 134 countries covered, coupled with widespread usage (6th and 3rd for individual and business usage, respectively), while the government lags behind, at a rather disappointing 17th place for both its ICT readiness and usage.

**The Netherlands** is down two positions at 9th, although improving its NRI score slightly. The country continues to post a very robust performance, driven by impressive levels of ICT usage (4th), particularly by individuals (1st). The fairly low marks obtained by the

government for its readiness (23rd) and usage (22nd) point to the weak prioritization of ICT in the national agenda and to the need for a more active government role in leveraging ICT for overall growth.

Improving three positions from last year, **Canada** re-enters the top 10, at 10th place, for the first time since 2005–06. The country's networked readiness is particularly boosted by an excellent ICT infrastructure (4th), a conducive market environment (15th), and widespread ICT usage (11th) by all social actors (12th, 12th, and 13th for individual, business, and government usage, respectively).

Tables 5 and 6 provide some additional insight into the most successful economies in leveraging ICT this year, by looking at the top three performers in each of the nine pillars composing the NRI, and at the evolution of the top 10 economies since 2001–02.

Table 5 highlights a number of features:

1. Denmark, Sweden, and Singapore are the countries appearing in the top three positions most frequently (i.e., in five pillars out of nine), followed by Switzerland and the United States, which each appear three times within the top three.
  2. Singapore is once again the only country to rank 1st in more than one pillar, topping the political and regulatory environment pillar and the government readiness pillar. Top-ranked Denmark leads only in one pillar (government usage).
  3. Finland, Iceland, the Netherlands, Sweden, Switzerland, and the United States each rank 1st in one pillar. Finland and the Netherlands are home of the highest individual readiness and usage, respectively. In particular, the Netherlands displays among the highest penetration rates in the world for PCs (2nd), broadband Internet subscribers (4th), and Internet users (1st). Iceland has the most ICT-friendly infrastructure in the world as assessed by the NRI, with outstanding marks in most of the hard infrastructure components, notably the number of telephone lines (4th), secure Internet servers (1st), and electricity production (2nd). Switzerland and Sweden, in turn, top the league for the readiness and usage, respectively, of their business sectors.
- Switzerland ranks among the best in the world for on-the-job training, industry-academia collaboration, and company spending in R&D, among others, while Swedish businesses appear among the most innovative in the world (4th for capacity of innovation and firm level technology absorption) and are using the Internet extensively in their transactions (2nd). Last, the United States can count on one of the most ICT-conducive market environments in the world, as noted above.

4. Hong Kong (12th overall) and Estonia (18th) are the only two economies outside the top 10 to appear within the top three of one pillar. Hong Kong tops the market environment pillar, thanks to its volume of high-tech exports, which account for 50 percent of total exports (2nd), the low burden of taxation (3rd) and bureaucracy (2nd), the sophistication of its financial market (2nd), and its extensive domestic competition (7th). As for Estonia, it ranks 3rd on government usage. The government gets top marks for the availability of online services (1st

worldwide), ICT-driven efficiency (2nd), the presence of ICT in its offices (2nd), and its successes in promoting ICT (5th).

Completing the analysis conducted above, Box 2 relates the main findings of an across-time analysis aimed at identifying the regions and countries that have progressed the most in the eight years since the NRI's inception.

### Box 2: Evolution of the NRI: Focus on the most and least dynamic countries and regions

Table A provides the results of an analysis of country performance based on decile rankings. Like a percentile ranking, a decile ranking attributes ranks *relative* to the number of countries in the sample.<sup>1</sup> This allows us to compare countries' performances across time in the presence of varying sample sizes. In effect, one has to take into account the fact that the country coverage has increased ever since the first edition of the *Report* and, as a result, for a country to be ranked 50th among 75 countries is not the same as being ranked 50th out of 134.

The **Middle East** stands out as the region having benefited the most from ICT advances over the last eight years, registering a 3.5 decile rank improvement, an extra 0.5 from 2007. The regions of the **Commonwealth of Independent States (CIS)** and **Mongolia** and **Developing Asia** follow, with a 2 and 1.5 decile rank improvement, respectively. The Middle East, in particular, has seen a stellar upsurge in penetration rates in recent years, with a 600 percent increase in the number of Internet users from 2002 to 2007, the largest in the world. Also ICT is increasingly seen by many countries in the region, notably the Gulf countries, as an essential tool (both as a target sector and infrastructure) to promote a structural transformation in the production and export sector toward more value-added goods and to modernize their societies.

For this reason, the **United Arab Emirates** has embarked on a number of multibillion dollar technology-based projects, notably the Dubai Media City, Dubai Internet City, and Knowledge Village, with the aim of creating innovation clusters. **Qatar**, in turn, made ICT the focal point of its economic, political, and social modernization process, creating in 2004 *ictQatar* as both regulator and ICT champion in the country.<sup>2</sup> Other, less wealthy economies in the region, such as **Jordan** and **Egypt** (respectively progressing 3 and 2 decile ranks during the period under consideration), have proven quite successful in leveraging ICT to improve economic efficiency and service provision, particularly in education. Egypt has also recently turned into an important ICT outsourcing center, thanks to a savvy government strategy in promoting an FDI-friendly environment, as explained in Chapter 2.1 of this *Report*.

In the CIS and Mongolia region, **Ukraine** and **Russia** have proven particularly dynamic over the period,

progressing 4 and 3 decile ranks, respectively. Both countries have been fairly successful in leveraging their well-educated workforces and in dramatically improving ICT penetration rates.

In Developing Asia, **China** and **India** have realized impressive upward movements across decile ranks (five and three places, respectively) from 2001. This does not come as a surprise, given that they have established themselves as major players in the international ICT markets in recent times, with India emerging as a prime ICT service exporter and China as the biggest exporter of ICT goods in the world.

In the **Western hemisphere** region, which comprises the Latin American and Caribbean countries, **Jamaica** is the country that has improved the most over the period of inclusion. Ranked in the 8th decile in 2001–02, it climbed the NRI ranking steadily to reach the 4th decile in 2006–07 and has maintained this position ever since.

On a more negative note, **Africa** continues to stagnate in networked readiness, dropping 0.5 in decile rank over the 2001–08 period. Despite the spectacular advances in ICT penetration—notably mobile telephony—realized in the last decade or so, and the great untapped potential of its domestic market, the region is not closing the digital divide with respect to other more networked areas of the world, which are progressing much faster. Nevertheless, 11 countries in the region have progressed in decile ranks since their first inclusion in the NRI, with Mauritius and Nigeria at the forefront (both 3 decile ranks up).

The decile ranking approach presents one caveat: countries that were included after the first edition of the NRI in 2001 are, in majority, from the developing world, in particular Africa. Admittedly, their performance in general has been worse than that of incumbent countries. This means that it is enough for an incumbent country to maintain its rank to automatically progress in the decile ranking. However, examples abound in our analysis of incumbent countries losing ground to incoming countries and, consequently, stagnating or even dropping in terms of decile ranking. Argentina and Tanzania have both lost two decile ranks since 2001–02, Venezuela and Poland have lost one decile rank, Zimbabwe has remained in the 10th decile since the beginning. Two such examples are Italy and Greece. These two EU members have not managed to progress a single

Table A: Evolution in decile rankings since first inclusion

Country	Region*	First inclusion		NRI 2008–2009		Decile diff.
		Edition	Rank Decile	Rank	Decile	
Albania	CEE	05–06	106 10	105 8	2	
Algeria	AF	03–04	87 9	108 9	—	
Argentina	WH	01–02	32 5	87 7	–2	
Armenia	CIS	05–06	86 8	114 9	–1	
Australia	AE	01–02	14 2	14 2	—	
Austria	AE	01–02	9 2	16 2	—	
Azerbaijan	CIS	05–06	73 7	60 5	2	
Bahrain	ME	04–05	33 4	37 3	1	
Bangladesh	DA	01–02	73 10	130 10	—	
Barbados	WH	06–07	40 4	36 3	1	
Belgium	AE	01–02	18 3	24 2	1	
Benin	AF	05–06	108 10	121 10	—	
Bolivia	WH	01–02	67 9	128 10	–1	
Bosnia and Herzegovina	CEE	04–05	89 9	106 8	1	
Botswana	AF	02–03	44 6	77 6	—	
Brazil	WH	01–02	38 6	59 5	1	
Bulgaria	CEE	01–02	53 8	68 6	2	
Burkina Faso	AF	06–07	99 9	113 9	—	
Burundi	AF	06–07	121 10	131 10	—	
Cambodia	DA	05–06	104 10	126 10	—	
Cameroon	AF	03–04	83 9	123 10	–1	
Canada	AE	01–02	12 2	10 1	1	
Chad	AF	03–04	102 10	134 10	—	
Chile	WH	01–02	34 5	39 3	2	
China	DA	01–02	64 9	46 4	5	
Colombia	WH	01–02	57 8	64 5	3	
Costa Rica	WH	01–02	45 6	56 5	1	
Croatia	CEE	02–03	48 6	49 4	2	
Cyprus	AE	04–05	37 4	33 3	1	
Czech Republic	CEE	01–02	28 4	32 3	1	
Denmark	AE	01–02	7 1	1 1	—	
Dominican Republic	WH	01–02	47 7	75 6	1	
Ecuador	WH	01–02	71 10	116 9	1	
Egypt	ME	01–02	60 8	76 6	2	
El Salvador	WH	01–02	55 8	78 6	2	
Estonia	CEE	01–02	23 4	18 2	2	
Ethiopia	AF	03–04	101 10	129 10	—	
Finland	AE	01–02	3 1	6 1	—	
France	AE	01–02	24 4	19 2	2	
Gambia, The	AF	03–04	82 9	91 7	2	
Georgia	CIS	04–05	91 9	88 7	2	
Germany	AE	01–02	17 3	20 2	1	
Ghana	AF	03–04	74 8	103 8	—	
Greece	AE	01–02	31 5	55 5	—	
Guatemala	WH	01–02	68 10	82 7	3	
Guyana	WH	05–06	111 10	100 8	2	
Honduras	WH	01–02	72 10	95 8	2	
Hong Kong SAR	AE	01–02	13 2	12 1	1	
Hungary	CEE	01–02	30 4	41 4	—	
Iceland	AE	01–02	2 1	7 1	—	
India	DA	01–02	54 8	54 5	3	
Indonesia	DA	01–02	59 8	83 7	1	
Ireland	AE	01–02	19 3	23 2	1	
Israel	AE	01–02	22 3	25 2	1	
Italy	AE	01–02	25 4	45 4	—	
Jamaica	WH	01–02	56 8	53 4	4	
Japan	AE	01–02	21 3	17 2	1	
Jordan	ME	01–02	49 7	44 4	3	
Kazakhstan	CIS	05–06	60 6	73 6	—	
Kenya	AF	03–04	84 9	97 8	1	
Korea, Rep.	AE	01–02	20 3	11 1	2	
Kuwait	ME	05–06	46 4	57 5	–1	
Kyrgyz Republic	CIS	05–06	103 9	115 9	—	
Latvia	CEE	01–02	39 6	48 4	2	
Lesotho	AF	06–07	116 10	118 9	1	
Lithuania	CEE	01–02	42 6	35 3	3	
Luxembourg	AE	02–03	27 4	21 2	2	
Macedonia, FYR	CEE	03–04	75 8	79 6	2	
Madagascar	AF	03–04	92 10	112 9	1	
Malawi	AF	04–05	93 9	110 9	—	
Malaysia	DA	01–02	36 5	28 3	2	
Mali	AF	03–04	96 10	107 8	2	
Malta	CEE	03–04	27 3	26 2	1	
Mauritania	AF	06–07	87 8	109 9	–1	
Mauritius	AF	01–02	51 7	51 4	3	
Mexico	WH	01–02	44 6	67 5	1	
Moldova	CIS	05–06	94 9	99 8	1	
Mongolia	CIS	05–06	92 8	93 7	1	
Morocco	AF	02–03	52 7	86 7	—	
Mozambique	AF	03–04	97 10	124 10	—	
Namibia	AF	02–03	53 7	92 7	—	
Nepal	DA	06–07	108 9	127 10	–1	
Netherlands	AE	01–02	6 1	9 1	—	
New Zealand	AE	01–02	11 2	22 2	—	
Nicaragua	WH	01–02	69 10	125 10	—	
Nigeria	AF	01–02	75 10	90 7	3	
Norway	AE	01–02	5 1	8 1	—	
Pakistan	DA	03–04	76 8	98 8	—	
Panama	WH	01–02	48 7	66 5	2	
Paraguay	WH	01–02	63 9	122 10	–1	
Peru	WH	01–02	52 7	89 7	—	
Philippines	DA	01–02	58 8	85 7	1	
Poland	CEE	01–02	35 5	69 6	–1	
Portugal	AE	01–02	27 4	30 3	1	
Qatar	ME	05–06	39 4	29 3	1	
Romania	CEE	01–02	65 9	58 5	4	
Russian Federation	CIS	01–02	61 9	74 6	3	
Senegal	AF	03–04	81 8	80 6	2	
Singapore	AE	01–02	8 2	4 1	1	
Slovak Republic	CEE	01–02	33 5	43 4	1	
Slovenia	AE	01–02	29 4	31 3	1	
South Africa	AF	01–02	40 6	52 4	2	
Spain	AE	01–02	26 4	34 3	1	
Sri Lanka	DA	01–02	62 9	72 6	3	
Suriname	WH	06–07	110 10	117 9	1	
Sweden	AE	01–02	4 1	2 1	—	
Switzerland	AE	01–02	16 3	5 1	2	
Taiwan, China	AE	01–02	15 2	13 1	1	
Tajikistan	CIS	05–06	93 9	104 8	1	
Tanzania	AF	03–04	71 7	119 9	–2	
Thailand	DA	01–02	43 6	47 4	2	
Trinidad and Tobago	WH	01–02	46 7	81 7	—	
Tunisia	AF	02–03	34 5	38 3	2	
Turkey	CEE	01–02	41 6	61 5	1	
Uganda	AF	03–04	80 8	120 9	–1	
Ukraine	CIS	01–02	66 9	62 5	4	
United Arab Emirates	ME	04–05	23 3	27 3	—	
United Kingdom	AE	01–02	10 2	15 2	—	
United States	AE	01–02	1 1	3 1	—	
Uruguay	WH	01–02	37 5	65 5	—	
Venezuela	WH	01–02	50 7	96 8	–1	
Vietnam	DA	01–02	74 10	70 6	4	
Zambia	AF	03–04	85 9	102 8	1	
Zimbabwe	AF	01–02	70 10	132 10	—	

REGIONS (MEDIANS)						
Advanced Economies	AE	01–02	14.5 2	15.5 2	–	
Africa	AF	01–02	60.5 8.5	109 9	–0.5	
Central and Eastern Europe	CEE	01–02	37 5.5	58 5	0.5	
CIS and Mongolia	CIS	01–02	63.5 9	90.5 7	2	
Developing Asia	DA	01–02	59 8	77.5 6.5	1.5	
Middle East	ME	01–02	54.5 7.5	47 4	3.5	
Western Hemisphere	WH	01–02	51 7	79.5 6.5	0.5	

Note: See text for details. Countries added in, or after, the 2007–2008 edition are not reported but are included in the calculation of the regional medians.  
\* Regional abbreviations: Advanced Economies (AE); Africa (AF); Central and Eastern Europe (CEE); CIS and Mongolia (CIS); Middle East (ME); Western Hemisphere (WH).

### Box 2: Evolution of the NRI: Focus on the most and least dynamic countries and regions (cont'd.)

decile rank since the first edition of the NRI despite the nearly twofold increase in country coverage. Italy appears in the 4th decile in both editions (it was ranked 25th in 2001–02 and 45th in 2008–09), while Greece appears in the 5th decile (31st in 2001–02 and 55th in 2008–09). This means that these two nations have been overtaken by many incumbent and newly included economies.

#### Notes

1 For each edition of the NRI, the overall ranking was divided into 10 segments—or *deciles*—each with an equal count of ranks. The 1st and 10th deciles comprise the economies that rank the highest and the lowest, respectively. The 1st decile includes ranks 1 to 6 in the 2001–02 edition, and ranks 1 to 13 in 2008–09. Similarly, the 10th decile includes ranks 68 to 75 in 2001–02 and ranks 121 to 134 in 2008–09. Based on this approach, the 50th rank corresponds to the 7th decile in 2001–02 and to the 4th decile in 2008–09. A similar analysis was conducted last year (see Mia and Dutta 2008).

2 See Al-Jaber and Dutta 2008.

agendas over time, involving the private sector in a shared vision of ICT excellence.

Turning our attention to the **EU15** economies,<sup>10</sup> the appraisal is more varied. Similarly to the NRI findings in previous editions of the *Report*, there exists a divide among countries such as Denmark, Sweden, Finland, Norway, the Netherlands, the United Kingdom, Austria, France, Germany, **Ireland** (23rd), and **Belgium** (24th), which seem to be leveraging ICT in their economic, political, and social systems, and others such as **Greece** (55th) and, to a lesser extent, **Italy** (45th), which lag behind in networked readiness. While Greece remains stable with respect to 2007 and shows a slight improvement in score (from 3.94 to 4.00), Italy continues the downward trend that began last year, dropping another three places. Important flaws preventing the country to fully leverage ICT are the weak market (75th) and regulatory (92nd) environments and the low priority given to ICT diffusion in the government agenda, as highlighted by the disappointing 83rd place for government readiness.

Among EU newcomers (the **EU accession 12**),<sup>11</sup> **Estonia** (18th) and, to a lesser extent, **Slovenia** (31st), the **Czech Republic** (32nd), **Lithuania** (35th) have successfully used ICT as a lever for the structural transformation and modernization of their economies and societies after the fall of the Berlin Wall. In Estonia, in particular, ICT diffusion eased and facilitated the transition from a planned economy to an extremely competitive market economy in less than 20 years, thanks to a visionary leadership and the government's continuous prioritization of innovation and universal ICT access as a tool for improved growth and competitiveness.<sup>12</sup> Estonia continues this year its march to the top of the rankings, gaining two positions from 2007, showing that small can be beautiful when coupled with the right ICT- and competitiveness-friendly policies and with a vision of a fully networked society.

On the other side of the spectrum, **Bulgaria** (68th) and **Poland** (69th) continue to trail behind. While Bulgaria's rank is essentially unchanged from last year, with a small score improvement (from 3.71 to 3.80), Poland is losing further ground with respect to the most networked among the EU accession 12 countries. Poland has not tackled perennial weaknesses in its networked readiness landscape, such as the poor market and regulatory environment (ranked 87th and 100th, respectively) and the marginal importance given by the government to ICT in its national agenda (103rd and 127th for government readiness and usage, respectively).

**Turkey** drops six places from 2007, positioning itself at 61st, with a fairly homogeneous showing across the different pillars composing the NRI. While the environment appears to be quite ICT friendly (56th), especially in its regulatory dimensions (56th), significant room for improvement remains in the readiness

## Europe

Europe, as region, continues to occupy a relevant position in the global networked map drawn by the NRI rankings. Twelve out of the top 20 performers are from the region, with Denmark and Sweden showing the way to the rest of the world in networked readiness, followed by Switzerland (5th), Finland (6th), Iceland (7th), Norway (8th), the Netherlands (9th), the United Kingdom (15th), Austria (16th), Estonia (18th), France (19th), and Germany (20th).

The **Nordic countries** are surely the networked readiness champions in the region as well as globally, having consistently ranked in the top 10 for the past eight years, as indicated in Table 6. These countries seem to be fully benefiting from ICT advances, as shown by their extraordinary penetration and diffusion rates and their sophisticated business sectors, successfully exporting high-tech products to international markets. The Nordic recipe for networked success owes much to a transparent and business-friendly legal framework, well-functioning markets, top-notch educational and research systems, and a widespread culture of innovation both in the public and private sectors, among others. Also, Nordic policymakers have early understood the importance of ICT as a competitiveness enabler and have constantly promoted its use and diffusion in their national

subindex (69th), in particular with respect to ICT accessibility, the quality of education, and the government's vision and e-leadership in ICT diffusion, among others. In particular, Turkey's government readiness, at 87th, receives the lowest mark across the nine pillars.

**Russia** is fairly stable at 74th, with a minor score improvement (from 3.68 to 3.77) from 2007. The country can count on important competitive advantages for leveraging ICT, such as the quality of educational and research systems together with fairly innovative firms (45th for innovation capacity) that invest significantly in R&D (46th). On the other hand, significant flaws remain to be addressed in the unsatisfactory quality of the market (96th) and regulatory (85th) environments, as well as the scarce ICT focus in the government's agenda and competitiveness strategy, reflected by below par marks for government readiness and usage (81st and 111th, respectively).

### Asia and the Pacific

Behind 4th-ranked Singapore, five other Asia and Pacific region's economies place in the top 20 this year, as follows: Korea (11th), Hong Kong (12th), Taiwan (13th), Australia (14th), and Japan (17th). By contrast, the region is also home to some of the least ICT-ready economies in the world with four countries—**Cambodia** (126th), **Nepal** (127th), **Bangladesh** (130th), and **Timor-Leste** (133rd)—featuring in the bottom 10 of the rankings.

Following a 10-place jump last year, **Korea** is fairly stable at a remarkable 11th position. The Korean government continues to show the way as a major catalyst of ICT diffusion and innovation (4th for both government readiness and usage). The latter have been a cornerstone of the government's development strategy followed in the last couple of decades and have resulted, among others, in high-quality educational and research systems, producing a large number of scientists and engineers (19th) and leading research institutions (14th). This, coupled with a sophisticated business sector, has transformed the country into one of the world's innovation powerhouses, registering 129.7 utility patents per million population in 2007 (7th worldwide) and massively exporting high-tech products to the international markets (28 percent of its total exports, 8th). Chapter 2.2 of this *Report* provides an account of Korea's rise to one of the most important high-tech global players in the space of two decades or so.

**Hong Kong** (12th) is down two places, with an essentially unchanged performance with respect to last year. Major strengths continue to be found in its very business friendly market environment (first worldwide) characterized by low taxes, strong competition, and a well-developed financial sector. Individual readiness (7th) is excellent, thanks to the affordability of ICT and the high quality of the educational system, while the government leads the way when it comes to ICT usage

(7th). On a less positive note, the infrastructure environment (37th) constitutes the main area for improvement, notably the availability of scientists and engineers (67th) and tertiary education enrollment (63rd).

Just after Hong Kong, **Taiwan** moves up four positions to 13th rank. Taiwan's impressive networked readiness is reflected in the economy ranking 15th or higher in eight of the nine pillars composing the NRI, confirming the success of the development strategy followed by the government in the last three decades (14th and 8th for government readiness and usage, respectively). In particular, Taiwan benefits from a very ICT-conducive market environment (5th), displaying the highest number of utility patents per million population (266.9), the fifth-largest high-tech exports (44.6 percent) worldwide, and extensive ICT penetration rates across the three main stakeholders.

Very much like Korea, Taiwan is a compelling textbook example of a resource-poor, mainly rural economy transformed into a high-tech powerhouse in the space of a few decades, thanks to a savvy government's strategy and vision based on the importance of education, innovation, and ICT diffusion.<sup>13</sup> On a more negative note, Taiwan gets fairly low marks in the political and regulatory environment category (43rd), mainly due to the perceived inefficiency of the lawmaking bodies (96th), mediocre judicial independence (49th), and widespread red tape as reflected in Taiwan's 119th rank for the number of procedures to start a business.

At 14th, **Australia** delivers a performance in line with the previous three editions, which saw the country rank 15th, 15th, and 14th, respectively. Remarkably, the country ranks no lower than 22nd in any of the nine dimensions of the NRI. The infrastructure environment (8th), the political and legal framework (9th), and the government's zeal at using ICT (9th) constitute Australia's main strengths.

**Japan** is up two notches at 17th, thanks to a small score improvement from 5.14 to 5.19. Japan boasts undeniable prowess at leveraging ICT and innovating, as reflected by the level of business readiness (11th) and usage (4th), individual usage (13th), and the number of per capita utility patents (3rd). However, ICT readiness remains impaired by several regulatory, administrative, and infrastructural shortcomings. Furthermore, the rating of government readiness (25th) and usage (34th) has plummeted, the result of a sharp fall in the measures of prioritization, promotion, and procurement of ICT.

**New Zealand** retains its 22nd rank. The country possesses excellent infrastructure (10th) as well as a very ICT-friendly political and regulatory environment (14th). New Zealand's comparatively low rank of 32nd in government readiness is mainly due to low prioritization and procurement of ICT by the government.

**Malaysia** drops two ranks to what remains a satisfactory 28th place. Its performance deteriorates across the entire NRI: Malaysia ranks the same or lower than

last year in all the nine categories and in 56 of the 68 indicators of the Index, although the government is well assessed for its ICT readiness (12th) and for its ICT usage (20th). Malaysia does better than many advanced economies in several indicators pertaining to business readiness, in particular spending on R&D (18th). Infrastructure (48th) and individual usage (45th), where low IT penetration rates drive performance down, constitute the two categories with the largest room for improvement.

Leapfrogging 11 positions, **China** ranks 46th this year, overtaking India and the rest of the BRIC economies for the first time. Although the improvement is generalized, it is especially remarkable in the readiness component of the NRI, in which China jumps from 54th to 36th position: individual readiness is soaring (38th, up 21 places), while business (44th, up 14 places) and government (33rd, up nine places) readiness display significant progress. There is a sense in the business community that ICT now constitutes much more of a priority for the government (38th, a 36-place surge) and a key aspect of its competitiveness strategy. ICT usage by the government is increasing too, translating into more services and efficiency. Yet, major challenges remain to be addressed. Mobile telephony (94th), PCs (79th), and Internet (78th) are spreading but not as rapidly as in many other countries and remain very low (83rd, down three places, for individual usage), while the market environment (59th) and infrastructure (74th) represent major impediments to further ICT diffusion.

Pursuing its downward slide in the ranking, **Thailand** plunges a further seven positions to 47th. Behind this negative trend is the continuous worsening of the country's performance in all the government-related indicators.

**India** is down four positions this year, at 54th, as a result of a very mixed performance. On one hand, India's business readiness (27th) remains impressive, thanks to high-quality management schools (12th), significant corporate spending on R&D (29th), and a broad base of suppliers. This results in high ICT usage by businesses (30th), with a fairly strong capacity not only to adopt new technologies (26th) but also to innovate (35th). On the other hand, like China, India ranks a low 114th in the individual usage category because of a very spotty ICT penetration. Notably, and despite a twofold increase, there are fewer than three PCs and only seven Internet users for every 100 inhabitants, corresponding to 94th and 99th place, respectively. The quality of the infrastructure environment is poorly rated (76th), despite India's ranking 3rd worldwide for the availability of scientists and engineers and 27th for the quality of its research institutions.

Covered for the first time, **Brunei Darussalam** enters the NRI ranking at 63rd.

At 60th, up seven ranks, **Azerbaijan** reinforces its dominance within the **CIS**, thanks to progress made in

several indicators in the environment component and to the government's efforts to prioritize, promote, and use ICT. Within the CIS, the country precedes **Kazakhstan** (73rd, down two) and **Russia** (74th; see the Europe section for further details).

Up three ranks, **Vietnam** (70th) confirms last year's improvement; by contrast, Indonesia and Pakistan, two of the largest Asian economies, display a worrying trend. In just two years, **Indonesia** has lost 21 places and now ranks 83rd. Over the same period, **Pakistan** has dropped 14 ranks and now places 98th, getting dangerously close to the 100 mark.

### Latin America and the Caribbean

The NRI 2008–2009 sketches a rather mixed picture of the Latin American and the Caribbean networked readiness landscape. Although a number of countries are improving their scores and ranks, the region does not seem to be benefiting from ICT to its full potential. Ten countries from the region feature in the top half of the rankings, namely Barbados (36th), Chile (39th), Puerto Rico (42nd), Jamaica (53rd), Costa Rica (56th), Brazil (59th), followed by Colombia, Uruguay, Panama, and Mexico (ranked 64th to 67th, respectively).

Two places up from last year, tiny **Barbados** positions itself at 36th, with a significant score improvement (from 4.26 to 4.38), overcoming Chile as the most networked country in Latin America and the Caribbean for the first time since the NRI's inception. Barbados' networked readiness rests on a rather ICT-conducive environment (31st), especially in its regulatory and infrastructure dimensions (25th in both), and on an outstanding disposition and ICT usage by the individuals (33rd and 35th, respectively, for individual readiness and usage). Among the three stakeholders, individuals play a leading role in leveraging ICT advances. The relative degree of government readiness (38th) has failed so far to translate into high levels of usage, although government usage is one of the items showing the largest improvement from 2007 (rising from 87th to its current rank of 71st).

**Chile**, at 39th, loses five positions as well as its networked readiness prominence in the region. The fact that the country's score is stable (4.32 vs. 4.35 in 2007) underlines the importance of constant progress in ICT diffusion and usage for a country to maintain its competitive edge in the rankings. Chile displays a rather evenly robust performance across all the Index's components, with an especially ICT-conducive market (35th) and regulatory (35th) environments coupled with a strong prioritization of ICT penetration by the government (42nd and 31st for government readiness and usage), as reflected also by the very early adoption—with respect to regional standards—and successful implementation of a comprehensive digital agenda.<sup>14</sup> Among the main outcomes, one can mention the

world-class e-government services (12th), mirrored by extensive business Internet usage (27th). The country's main relative weakness has to do, as in previous years, with the quality of the educational system, especially for math and science (107th) and, to a lesser extent, of research institutions (62nd) and the collaboration between academia and industry (51st). The upgrading of educational and research systems should be a priority in the national competitiveness strategy in the years ahead.

Two other Caribbean economies, **Puerto Rico** (42nd) and **Jamaica** (53rd), continue to post a remarkable showing, even if both seem to be losing some ground with respect to last year (three and seven places, respectively).

On a more positive note, **Costa Rica** (56th) and **Colombia** (64th) are progressing four and five places, respectively, in the ranking, mainly because of a significant improvement in the readiness component from last year: from 48th to 39th and from 64th to 53rd, respectively. In particular, both countries get significantly better marks for individual readiness (Costa Rica moved from 52nd to 44th, and Colombia from 74th to 63rd) and government readiness (from 66th to 48th for Costa Rica, and from 57th to 50th for Colombia).

**Brazil** is unchanged at 59th, with a small score improvement (from 3.87 to 3.94). The country's networked readiness is mainly driven by high levels of usage especially by businesses (32nd) and the government (32nd). Indeed, Brazil is one of the regional and world leaders in e-government services (26th), and the Internet is widely used by businesses in their daily transactions (28th). Chapter 2.3 of this *Report* provides a thoughtful account of successful Brazilian e-government practices and ICT strategy as a tool to reduce the important social and economic divide affecting the country. On a less positive note, Brazil's market (119th) and regulatory (82nd) environments continue to show important flaws in terms of business and ICT friendliness; the soft infrastructure needs to be upgraded, and general education and training standards lag behind. This has negative implications on citizens' readiness to use ICT (81st) and contributes to fairly low levels of individual usage (62nd).

The other regional giant, **Mexico**, is down nine positions from 2007 at 67th and now trails **Uruguay** (65th) and Panama (66th). Mexico shows a deterioration across all nine pillars. The country presents important strengths for leveraging ICT, notably a fairly strong focus on ICT penetration in the government agenda (62nd in government readiness), which translates into high levels of government usage (36th). However, the country suffers from most of the same weaknesses highlighted for Brazil: that is, an overregulated market environment, a poor-quality educational system, and low R&D investment, coupled with rather low ICT readiness and usage by both individuals (74th and 66th,

respectively) and the business sector (72nd and 76th, respectively).

Despite a score virtually unchanged (3.58), **Argentina** (87th) is down 10 positions. The country continues to display serious flaws in the market (128th) and regulatory (120th) environments and a perceived lack of ICT prioritization in the government's national agenda (117th and 91st for government readiness and usage, respectively). These challenges will need to be addressed in the coming years for Argentina to fully exploit ICT advances for increased competitiveness.

**Peru** (89th), **Honduras** (95th), and **Venezuela** (96th) follow, while **Ecuador** (116th), **Paraguay** (122nd), **Nicaragua** (125th), and **Bolivia** (128th) continue to stagnate at the bottom of the rankings, lagging behind the rest of the region and most of the world in networked readiness. Overregulated markets, poor educational and research standards, and high ICT-access costs are some of the obstacles preventing these countries from leveraging more ICT in their national competitiveness strategies.

### Sub-Saharan Africa and Middle East and Northern Africa (MENA)

Despite some positive trends, **sub-Saharan Africa** continues to lag behind the rest of the world by a significant margin, as highlighted by the trend analysis discussed above. Among the 26 countries of the region, only two make it into the top half of the NRI, while 18 rank below the 100th mark.

At 51st, three positions up from 2007, **Mauritius** overtakes South Africa as the most ICT-ready economy in the region. Mauritius' networked readiness is boosted by an excellent market environment (29th), characterized by little red tape and low and non-distortive taxes (8th and 12th for the extent and effect of taxation and total tax rate, respectively), among others.

**South Africa** is stable at 52nd. The country's satisfactory performance continues to rest on the ICT and business friendly regulatory (26th) and market environments (33rd). While the business sector appears quite disposed to use ICT (36th) and to be leveraging its latest advances (46th), major weaknesses remain in individual readiness (80th), due to a mediocre assessment of the quality of educational system and high ICT access costs. This partly explains South Africa's low ICT penetration rates and, therefore, its poor showing in the overall individual usage pillar (78th).

Progressing one rank, **Botswana** comes in 77th overall and 3rd in sub-Saharan Africa. The country posts a major improvement in its environment component (moving seven places up to 58th), mainly because of progress made in the infrastructure pillar (from 93rd to 77th). However, the very low levels of usage by individuals (89th) and businesses (93rd), linked to poor

individual and business readiness (67th and 96th, respectively) remain areas of particular concern.

For its second appearance, **Senegal** ranks 80th this year, up five ranks. Sub-Saharan Africa's largest country, **Nigeria** (90th), regains some of the ground lost last year. Despite posting the same score as last year, **Kenya** loses five places to come in at 97th. Still below rank 100, **Zambia** progresses 10 places at 102nd. Entering just below is **Ghana**, at 103rd, clustering together with the other two African newcomers: **Malawi** (110th) and **Côte d'Ivoire** (111th). Among the other countries of the region, only **Lesotho** does not lose further ground, lagging, however, at the bottom of the global rankings (118th, up four).

Despite a small drop, **Tunisia** (38th) continues to lead the way on the continent. And the gap with respect to the rest of **Northern Africa** is large and widening. The country's successful performance reflects the government's strong emphasis on ICT diffusion (27th and 39th for government readiness and usage, respectively) and rests on a business-friendly regulatory environment (29th) and a fairly good preparation of the three main national stakeholders to use ICT (29th for the readiness component).

The picture for the rest of the region is rather negative this year, with all countries losing some ground in networked readiness with the exception of **Libya** (up four positions to 101st). **Egypt** drops 13 ranks to 76th,<sup>15</sup> and **Morocco** loses 12 to 86th. The case of **Algeria** is even more worrying, with the country plummeting from 88th to 108th.

By contrast, the **Middle East** region continues to improve its networked readiness, with all countries but one appearing in the top half of the NRI ranking. At 25th, **Israel** remains the leader in the region, although by a tiny margin. A member of the top 20 from 2001 to 2007 consecutively, the country drops seven places this year, as a result of a poorer assessment in the area of individual readiness (34th) and individual usage (28th). Both the market environment (17th) and the political and regulatory framework (34th) deteriorate significantly. This does not put into question the fundamentals of Israel's prowess in networked readiness and innovation, confirmed by its impressive 5th position in the world for the number of utility patents (154.3 in 2007), coupled with its 24th position for high-tech exports (12.7 percent of total exports). Indeed, Israel's recent development history is another inspiring example of a small, resource-poor country turned into a global high-tech player in less than 30 years, thanks to a government's coherent vision and strategy in this area.<sup>16</sup>

The **United Arab Emirates (UAE)** is up two positions at 27th, almost closing the gap with Israel. As already mentioned in the historical trend analysis above, the government's push for ICT diffusion and usage has been impressive in recent years, as reflected by the country's 9th and 16th position in the government

readiness and usage categories, respectively. The country realizes its largest improvement from 2007 in the environment component, going up seven places to 32nd in this dimension. The business environment is assessed as being quite ICT conducive (24th), with an impressive 1st and 2nd place for the extent and effect of taxation and for total tax rate, respectively, and little red tape (5th for the burden of government regulation). The challenge for the country in increasing its innovation potential in the years to come has to do with the quality of its higher educational and research system, which is assessed as being fairly poor and does not seem to provide local businesses with a sufficiently large qualified labor pool (75th for the availability of scientists and engineers).

At 29th, **Qatar** continues its rise to the top of the rankings, with a cumulated seven-place improvement since 2006, the year of its first inclusion. The country makes significant progress in all three NRI components with gains of 14, two, and three positions in environment (29th), readiness (26th), and usage (31st), respectively.

Also on a steep upward trend, **Bahrain** soars eight ranks to 37th for a total gain of 13 ranks since its first NRI appearance in 2006. As for the United Arab Emirates and Qatar, the most significant improvements are observed in the environment component (from 50th to 37th this year).

Thanks to progress made across the board, **Saudi Arabia** (40th) improves by eight positions with respect to its inaugural rank last year. While it places 45th or higher in seven other categories of the NRI, Saudi Arabia's situation presents serious shortcomings in terms of individual readiness (79th), notably the quality of the educational system, especially for math and science (85th). As a result, individual usage still remains limited (53rd). While **Jordan** (44th, up three) and **Oman** (50th, also up three) are on the rise, **Kuwait** (57th) drops five places. Much lower in the rankings, **Syria** realizes an outstanding 16-place jump to 94th rank as the result of a remarkable strengthening of individual and business readiness.

## Conclusions

Networked readiness has proven to be an important element in the development and competitiveness strategy of many countries. The successful development stories highlighted in this chapter show that a consistent focus in the national agenda on educational excellence, innovation, and extensive ICT access is instrumental for both developed countries, to maintain their competitive edge, and developing economies, to leapfrog to higher stages of development and facilitate the structural transformation of their economies and societies.

In the current severe economic downturn, policymakers and civil society should not forget the power of innovation, and ICT in particular, as enabler of economic growth and modernization. Public and private invest-

ment in R&D and in ICT infrastructure should not be sacrificed for the sake of budget cuts, since these are not only key for reinforcing national capacity to recover in the short term, but also to sustaining the innovation and growth potential of an economy in the longer term.

We hope the Networked Readiness Framework, the NRI benchmarking exercise, and the insightful papers included in this *Report* will help to raise awareness on the issue, by showcasing best policies and success stories and to underscore the link between economic growth and networked readiness also in times of global economic crisis.

## Notes

- 1 See ceBIT Australia 2008a.
- 2 CeBIT Australia 2008b.
- 3 With a caveat: the NRI used in the first 2001–2002 edition of the *Report* is not strictly comparable with the one developed by INSEAD in 2002 and used since then as the main methodological framework in the GITR series. For more information on the 2001–02 theoretical framework, see Kirkman et al. 2002.
- 4 For further details on the Networked Readiness framework and its theoretical conception, see Dutta 2003.
- 5 Until 2005–06, NRI variables were selected using factor analytical techniques from a larger set of possible variables. Although this was a technically rigorous approach, it reduced the ability to easily explain the underlying logic for including specific variables and to make strict comparisons over time. As a consequence, starting from the 2006–07 edition, expert opinion has played a predominant role in selecting the variables, obviously with the benefit of previous experience in identifying appropriate variables for computing the NRI, thus aligning the NRI's to the Forum's general competitiveness methodology. Also the treatment of missing variables has changed: whereas until 2005–06, those were estimated using analytical techniques such as regression and clustering, beginning in 2006–07 they are indicated with "n/a" and not taken into consideration in the calculation of the specific pillar to which they belong. Moreover, the scale used to compute the NRI and its composing variables has been aligned to the Forum's (increasing) 1–7 scale, changing with respect to the scale used previously for a couple of years (i.e., positive and negative scores around a standardized mean of 0). For more detailed information on the old computation methodology and the changes introduced in 2006–07, see Dutta and Jain 2006 and Mia and Dutta 2007.
- 6 No specific reference is made to North America as a region in this chapter, since the performances of the United States and Canada are detailed in the top 10 section, while Mexico is included, for analysis purposes, in the Latin America and the Caribbean section.
- 7 An important element of the government's ICT prioritization was the liberalization of the telecommunications sector in 1996, well ahead of most fellow members of the European Union. This also contributed to the development of a world-class local high-tech industry, whose exports accounted in 2006 for 20 percent of total exports, earning Denmark 24th place in this dimension of the Index.
- 8 See Sala-i-Martin et al. 2008.
- 9 For a more detailed analysis of Singapore's ICT success story, see Ng et al. 2008.
- 10 Included in the EU15 are the countries that joined the European Union before the last two accession rounds in 2004 and 2007, namely Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom.
- 11 The 12 EU accession countries are Bulgaria, the Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovak Republic, and Slovenia.

- 12 For a more in-depth review of Estonia's ICT development story, see Dutta 2007.
- 13 See Dahl and Lopez-Claros 2006.
- 14 For a full account of Chile's ICT strategy, see Alvarez Voullième et al. 2005.
- 15 In Egypt's case, the dramatic fall in ranking does not correspond to a fall in the absolute performance of the country, but rather to the fact that other countries have progressed more rapidly. Indeed, Egypt even improves its score slightly from 2007 (3.76 compared with 3.74 last year).
- 16 See Lopez-Claros and Mia 2006 for more details on Israel's success story.

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This appendix presents the structure of the Networked Readiness Index (NRI). The NRI separates environmental factors from ICT readiness and usage, and is composed of three subindexes. Each subindex is divided into three pillars. The 68 variables (or *indicators*) used in the computation of the NRI are then distributed among the nine pillars.<sup>a</sup>

The numbering of the variables matches the numbering of the Data Tables found at the end of the *Report*. The number preceding the period indicates to which pillar the variable belongs (e.g., variable 1.01 belongs to the first pillar; variable 9.02 belongs to the ninth pillar). The hard data indicators used in the NRI are normalized on a 1-to-7 scale in order to align them with the Executive Opinion Survey's results.<sup>b</sup> The Technical Notes and Sources at the end of this *Report* provide detailed information on all the hard data indicators.

## NETWORKED READINESS INDEX

$$\begin{aligned} \text{Networked Readiness Index} &= 1/3 \text{ Environment component subindex} \\ &+ 1/3 \text{ Readiness component subindex} \\ &+ 1/3 \text{ Usage component subindex} \end{aligned}$$

### Environment subindex

$$\begin{aligned} \text{Environment subindex} &= 1/3 \text{ Market environment} \\ &+ 1/3 \text{ Political and regulatory environment} \\ &+ 1/3 \text{ Infrastructure environment} \end{aligned}$$

#### 1st pillar: Market environment

- 1.01 Venture capital availability
- 1.02 Financial market sophistication
- 1.03 Availability of latest technologies
- 1.04 State of cluster development
- 1.05 Utility patents (hard data)
- 1.06 High-tech exports (hard data)
- 1.07 Burden of government regulation
- 1.08 Extent and effect of taxation
- 1.09 Total tax rate (hard data)
- 1.10 Time required to start a business (hard data)
- 1.11 Number of procedures required to start a business (hard data)
- 1.12 Intensity of local competition
- 1.13 Freedom of the press
- 1.14 Accessibility of digital content

#### 2nd pillar: Political and regulatory environment

- 2.01 Effectiveness of law-making bodies
- 2.02 Laws relating to ICT
- 2.03 Judicial independence
- 2.04 Intellectual property protection
- 2.05 Efficiency of legal framework for disputes
- 2.06 Property rights
- 2.07 Quality of competition in the ISP sector
- 2.08 Number of procedures to enforce a contract (hard data)
- 2.09 Time to enforce a contract (hard data)

#### 3rd pillar: Infrastructure environment

- 3.01 Telephone lines (hard data)
- 3.02 Secure Internet servers (hard data)
- 3.03 Electricity production (hard data)
- 3.04 Availability of scientists and engineers
- 3.05 Quality of scientific research institutions
- 3.06 Tertiary enrollment (hard data)
- 3.07 Education expenditure (hard data)

### Readiness subindex

$$\begin{aligned} \text{Readiness} &= 1/3 \text{ Individual readiness} \\ &+ 1/3 \text{ Business readiness} \\ &+ 1/3 \text{ Government readiness} \end{aligned}$$

#### 4th pillar: Individual readiness

- 4.01 Quality of math and science education
- 4.02 Quality of the educational system
- 4.03 Internet access in schools
- 4.04 Buyer sophistication
- 4.05 Residential telephone connection charge (hard data)
- 4.06 Residential monthly telephone subscription (hard data)
- 4.07 High-speed monthly broadband subscription (hard data)
- 4.08 Lowest cost of broadband (hard data)
- 4.09 Cost of mobile telephone call (hard data)

#### 5th pillar: Business readiness

- 5.01 Extent of staff training
- 5.02 Local availability of specialized research and training services
- 5.03 Quality of management schools
- 5.04 Company spending on R&D
- 5.05 University-industry research collaboration
- 5.06 Business telephone connection charge (hard data)
- 5.07 Business monthly telephone subscription (hard data)
- 5.08 Local supplier quality
- 5.09 Local supplier quantity
- 5.10 Computer, communications, and other services imports (hard data)

#### 6th pillar: Government readiness

- 6.01 Government prioritization of ICT
- 6.02 Government procurement of advanced technology products
- 6.03 Importance of ICT to government vision of the future
- 6.04 E-Government Readiness Index (hard data)

### Usage subindex

$$\begin{aligned} \text{Usage} &= 1/3 \text{ Individual usage} \\ &+ 1/3 \text{ Business usage} \\ &+ 1/3 \text{ Government usage} \end{aligned}$$

#### 7th pillar: Individual usage

- 7.01 Mobile telephone subscribers (hard data)
- 7.02 Personal computers (hard data)
- 7.03 Broadband Internet subscribers (hard data)
- 7.04 Internet users (hard data)
- 7.05 Internet bandwidth (hard data)

## Technical Appendix: Composition and computation of the Networked Readiness Index 2008–2009 (cont'd.)

### 8th pillar: Business usage

- 8.01 Prevalence of foreign technology licensing
- 8.02 Firm-level technology absorption
- 8.03 Capacity for innovation
- 8.04 Availability of new telephone lines
- 8.05 Extent of business Internet use

### 9th pillar: Government usage

- 9.01 Government success in ICT promotion
- 9.02 Availability of government online services
- 9.03 ICT use and government efficiency
- 9.04 Presence of ICT in government offices
- 9.05 E-Participation Index (hard data)

## Notes

- a The computation of the NRI is based on successive aggregations of scores, from the variables level (i.e., the lowest level) to the overall NRI score (i.e., the highest level). For example, the score a country achieves in the 3rd pillar, *Infrastructure environment*, accounts for one third of the *Environment subindex*. Similarly, the *Usage subindex* accounts for one third of the overall NRI score.
- b The standard formula for converting hard data is the following:

$$6 \times \left( \frac{\text{country score} - \text{sample minimum}}{\text{sample maximum} - \text{sample minimum}} \right) + 1$$

The *sample minimum* and *sample maximum* are, respectively, the lowest and highest country scores in the sample of countries covered by the NRI. In some instances, adjustments were made to account for extreme outliers. For those hard data variables for which a higher value indicates a worse outcome (e.g., total tax rate, time to enforce a contract), we rely on a normalization formula that, in addition to converting the series to a 1-to-7 scale, reverses it, so that 1 and 7 still correspond to the worst and best possible outcomes, respectively:

$$-6 \times \left( \frac{\text{country score} - \text{sample minimum}}{\text{sample maximum} - \text{sample minimum}} \right) + 1$$