McKinsey Global Institute




May 2011

Internet matters: The Net's sweeping impact on growth, jobs, and prosperity

The McKinsey Global Institute

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Matthieu Pélissié du Rausas
James Manyika
Eric Hazan
Jacques Bughin
Michael Chui
Rémi Said

Preface

It has become obvious that the Internet is changing our lives—the way we work, shop, search for information, communicate, and meet people. Two billion people are now connected to the Internet, and this number is growing by 200 million each year. But the magnitude of the economic impact of Internet-related activities is not obvious. Indeed, debate rages about what transformational effect the Internet is having and how best to harness its power for the common good. There are many studies on the impact of IT or telecommunications but little analysis, to our knowledge, on the global impact of the Internet on growth, jobs, and wealth creation. Does the Internet really create wealth or just displace it? Does the Internet in fact favor just one or two types of actors (e.g., big Internet companies and consumers) or all stakeholders? And how large is the economic impact of the Internet in objective terms?

The mission of the McKinsey Global Institute (MGI), McKinsey & Company's business and economics research arm, is to help leaders in the commercial, public, and social sectors to develop a deeper understanding of the evolution of the global economy and to provide a fact base that contributes to decision making on critical management topics. In that spirit, we publish this independent report and release it in time for the e-G8 Forum in Paris in May. Our aim is to make a contribution to e-G8 and G8 debates by providing data, statistical analyses, measures, and indicators about the impact of the Internet, and contribute to the discussion about its current and future impact to growth and prosperity, and how companies, sectors and countries can fully capitalize its potential.

Our primary aim in this report is to estimate the magnitude of the impact of the Internet on the world economy. We focus on 13 countries that account for more than 70 percent of global GDP. These countries are at different stages of development. We include the G8 as well as South Korea and Sweden, because they have very high Internet penetration, and the large, high-growth economies of Brazil, China, and India. Our analysis offers a quantitative view of this topic and new insights, from a holistic perspective that examines a range of players from enterprises and consumers to companies that form part of the Internet supply chain and those that leverage the technologies for their own business needs—companies that range from large corporations in the United States to small and medium-sized businesses in China. This study is by no means the final word on the Internet's impact, given its continuous evolution, as users, entrepreneurs, companies, and other organizations find new uses and develop new innovations that capitalize on the power and reach of the Internet, and as the Internet and its related technologies and devices continue to advance.

However, there are some key insights that emerge from our research. This report finds that the Internet has delivered substantial economic growth and created jobs on a large scale. Internet maturity correlates with wealth creation, and we find that the Internet is, and will remain over coming decades, one of the biggest drivers of global economic growth.

To measure the impact of the Internet on the economy, we looked at both expenditures and supply, following three original, quantitative, and complementary approaches:

- A macroeconomic approach using national accounts to calculate the contribution of GDP via a classical macroeconomic spending approach, where the Internet economy is simply the sum of Internet consumption (service, access, e-commerce, etc.), private investment, public expenditure, and the trade balance in Internetrelated goods and services

- A statistical econometric approach analyzing the correlation between Internet maturity and a country's GDP per capita growth, leveraging the theory of endogenous economic growth

- A microeconomic approach, analyzing the results of a survey of 4,800 small and medium-sized businesses in 12 countries we studied

We believe that it is important to understand the Internet better and to monitor its progress. For now, we propose an initial set of four key indicators to measure both consumption and supply but, in an "open-source" spirit, we welcome suggestions for more and improved metrics that we might use to analyze the impact of the Internet—and even criticism and rebuttal of the approach we have taken. We propose to publish an annual summary of the debates that we hope our work will spark.

This report leverages MGI's "micro-based macro" approach that draws from McKinsey's work with its clients, practice research on technology, and more than ten years of MGI research on technology trends and on the impact of technology on business and the economy published in more than ten reports, including *US productivity growth, 1995–2000* (October 2001); *How IT enables productivity growth* (October 2002); *Reaching higher productivity growth in France and Germany* (October 2002); *Beyond austerity: A path to economic growth and renewal in Europe* (October 2010); *Growth and competitiveness in the United States: The role of its multinational companies* (June 2010); and *Big data: The next frontier for innovation, competition, and productivity* (May 2011).

This project was led by Matthieu Pélissié du Rausas, a director in Paris; James Manyika, a director in San Francisco, and Director of MGI, Eric Hazan, a principal in Paris, Jacques Bughin, a director in Brussels. Rémi Said managed the project team of Vincent Luciani and Yves Matton. The team also worked closely with Eric Labaye, a director in Paris and chair of MGI, Michael Chui, MGI senior fellow, and Patrice Navarre, an associate principal in Paris. We are grateful for the vital input and support of numerous McKinsey colleagues around the world, including Adam Bird, Endre Holen, and Jurgen Meffert, all three directors and leaders of McKinsey's Global Technology, Media, and Telecom Practice.

Distinguished experts outside McKinsey reviewed our work and provided invaluable insights and advice. We should particularly thank our academic advisers Martin N. Baily, Schwartz Chair and senior fellow of the Brookings Institution and former chair of the US President's Council of Economic Advisers; and Christian Saint-Etienne, professor of business economics at the Conservatoire National des Arts et Métiers in Paris and member of the Conseil d'Analyse Economique, reporting to the French Prime Minister.

M. Pélissié du Rausas
Director, Paris

J. Manyika
Director, San Francisco
Director, McKinsey Global Institute

J. Bughin
Director, Brussels

E. Hazan
Principal, Paris

E. Labaye
Director, Paris
Chairman, McKinsey Global Institute

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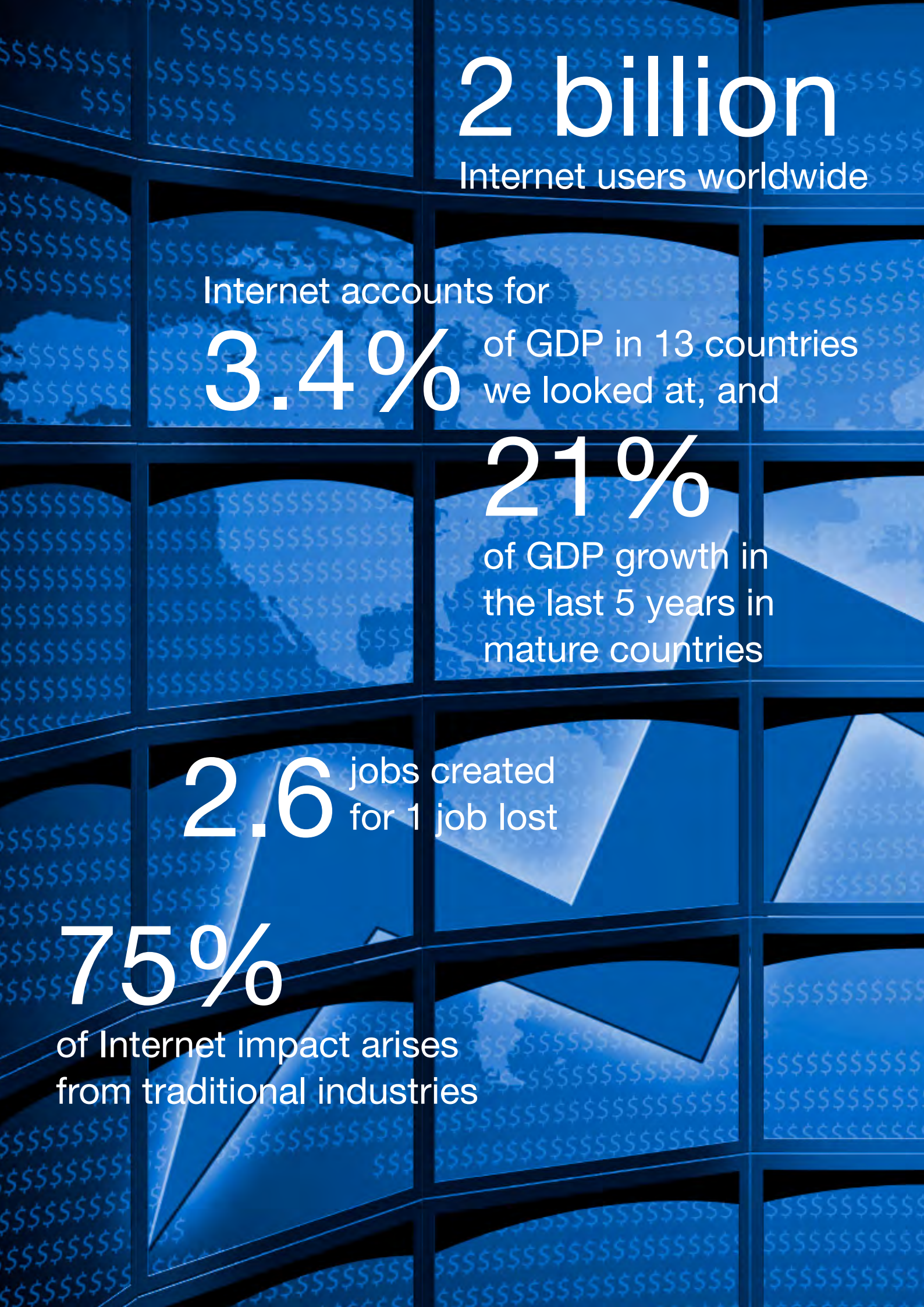
2 billion
Internet users worldwide
Internet accounts for
3.4%
of GDP in 13 countries we looked at, and
21%
of GDP growth in the last 5 years in mature countries
2.6
jobs created for 1 job lost
75%
of Internet impact arises from traditional industries


10%
increase in productivity for small and medium businesses from Internet usage
Small and medium businesses heavily using Web technologies grow and export 2x as much as others
Up to
€20
per Internet user per month of consumer surplus


/**
* Execute commands
* @access public
* @return boolean $bResult
*/
function deleteRegisterAssistance
$oRegisterAssistanceBD = $this
$bResult = $oRegisterAssistanceBD
if($bResult) {
$oStructureTransaction = new
function
startDataAssistance($nIdBen
UserPercentager,$sObs)
$oDataAssistance = new
DataAssistance($nIdBenefit,$s
ercentager,$sObs);
return $oDataAssistance;
}
function RecoverDataAssistance
$oDataAssistanceBD = $this->start
$oDataAssistance = $oDataAssistan
return $oDataAssistance;
}
function RecoverAllDataAssistance
$oDataAssistanceBD = $this->Start
$voObject = array();
$voObject = $oDataAssistanceBD->
return $voObject;

Contents

Executive summary

Two billion people are connected to the Internet. Almost $8 trillion exchange hands each year through e-commerce. In some developed markets, about two-thirds of all businesses have a Web presence of some kind, and one-third of small and medium-sized businesses extensively use Web technologies.[1] The Internet has transformed the way we live, the way we work, the way we socialize and meet, and the way our countries develop and grow. In two decades, the Internet has changed from a network for researchers and geeks to a day-to-day reality for billions of people. Our research sheds new light on this revolution and helps explain the direct link between the Internet and economic vitality.

Many have compared the dawn of the Internet to another communications game changer, the introduction of the Gutenberg press five centuries earlier. But a comparison with the development and commercialization of electric power may be more appropriate.[2] Among its many other consequences, electricity changed the landscape of cities around the world, allowing elevators that can travel great heights and heralding the dawn of massive skyscrapers. As with electricity, the Internet has changed the global landscape. The Internet bridges vast distances and has made the world flatter by allowing instant access to an almost endless stream of information that can be immediately brought into play. Its impact on economic wealth reaches well beyond pure players in the industry. Indeed, the brunt of its economic contribution derives from established industries that, in the shadow of the Internet, have become more productive, have created more jobs, have increased standards of living, and have contributed more to real growth. Our research shows that more than 75 percent of the value added created by the Internet is in traditional industries.

Also, as with electricity, the Internet has influenced every corner of the world, not just those countries that pushed its original development or were instrumental in its growth. As Internet usage spreads to even the most remote communities—where gas-powered generators and satellite links make the connection—its observable positive effects grow. As evidence, the United Nations in its Millennium Development Goals lists Internet penetration as a key metric in efforts to reduce poverty and encourage rational development.

Yet despite its ubiquity, little is known about how much value the Internet contributes to national economies. To help fill this gap, McKinsey has conducted extensive research on the contribution of the Internet to GDP and economic growth in the G8 economies and five other key countries at various levels of development: Brazil, China, India, South Korea, and Sweden.

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1 The sources for these statistics are the World Bank, 2009; Gartner, 2010; Eurostat, 2010; and a McKinsey & Company Internet survey of more than 4,800 small and medium-sized enterprises.

2 Nicholas Carr, *The big switch: Rewiring the world, from Edison to Google*, New York: W.W. Norton & Company, 2009.

The study, drawn from public sources and targeted surveys, examines the Internet ecosystem, how it is being framed, and who is doing the framing. For the first time, we believe, this work offers a quantitative assessment of the impact of the Internet on GDP and growth while also considering the most relevant tools governments and businesses can use to get the most benefit from the Internet.

THE INTERNET IS CONTRIBUTING STRONGLY TO WEALTH

The Internet embraces all of us: businesses, individuals, governments, and entrepreneurs. The Web has made possible new waves of business models and entrepreneurship but has also led to radical innovations for accessing, using, and delivering goods and services for everyone. It has transformed industries and governments through innovative approaches and changed how users engage the world.

The Internet is already a significant contributor to the economies of the 13 countries we studied—economies that account for more than 70 percent of global GDP—exerting a strong influence on economic growth rates particularly in mature economies.

To measure the Internet's impact on a country's economy and to understand how the Internet is framed worldwide, we structured the analysis around its two primary components: consumption and expenditure on one hand, and supply on the other.

Internet consumption and expenditure contributes significantly to the economy

Looking at Internet-related usage through expenditure and consumption first, we see:

- **The Internet is big and continues to grow and reach everywhere.** The Internet is now used in every country, in every sector, in most companies, and by more than 2bn people and it is still growing. Internet-related consumption and expenditure is now bigger than agriculture or energy, and our research shows that the Internet accounts for, on average, 3.4 percent of GDP in the 13 countries we studied. If Internet consumption and expenditure were a sector, its weight in GDP would be bigger than energy, agriculture, or several other critical industries. The Internet's total contribution to the GDP is bigger than the GDP of Spain or Canada, and it is growing faster than Brazil.

- **The Internet is still in its infancy, and the weight of the Internet in GDP varies drastically, even among countries at the same stage of development.** While the Internet accounts for around 6 percent of GDP in advanced countries such as Sweden and the United Kingdom, in 9 out of the 13 countries its contribution is below 4 percent, leaving tremendous room for further Internet development.

- **The Internet is a critical element of growth.** Both our macroeconomic approach and our statistical approach show that, in the mature countries we studied, the Internet accounted for 10 percent of GDP growth over the past 15 years. And its influence is expanding. Over the past five years, the Internet's contribution to GDP growth in these countries doubled to 21 percent. If we look at all 13 countries in our analysis, the Internet contributed 7 percent of growth over the past 15 years and 11 percent over the past five. This is a reflection of small and medium-sized enterprises (SMEs) receiving a performance boost from the Internet. As part of our research, we surveyed more than 4,800 SMEs in the

countries we studied.[3] We found that those with a strong Web presence grew more than twice as quickly as those that had minimal or no presence, an outcome that holds across sectors. In addition, SMEs that took advantage of the Internet reported the share of total revenues that they earned from exports was more than twice as large as that reported by others. They also created more than twice the number of jobs as others.

- **The maturity of the Internet correlates with rising living standards.** Leveraging endogenous economic growth theory, we have been able to show that Internet maturity correlates with growth in per capita GDP. Using the results of the correlation, a simulation shows that an increase in Internet maturity similar to the one experienced in mature countries over the past 15 years creates an increase in real GDP per capita of $500 on average during this period. It took the Industrial Revolution of the 19th century 50 years to achieve same results.[4] This shows both the magnitude of the positive impact of the Web at all levels of society and the speed at which it delivers benefits.

- **The Internet is a powerful catalyst for job creation.** Some jobs have been destroyed by the emergence of the Internet. However, a detailed analysis of the French economy showed that while the Internet has destroyed 500,000 jobs over the past 15 years, it has created 1.2 million others, a net addition of 700,000 jobs or 2.4 jobs created for every job destroyed. This conclusion is supported by McKinsey's global SME survey, which found 2.6 jobs were created for every one destroyed.

- **The Internet drives economic modernization.** The Internet's main impact is through the modernization of traditional activities. Although the Internet has resulted in significant value shifts between sectors in the global economy, our research demonstrates that all industries have benefited from the Web. Indeed, in McKinsey's global SME survey, we found that 75 percent of the economic impact of the Internet arises from traditional companies that don't define themselves as pure Internet players. The businesses that have seen the greatest value creation have benefits from innovation leading to higher productivity triggered by the Internet.

- **The impact of the Internet goes beyond GDP, generating astonishing consumer surplus.** Beyond its impact on GDP, the Internet creates substantial value for users, ranging from €13 ($18) a month per user in Germany to €20 ($28) in the United Kingdom.[5] In total, the consumer surplus generated by the Internet in 2009 ranged from €7 billion ($10 billion) in France to €46 billion ($64 billion) in the United States.

3 Excluding Brazil.

4 See Angus Maddison, *The World Economy: Historical Statistics*, Paris: OECD, 2003.

5 Internet Advertising Board, *Assessing the consumer benefits of online advertising*, July 2010.

The rapidly shifting supply side offers some contrasts

Looking at the "supply" of the Internet globally, we find that countries with a strong Internet ecosystem also have a high Internet contribution to GDP. However, the global Internet landscape is shifting rapidly and offers some interesting contrasts:

- **The United States leads the global Internet supply ecosystem.** The United States captures more than 30 percent of global Internet revenues and more than 40 percent of net income. Using a proprietary model, the McKinsey Internet Supply Leadership Index, we show that the United States remains the largest player in the Internet supply ecosystem. It is the country with the most diverse structure within the global ecosystem among the 13 we analyzed in this research, garnering relatively equal contributions from hardware, software and services, and telecommunications.

- **The United Kingdom and Sweden are changing the game.** These two countries have leveraged very strong Internet usage across the board to gain greater importance within the global Internet ecosystem. This move is helped by the strength and strong performance of their telecom operators.

- **India and China are strengthening their position** in the global Internet ecosystem rapidly. Both countries show growth rates of more than 20 percent.

- **France, Canada, and Germany have strong Internet usage.** All three could leverage this usage to increase their presence in the global supply ecosystem.

- **South Korea is rapidly accelerating** its influence on the Internet economy at a faster rate than **Japan**.

- **Brazil, Russia, and Italy are in the early stages of Internet supply.** They all have strong potential for growth.

Only strong Internet ecosystems can capture maximum value. We find that to build a strong ecosystem, the best performers focus their efforts on four critical areas:

- **Promote human capital.** The United States in particular has used its vast talent pool effectively compared to other countries. Its relative attractiveness to talent with the right skills has been critical in the creation of a strong Internet ecosystem, and this human capital has been nurtured in universities, corporate research and development centers, startups and elsewhere. However, the US will increasingly compete for such talent with other countries.

- **Ease access to financial capital.** The United States, Israel, and South Korea have all ensured sufficient financial capital is available and the mechanism for capital formation in place to nurture innovation and support entrepreneurial resolve.

- **Develop infrastructure.** Infrastructure, the backbone of the entire Internet ecosystem, is an irreplaceable prerequisite. It creates the platforms upon which users, and organizations experience the Internet, and upon which entrepreneurs and businesses innovate.

- **Create an attractive business environment.** The context in which business operates is critical to the growth of the Internet ecosystem and will hold back its growth if the environment does not encourage expansion of usage, encouragement of innovation, and business investment and participation. To ensure such an attractive environment requires ongoing assessment of the frameworks that govern access, usage, protection of various rights, and considerations of security.

LEVERAGING THE INTERNET TO REVIVE THE ENGINE OF GROWTH

Armed with a better understanding of how—and how much—the Internet contributes to national economies, policy makers and business executives can focus their efforts more acutely and effectively to promote and strengthen their domestic Internet ecosystems. In particular, they should consider the following immediate practical steps:

- **Public decision makers should act as catalysts to unleash the Internet's growth potential.** Governments could leverage Internet public spending as a catalyst for innovation. Indeed, countries with the highest public investment in the Internet are also those with the largest nonpublic Internet contribution to GDP. Governments' own use of the Internet encourages citizens to use it. Government e-transformation creates large-scale, complex demand that stimulates the supply ecosystem. In addition, governments must promote Internet usage by informing and training businesses and individuals.

- **All business leaders, not just e-CEOs, should put the Internet at the top of their strategic agenda.** Business leaders must optimize the benefits gleaned from the Internet through innovation and change. . It is no longer a choice, given that many businesses face competitors who capitalize on the power of the Internet to innovate business models. Business leaders should play a significant role in the spread of the Internet and systematically review how the Internet allows them to innovate more aggressively and even reinvent their business models to boost growth, performance, and productivity. In particular, businesses should constantly try to identify up-and-coming Internet trends that have the potential to increase the impact of their efforts—e.g., by applying statistical analyses to the mass of data available from the Internet or using IT-enabled services to improve production capabilities.

- **All stakeholders should take part in a fact-based, public-private dialogue** to assure optimal conditions for the development of the Internet ecosystem within each country, as well as internationally. Open discussions between government and business leaders should work toward creating a nurturing environment in which the benefits of the Internet can be better understood and the Internet ecosystem can grow. Issues such as standards for digital identities and intellectual property protection must be addressed as countries strive to stimulate usage, while topics relevant to improving the supply ecosystem include net neutrality, the availability of talent, and the overall business environment.

MONITORING THE PROGRESS OF THE INTERNET USING FOUR CRITICAL INDICATORS

Behind our analysis and recommendations are four indicators to measure the impact and evolution of the Internet in individual countries. Two, the "e3" index and the "iGDP," focus on Internet expenditures and consumption. The other two, the McKinsey Internet Supply Leadership Index and the i4F indicator, track supply trends. Our aim is to improve and track them yearly and to review the global economy's progress toward reaping optimal economic benefits from the Internet. Also, as we know that our indicators are still imperfect, we encourage "open-source" improvements to our methodology. We've made public the details and welcome any suggestions for refining our approach.

Introduction

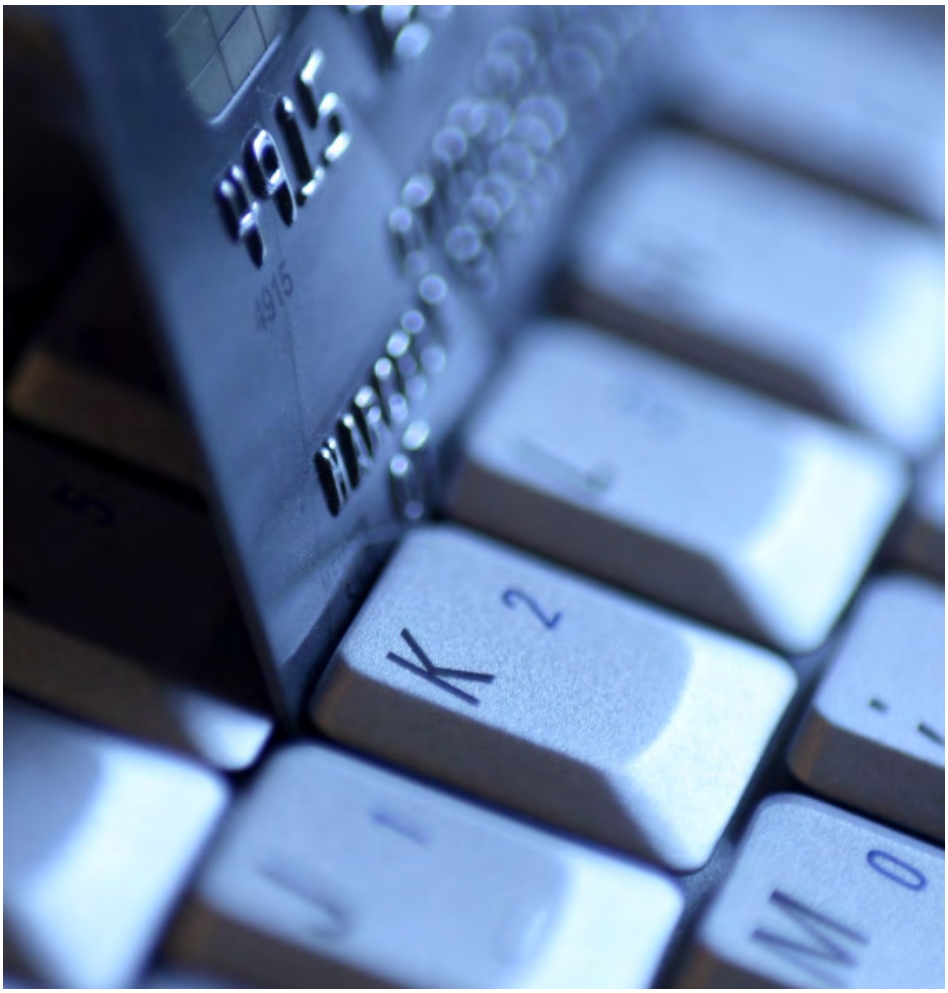
The Internet seems to be everywhere around us today. Yet the extent of its economic impact has been relatively unclear. Much of the economic impact of the Internet and the way that it contributes to growth and raising standards of living have gone unmeasured.

New McKinsey research has shown that the Internet not only delivers value to companies and users, it delivers astonishing value to national economies. Using an approach based on Internet-enabled consumption patterns by individuals, businesses, and governments, we found that in a broad range of countries the Internet contributes more to GDP than agriculture, energy, and several other traditional sectors do. In addition, it is a critical component of economic growth, especially in countries that embrace its utility and encourage usage at all levels.

In our study, we examined the impact of the Internet on 13 countries, accounting for more than 70 percent of global GDP: the members of the G8; Brazil, China, and India, as representative of emerging markets; and South Korea and Sweden, as countries with the most advanced broadband penetration. In addition to looking at economic impact, we developed the McKinsey Internet Supply Leadership Index and other indexes, which we calculated for each country to understand who is structuring the Internet's international landscape. The results showed economic value from the Internet beyond what most observers –even staunch Internet supporters–might suspect.

Our findings build on and go beyond earlier studies that have generally focused on one piece of the overall puzzle, for example productivity gains linked to information technologies. Our research quantifies the importance of the Internet to national economies. We also expose national differences in the Internet's impact and consider how governments should work toward building a stronger ecosystem, such as seeking ways to maximize Internet usage by individuals, businesses, and the government itself. Developing a strong Internet ecosystem requires harnessing the public's natural demand to attract talent and resources to the industry, building the necessary infrastructure, and creating an attractive business environment.

The Internet has become a significant and essential factor in national economies and, indeed, the global economy itself. As countries continue to navigate the aftermath of the global economic crisis, they must not lose sight of longer-term imperatives that could safeguard their economic health. Among other economic benefits, the Internet offers increased productivity, opportunities to expand reach into domestic and foreign markets, the means for radical product development, and the rapid deployment of game-changing ideas. Public leaders and executives who underestimate its contribution may be ignoring one of the strongest tools at their disposal.



1. The Internet is contributing strongly to wealth

The Internet has clearly grown to dazzling proportions since the 1990s, when computer networks developed by governments, businesses, and academia began to catch the public eye. Today, about 2.0 billion users worldwide, almost a third of the global population, connect to the Internet every day. Almost $8 trillion a year is spent through e-commerce (both business to business and business to consumer). In the European Union, about two-thirds of all businesses have a Web presence. Individuals, businesses, and governments have all been forever changed by the Internet.

- **Companies** keep costs down in many ways, including tapping into a broader range of suppliers for their needs and optimizing myriad processes. They have also changed the way they target customers: online marketing represents 15 percent of total marketing spending.[6] Companies are also able to bring their goods and services to markets around the world much more easily. The Internet has also enabled a new wave of business models and made possible a new type of entrepreneurship. For instance, in the United States, Internet-specific venture capital deals represent around 20 percent of total deals in terms of both numbers and investments.

- **Individuals** derive countless benefits. They compare prices. In France, the United States, and Germany, 40 percent of Internet users visit a price comparison Web site every month. They search for hard-to-find items or information (total search requests totaled more than 1 trillion in 2009).[7] They communicate and play without leaving their keyboards as new means of communication replace traditional ones. While landline and mobile voice share of the communications portfolio decreased by 7 percent between 2008 and 2010, Internet users spent 11 percent more time using social networking Web sites. They now spend as much time on social network Web sites as they do writing e-mails. The way people learn is also changing. Online video classes have allowed teachers to remove the one-size-fits-all lecture from the classroom, enabling students to learn at their own pace with online content and using class time for exercises and interactive activities. The Internet also allows teachers to follow each student individually and spot difficulties more quickly.

- **Governments** can serve citizens much more quickly and at a much lower cost with the development of e-government services such as online tax services or e-visas. In addition, a variety of government services can be delivered more cost effectively, and faster leveraging the Internet, examples range from public health and safety information to the renewal of driver's licenses.

6 MagnaGlobal, Global Ad spend by channel (including mobile), 2000–2016, 2010.

7 Comscore annual release, 2010.

The Internet embraces us all, and yet nobody has really measured its economic impact. The results of our study show that the Internet is already a significant contributor to the economies of the 13 countries we studied. In addition to its intrinsic weight in terms of GDP share, the Internet exerts a strong influence on economic dynamics—especially in the more mature countries—through its impact on growth, increased standards of living, and job creation. Moreover, beyond this direct contribution, the Internet has become a key contributor to the prosperity of nations through its indirect effects on traditional economy thanks to the productivity gains it offers to economic agents in all industries and all sectors, both private and public.

1.1. How we define Internet-related activities

The scope of our study includes all the activities linked to both the **creation and usage** of Internet networks as well as Internet services. Four types of activities are covered, and for each of those, we took the value of those activities, pro rata of their utilization of the Internet (see methodological appendix for more details):

- Web activities using Web as a support (e.g., e-commerce, content, online advertising)
- Telecommunication on IP or linked to IP communication (mainly Internet service providers)
- Software and services activities linked to Web (e.g., IT consulting, software development)
- Hardware manufacturers or maintenance providers of Web-specific tools (e.g., computers, smartphones, hardware equipment, servers used for the Internet)

Internet-related activities as we define them correspond to the totality of Internet activities (e.g., e-commerce) and to a portion of the information and communication technologies (ICT) sector delineated by activities, technologies, and services linked to the Web. This definition likely underestimates the full impact of the Internet, but has the benefit of providing a consistent definition that allows for direct analysis across multiple economies. Future research will be required to more fully account for the impact.

To measure the Internet's impact on a country economy and to understand how the Internet is framed worldwide, we structured the analysis around two parts: consumption and expenditure on one hand and supply on the other (Exhibit 1).

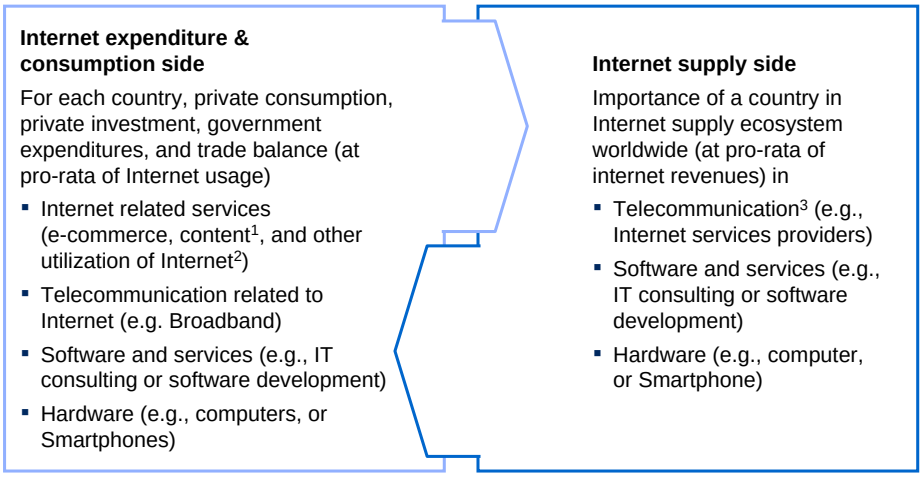
On the **expenditure and consumption** side, we focused on usage by companies, governments, and individuals of the four types of activities mentioned previously. Using this approach, we are able to measure the impact of the Internet on the economy on all types of actors, including nonpure Internet players using Web technologies and deriving benefits from it.

On the **supply side**, we focused on industries that are structuring and enabling the Internet worldwide. These are grouped as telecommunications, hardware manufacturers or maintenance providers, software, and services.[8]

8 For telecommunications, excluding traditional switched voice and GSM (Global System for Mobile Communications) voice.

Exhibit 1

To assess the Internet's impact on the economy, we structured the analysis around its two primary components: consumption & expenditure and supply



1 Content sold on the Internet (e.g., video on demand).
2 Other utilization of the Internet (e.g., administration, gambling).
3 Excluding traditional switched voice and GSM voice.
SOURCE: McKinsey analysis

1.2. Internet consumption and expenditure contributes significantly to the economy

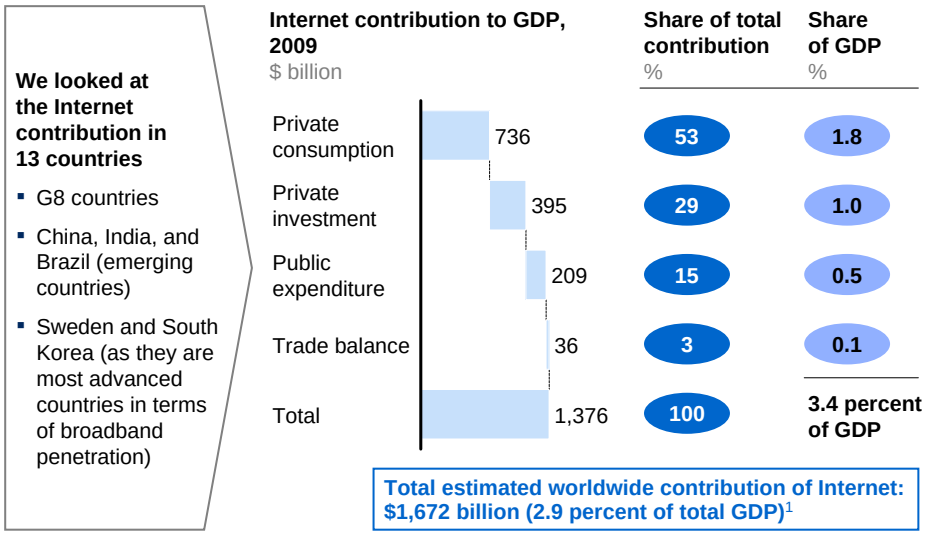
The Internet already appears as a substantial contributor to prosperity in our sample 13 countries. Its positive impact is reflected in many aspects of the economy, including GDP, growth, employment, standards of living, and global productivity. Indeed, seven strong convictions emerge from our consumption and expenditure analysis.

THE INTERNET IS BIG, CONTINUES TO GROW AND REACH EVERYWHERE

Across the 13 countries of our selection, our research into the consumption and expenditure side of the equation shows that the Internet accounts for 3.4 percent of GDP, on average, based on data from 2009 (Exhibit 2). A little more than half that total—53 percent—comes from private consumption. Private investment ranked as the next-largest component, followed by public expenditures.

Exhibit 2

The Internet has a 3.4 percent share of total GDP in the 13 countries that we analyzed



1 For the rest of the world, we used estimated percentage shares based on Internet penetration in each country (30 percent GDP remaining).

SOURCE: McKinsey analysis

To compute the weight of Internet in the GDP, we used the expenditure approach and relied on four major components (see methodological appendix for more details).

- **Private consumption.** This is the total consumption of goods and services by consumers via the Internet or needed to obtain Internet access, including electronic equipment, e-commerce, broadband subscriptions by individuals, mobile Internet market, hardware and software consumption, and smartphone consumption prorated for Internet usage. Private consumption from the Internet is driven primarily by online purchases of goods and services. In the United States, for example, Web surfers made purchases worth $250 billion in 2009,[9] with the average buyer spending about $1,773 over the year. In the United Kingdom, every online buyer purchased, on average, $2,535 worth of goods and services in 2009, making it one of the countries where e-commerce is the most developed (see Box 1, "How the United Kingdom benefits from online shopping").

- **Private investment.** Private-sector investment in Internet-related technologies (telecoms, extranet, intranet, Web sites, etc.), accounts for 29 percent of the Internet's total contribution to GDP.

- **Public expenditure.** Public expenditure accounts for 15 percent of total Internet weight in GDP and includes Internet spending for consumption and investment by the government (software, hardware, services, and telecoms) at pro rata of Internet.

- **Trade balance.** This is exports of goods, services, and Internet equipment, plus B2C and B2B e-commerce, from which were deducted all associated imports.

9 For retail, Forrester online retail forecast, 2010, for travel PhoCusWright's, Online travel overview, 2010, for gambling, H2 Gambling Capital Consultants, online gambling, 2010.

Box 1. How the United Kingdom benefits from online shopping

To the surprise of many—except perhaps online retailers active in Britain—residents of the United Kingdom are avid online shoppers, ringing the virtual till far more often than their US cousins or their French neighbors. In 2009, online shoppers in the United Kingdom bought, on average, $2,535 worth of goods and services ($1,016 per capita in the country), or 1.4 times the amount of the average US online shopper and 1.8 times that of the average French shopper.

Our research shows that it's not that more people in Britain use the Internet or that more shop on the Internet. In both categories, the United Kingdom is in the middle, with the United States leading and France third. British shoppers simply ring up more purchases, totaling $1,016 per capita in 2009 and accounting for $63 billion or 2.9 percent of GDP.[1] US shoppers bought just $814 in goods and services per capita in 2009 ($250 billion or 1.8 percent of GDP) and French shoppers $555 ($35 billion or 1.3 percent of GDP).[2]

Looking behind the aggregate numbers, a primary difference behind these differences in contribution to GDP comes directly from the structure of the economy itself, with the United States boasting a higher per capita GDP than the United Kingdom or France. But another critical difference is the amount British online shoppers spend on travel and groceries leading to larger online baskets. UK residents generally spend about 25 percent more on travel than those in United States, and the pattern continues online. British shoppers spent on average $1,067 on travel in 2009, compared $717 for French shoppers and $631 for US shoppers. In addition, online grocery shopping is much better established in Britain than the other countries. In the United Kingdom, the average online shopper bought $228 in groceries in 2009, compared with $79 in France and $33 in the United States, in part because Tesco embraced the Internet very early in the United Kingdom.

1 For retail, Forrester online retail forecast, 2010, for travel PhoCusWright's, Online travel overview, 2010, for gambling, H2 Gambling Capital Consultants, online gambling, 2010.

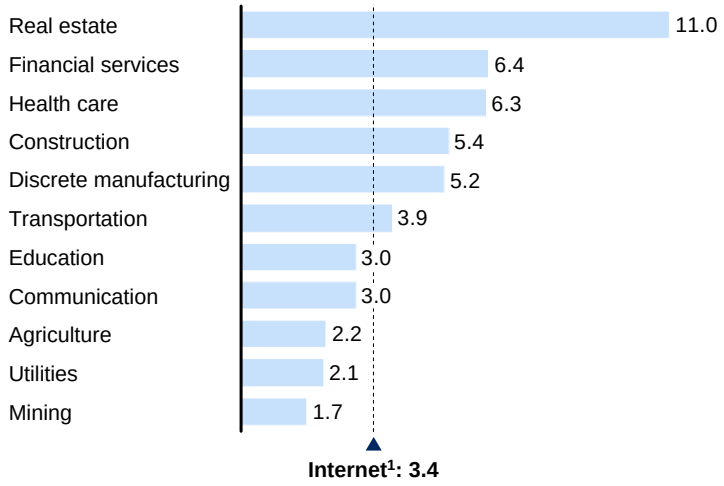
2 Fédération e-commerce et vente à distance annual release, 2010.

On average, our research showed that the Internet has a greater weight in the economies that we analyzed than agriculture, utilities, and other better-established industries. In addition, the Internet was already more than half as powerful in terms of economic contribution as such major sectors as health care and financial services (Exhibit 3).

Exhibit 3

If Internet were a sector, it would have a greater weight in GDP than agriculture or utilities

Sector contribution to GDP
% of total GDP, 2009



1 Internet share includes parts of other sectors (e.g., communication).
SOURCE: Organisation for Economic Cooperation and Development; McKinsey analysis

Internet-related consumption and expenditure worldwide in 2009 was larger than the GDP of Canada or Spain and growing faster than Brazil.

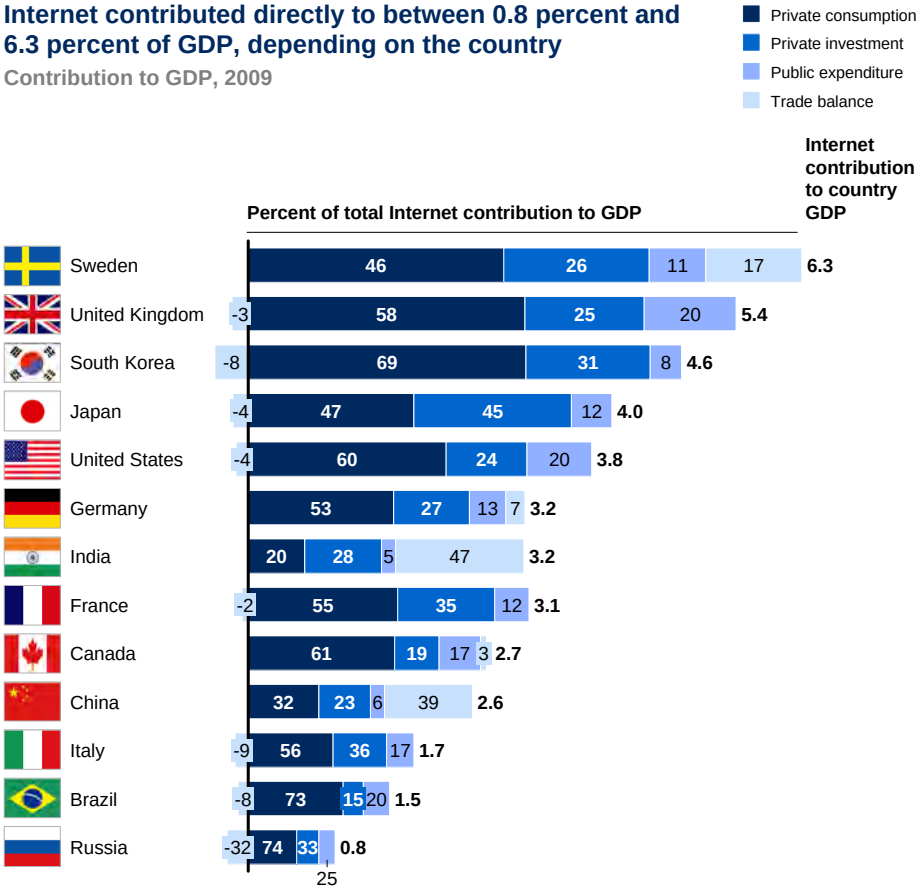
INTERNET IS STILL IN ITS INFANCY IN GLOBAL TERMS.

The Internet's economic impact varies widely even among countries at the same stage of development. While the Internet has reached around 6 percent of GDP in the most advanced countries like Sweden and the United Kingdom, nine out of the 13 countries are below 4 percent, leaving tremendous room for further Internet development. Within our sample group of 13 countries, the Internet's share of GDP ranges from 0.8 percent in Russia to 6.3 percent in Web-savvy Sweden (Exhibit 4).

Exhibit 4

Internet contributed directly to between 0.8 percent and 6.3 percent of GDP, depending on the country

Contribution to GDP, 2009



SOURCE: McKinsey analysis

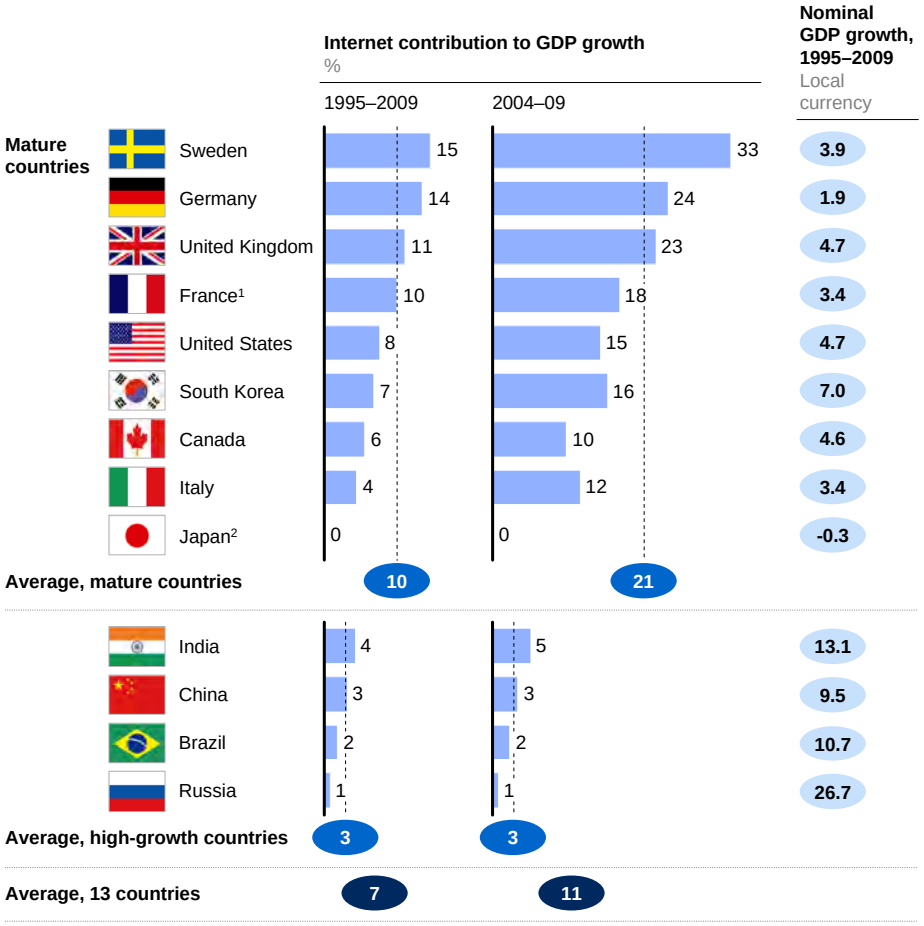
In every country except China and India, private consumption accounted for about half or more of the contribution, peaking at 69 percent of the total in South Korea or more than 70 percent in Brazil and Russia. In China and India, however, the impact of the Internet was powered by a strong trade balance, with net foreign trade making up 39 and 47 percent, respectively, of the total economic contribution from the Internet. Public expenditures on the Internet ranged widely from 5 percent of the total GDP contribution in India to more than 20 percent in the United Kingdom, United States, Brazil, and Russia.

THE INTERNET GENERATES GROWTH

Our analysis further shows that the Internet has been a major driver to economic growth and is getting stronger. Over the past 15 years, the Internet accounted for 7 percent of our 13 countries' combined economic growth. Its influence is expanding. Looking at the past five years, the contribution to GDP growth reaches 11 percent. When we look at mature countries, we see that the Internet contributed 10 percent of their growth over the past 15 years and doubled to 21 percent in the past five years. In the United Kingdom, which mirrors the typical experience of a mature country, the Internet contributed 11 percent to the country's growth rate over the past 15 years and 23 percent over the past five years (Exhibit 5).

Exhibit 5

The Internet contribution to GDP growth has been an average 21 percent in mature countries over the past five years



1 For France, the Internet contribution to growth from 2009–10 was 25 percent.
2 Negative growth due to deflation.

SOURCE: National accounts, Organisation for Economic Cooperation and Development; McKinsey analysis

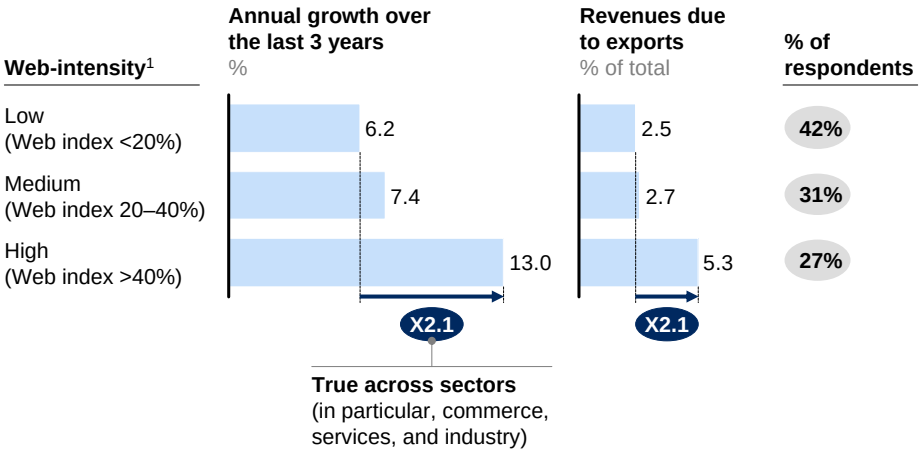
These results are reflected at a microeconomic level where the evidence is abundantly clear that Internet usage triggers a significant increase in performance in businesses at all levels and particularly among SMEs and other entrepreneurial endeavors. We surveyed more than 4,800 SMEs in 12 countries (our study group excluding Brazil) and found that those utilizing Web technologies grew more than twice as fast as those with a minimal presence (Exhibit 6). The results hold across all sectors of the economy. Further, Web-savvy SMEs brought in more than twice as much revenue through exports as a percentage of total sales than those that used the Internet sparingly. These Web-knowledgeable enterprises also created more than twice the jobs as companies that are not heavy users of the Internet (see Box 2, "SMEs capture a broad range of advantages"). When we look closely at individual sectors, we see that this is true across sectors from retail to manufacturing. Manufacturing is one of the sectors enjoying most impact from Internet.

On average, the survey showed that the Internet enabled a 10 percent increase in profitability across countries. The impact on profits came half from increased revenues, and half from lower costs of goods sold and lower administrative costs.

Exhibit 6

Small and medium-sized enterprises using Web technologies extensively are growing more quickly and exporting more widely

Growth and exports of SMEs analyzed by cluster of maturity of Internet
Analysis includes 12 countries and more than 4,800 SMEs



1 McKinsey Web index defined according to the number of technologies possessed by companies and the penetration of those technologies (i.e., the number of employees/ customers or suppliers having access to those technologies).

SOURCE: McKinsey SME Survey

Box 2. SMEs capture a broad range of advantages

Accelerated growth and a more accessible export market are just two of the many advantages the Internet brings to SMEs that invest in a substantial Web presence.

We produced an index reflecting the penetration and usage of Internet technologies, called the SME Internet Maturity Index. This index shows penetration of Internet technology and its usage by employees, clients, and suppliers. On the basis of the Index, we placed each of the companies in our sample into one of three categories: low Web intensity, medium Web intensity, and high Web intensity.

Our survey of more than 4,800 SMEs in 12 countries showed that on average, companies using Internet with a high intensity grow twice as quickly as low-Web-intensity companies, export twice as much as they do, and create more than twice as many jobs.

In addition—and not surprisingly—we found that countries where a greater proportion of SMEs have a strong presence on the Internet are also those with a greater contribution from the Internet to the national economy. For example, in the United Kingdom our survey showed that about 71 percent of the SMEs use the Internet with high or medium intensity, and our analysis concluded that the Internet contributes about 5.4 percent to the British GDP. In Russia, on the other hand, only about 41 percent of SMEs have high or medium Internet engagement, and the Internet contributes about 0.8 percent to the Russian GDP.

INTERNET MATURITY CORRELATES WITH A RISING STANDARD OF LIVING

Leveraging endogenous growth theory, we were able to assess the Web's impact on per capita GDP increase within the countries surveyed. The analysis showed a clear correlation between per capita GDP growth and a country's Internet maturity based on its e3 index.

We developed the e3 index to reflect Internet maturity of a country, measuring **e-ngagement**, **e-nvironment**, and **e-xpenditure**, which are themselves largely based on numbers provided by the World Economic Forum and OECD. Weighing these three components, the e3 index represents the depth of a country's maturity in access infrastructure and Internet usage by individuals, businesses, and governments. Scandinavian and North American countries, three north European countries (the Netherlands, Switzerland, and the United Kingdom), and South Korea capture the top ten positions in our e3 rankings.

A positive correlation has been established in the past between broadband penetration and per capita GDP growth. However, for the first time, to our knowledge, using the e3 index as an indicator of Internet maturity, we have been able to show statistically that the Internet correlates positively with net per capita GDP growth and therefore to increasing standards of living in the countries we examined. Our e3 index also correlates with labor productivity growth. Another regression we ran, based on the total Internet expenses of individuals, businesses, and government in a country, shows the same result (see Box 3, "Statistical approach"). Combined with very strong statistical evidence, these two regressions clearly show that use of the Internet correlates with higher growth in both per capita GDP and labor productivity.

Using the results of these correlations, a simulation shows the Internet has enabled an increase in real per capita GDP of $500 on average in mature countries over the last 15 years. The Industrial Revolution took 50 years to achieve the same result.[10] This analysis shows both the magnitude of the positive impact of the Web at all levels of society and the speed of the benefits it brings.

Of course, these are just correlations. Causality still needs to be fully proved and we welcome additional work in this field.

Our conclusions are consistent with earlier academic studies that explored the Internet's impact on economies. For example, a 2003 study at Myongji University in South Korea examined 207 countries and found Internet penetration has a positive impact on economic growth. [11] A more recent study by professors at the University of Munich in 2009 found a clear path from the introduction of broadband and its increased penetration to per capita GDP, concluding that every 10-percentage-point increase in broadband penetration adds 0.9 to 1.5 percentage points to per capita GDP growth.[12]

10 Angus Maddison, *The World Economy: Historical Statistics*, Paris: OECD, 2003.

11 Changkyu Choi and Myung Hoon Yi, *The effect of the Internet on economic growth: Evidence from cross-country panel data*, 2003.

12 Nina Czernich, Olivier Falck, Tobias Kretzchmer, and Ludger Woessmann, *Broadband infrastructure and economic growth*, CESIFO working paper, December 2009.

Box 3. Statistical approach

To complete our bottom-up analysis of the contribution of the Internet to GDP based on the expenditure approach, we used statistical analysis to correlate the evolution of Internet economy with per capita GDP in a given country.

The analysis was based on three main rationales:

- Confirm, using econometrical analysis, our first macroeconomic methodology on the contribution of the Internet to GDP growth.
- Isolate the net contribution of the Internet from the substitutive effect between the Internet and non-Internet spending (e.g., e-commerce) that could have been included in our contribution of the Internet to GDP.
- Determine the spillover effect from the Internet economy to the non-Internet economy. Some spillover, for instance, could be retail purchases that result from online price comparisons and searches, while many free services bundled with access contracts, such as e-mail, are driving some amount of economic productivity.

We ran two regressions to determine the net link between growth and Internet usage.

Methodology

The model relies on economic growth theory and extends a total factor productivity growth equation with Internet-specific data used as an additional factor of production.

Assuming a macroeconomic function between per capita GDP and input of production of Cobb-Douglas:

$$Y = AK^aL^b$$

where Y is the per capita GDP, A is the state of technology, K is physical capital per capita, and L is human capital.

Assuming that A is a combination of Internet contribution and a fixed effect, we can write growth of per capita GDP as a linear combination between Internet usage, physical capital growth, and human capital growth:

- As a measure of growth, we used real per capita GDP growth (in 2005 US dollars) provided by the World Bank database.
- As a measure of Internet use in a country, we used our McKinsey e3 index, which indicates Internet maturity.
- For measuring contribution of capital and labor, we used growth of fixed capital per capita (in 2005 US dollars) and growth of labor per capita, both provided by the World Bank database.
- We also applied controlling variables, such as lagged level of per capita GDP 2005 and dummy variable per years.

The second regression replaces the e3 index with total Internet expenses in each country,[1] leveraging endogenous growth theory and using Internet-related ICT as an extra factor of production in Cobb-Douglas equation.

We examined nine countries (the 13 countries is our study sample, excluding China, Brazil, India, and Russia, where some data were unavailable) and five years for regression for a total of 45 data points.

1 ICT expenses given by Gartner each year to which we apply Internet ratios to derive Internet expenses.

Box 3. Statistical approach (continued)

Findings

Both equations provide the same magnitude of impact of the Internet to GDP and show positive correlation between per capita GDP growth and Internet maturity of a country:

The first regression gives results statistically significant, with an R square of 89 percent and a Tstat of 2.3 for the contribution of e3 to growth. Statistical contribution of e3 to growth is evaluated at 2.6 percent. This would mean that an increase of 10 points of e3 would result in an increase of real per capita GDP growth of 0.26 percentage point.

The second regression gives the same statistically significant results with an R square of 91 percent and Tstat = 3.2 for the contribution of Internet expenses to per capita GDP growth. For every 10 percent increase in Internet expenses, real per capita GDP grows an additional 1.2 percentage point.

When comparing this statistical approach with a macroeconomic approach, we see that the two approaches converge and show that the Internet creates net value to an economy through GDP growth.

However, we see some differences between the two approaches at the country level:

In some countries (e.g., South Korea and Sweden) the statistical contribution of the Internet to growth is lower than under the macroeconomic approach, showing a substitutive effect of e-commerce.

In some countries (e.g., Canada and the United States) the statistical contribution to growth is higher than under the macroeconomic approach, showing strong spillover effects on the non-Internet economy.

THE INTERNET CREATES JOBS

Common wisdom tends to consider that the Web has a negative or neutral impact on employment. This is derived from the idea that the Internet has favored massive disintermediation. But this is a misconception. As we have demonstrated, the Internet is a contributor to net job creation in the sample countries. While some jobs have been destroyed by the emergence of the Internet, many more have been created during the same period, including jobs directly linked to the Internet such as software engineers and online marketers as well as more traditional jobs, for example in logistics to deliver online purchases.

A detailed analysis of France over the past 15 years shows that the Internet created 1.2 million jobs and destroyed 500 000 jobs, creating a net 700,000 jobs or 2.4 jobs for every one destroyed. This result is also reflected in our survey of more than 4,800 SMEs in the countries we studied, which shows that 2.6 jobs were created for every one destroyed, confirming the Internet's capacity for creating jobs across all sectors. Further, companies that have fully integrated the technology and use it extensively create more than twice as many jobs as the average, while the Internet has a neutral to slightly negative effect on companies using it only sparingly or not at all.

THE INTERNET IS A MODERNIZATION FACTOR FOR THE WHOLE ECONOMY

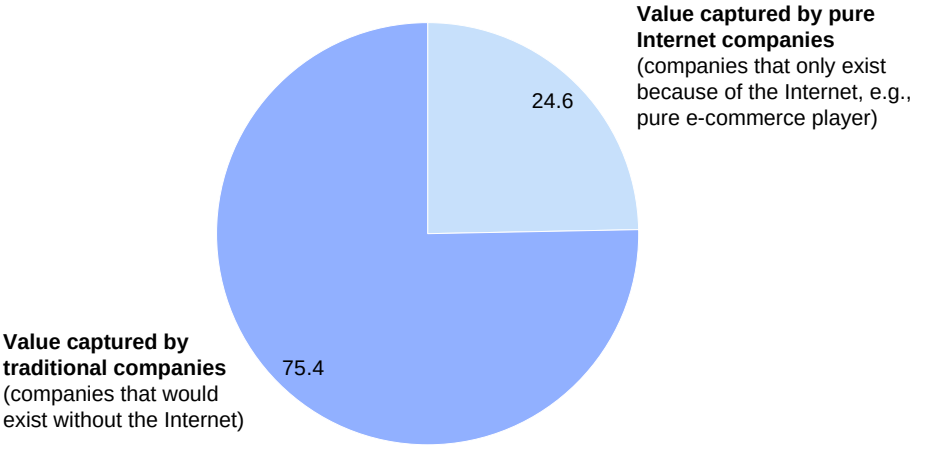
Although the Internet has resulted in significant value shifts between sectors in the economy, our study demonstrates that all industries have benefited from the Web.

Perhaps surprisingly, the vast majority of the economic value created by the Internet is derived from industries not directly linked to ICT. About 75 percent of the economic impact of the Internet is happening at companies in more traditional industries that have witnessed significant productivity increases (Exhibit 7). SMEs in particular obtain a strong boost from using the Internet.

Exhibit 7

Traditional industries capture 75 percent of the value of the Internet

Share of Internet profitability gain between companies
100% = Total Internet value for all companies



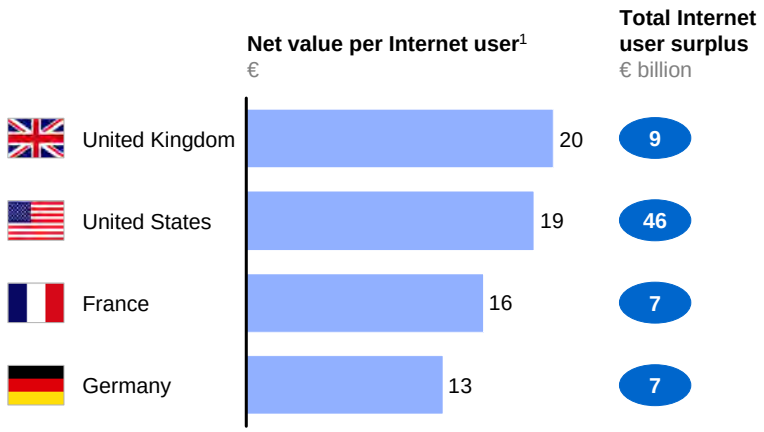
SOURCE: McKinsey SME Survey

THE INTERNET GOES BEYOND GDP, GENERATING CONSUMER SURPLUS

The Internet has changed our lives, giving us access to a large set of free services from e-mail and browsing to information services and search, or collaborative services such as wikis, blogs, and social networks. This access has given users substantial surplus value beyond the impact of the Internet on GDP. Our research shows that this value ranges from €13 ($18) a month per user in Germany to €20 ($28) in the United Kingdom (Exhibit 8). All told, the Internet generated substantial annual consumer surpluses, from €7 billion ($10 billion) in France to €46 billion ($64 billion) in the United States.

Exhibit 8

The value of the surplus accruing to users of the Internet varies between €13 and €20 per user per month in each country



1 All in the same currency based on Organisation for Economic Cooperation and Development exchange rates.
SOURCE: McKinsey study (with Internet Advisory Board); Yankee; McKinsey analysis

In general, this surplus is generated from the exceptional value users place on Internet services such as e-mail, social networks, search facilities, and online reservation services, among many others. This value far outweighs the costs, both actual costs such as access and subscription fees and annoyances such as spam, excessive advertising, and the need to disclose personal data for some services. In the United States, for example, research conducted with the Interactive Advertising Board[13] found that consumers placed a value of almost €61 billion on the services they got from the Internet, while they would pay about €15 billion to get rid of the annoyances, suggesting a net consumer surplus of about €46 billion.

13 Internet Advertising Board, *Assessing the consumer benefits of online advertising*, July 2010.

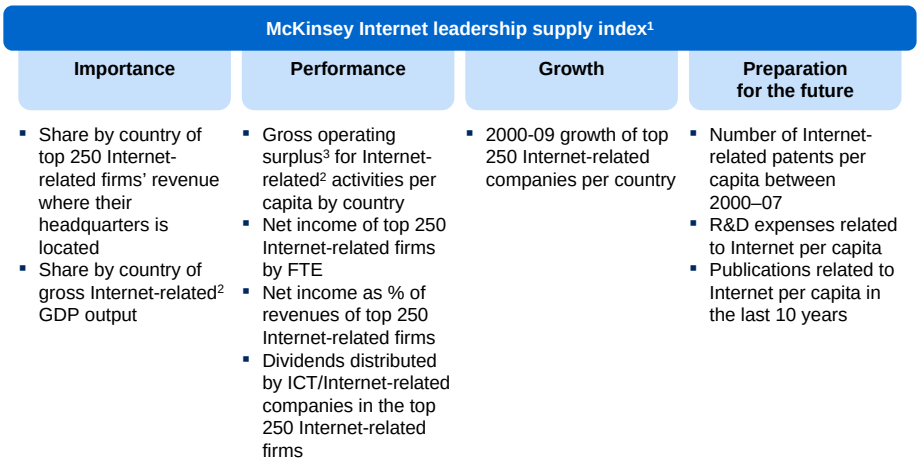
1.3. While countries with a high Internet contribution to GDP tend to have a strong Internet supply ecosystem, the Internet supply landscape offers contrasts

Along with the Internet's economic contribution within the countries in our study sample, we also examined supply, looking at the participation of each country in the framing of the global Internet ecosystem. To do this, we crafted the McKinsey Internet Supply Leadership Index, based on four subindexes (Exhibit 9):

- **Importance index**, measuring the country's overall contribution to the global ecosystem
- **Performance index**, measuring the profitability of a country in the Internet ecosystem
- **Growth index**, measuring the growth of the country in the Internet ecosystem
- **Preparation for the future**, measuring how well a country prepares for the future (e.g., in anticipating forthcoming trends and making R&D investments accordingly)

Exhibit 9

To understand the importance of an individual country to the Internet supply ecosystem worldwide, we built the McKinsey Internet leadership supply index using four indicators



1 Non-weighted average of all sub-indexes.
2 Computer and related activities, office, accounting and computing machinery, and post and telecommunication.
3 Organisation for Economic Cooperation and Development denomination.

SOURCE: McKinsey analysis

The McKinsey Internet Leadership Supply Index is the average of each subindex, while each subindex is the average of its components. The score for the leading country in each subindex is set at 100, and the scores for the other countries are based on their positions relative to the leader.

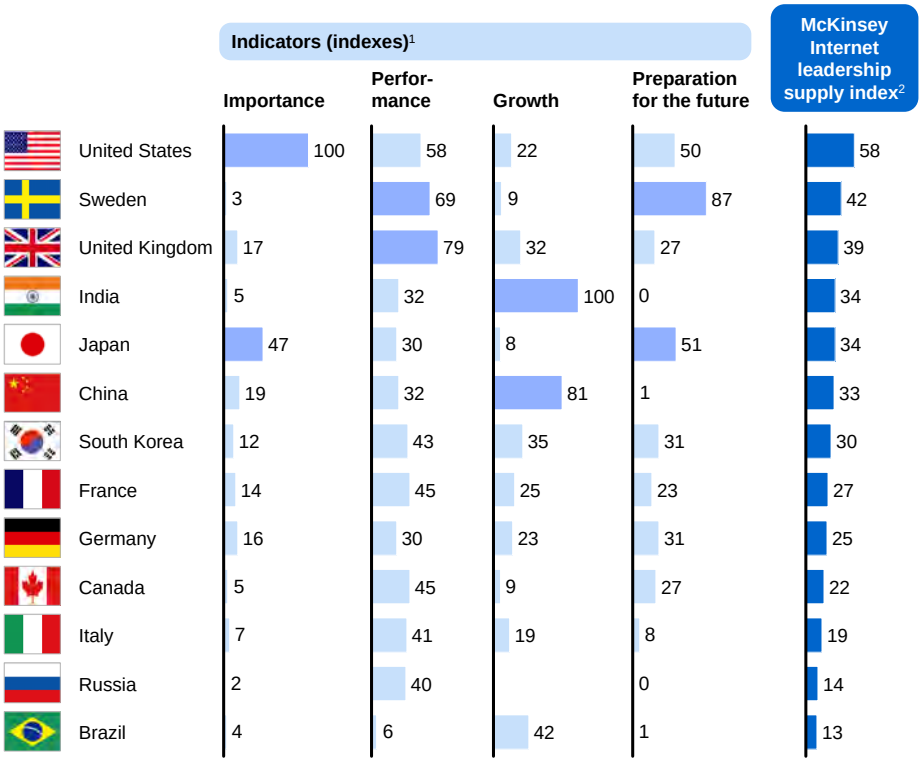
THE UNITED STATES LEADS THE GLOBAL INTERNET SUPPLY ECOSYSTEM MAINLY BECAUSE OF ITS IMPORTANCE WITHIN THE SYSTEM

Unsurprisingly, the United States leads the McKinsey Internet Supply Leadership Index with an overall score of 58, almost 40 percent higher than that for Sweden, the next-closest country (Exhibit 10).

The United States' leading position rests primarily on its economic importance within the system, where it scores more than twice as high as Japan, which ranked second on importance. For example, in measuring importance, we noted that from among the 13 countries in our study, 38 percent of the production needed to build the Internet—hardware, software, and content—originated in the United States, compared to 14 percent from Japan and 10 percent from China. In addition, US companies captured 35 percent of the total Internet revenues earned by the global top 250 Internet-related companies, followed by Japan with 20 percent.

Exhibit 10

The United States leads the Internet supply ecosystem



1 Each index is the average of component sub-indexes. See appendix for detail on sub-indexes.
2 Arithmetic mean of the four indicators.

SOURCE: Organisation for Economic Cooperation and Development; McKinsey Internet-related top 250 firm database; McKinsey analysis

Part of the explanation for this leadership may be the United States' mixed structure among the ICT industries. US companies in the top 250 Internet-related companies are spread over all the Internet-related supply domains: 42 percent of revenues are hardware, 26 percent are software and services revenues, and 30 percent are telecoms revenues (see methodological appendix on McKinsey Internet Supply Leadership Index for more details).

Other components of the McKinsey Internet Supply Leadership Index highlight the role played by other countries.

- **The United Kingdom and Sweden companies show the best performance.** In the performance portion, the United Kingdom and Sweden rank first and second, respectively, with the United Kingdom strong in per capita gross income from Internet-related companies and in net income per employee in these industries and Sweden ahead in dividends paid per capita. This is mainly because of the strong performance and importance of their telecoms operators. Indeed, telecommunications companies in European countries generally exhibit strong performance. For instance, in France, telecoms account for about 60 percent of all Internet revenues and in the United Kingdom, 87 percent.

- **With high-growth companies, India and China are catching up fast.** India is leading in the growth component with China second, followed closely by Brazil and South Korea, while Japan is near the bottom of the growth rankings. A critical difference appears to be Japan's inability to monetize its research and development expenditures, while companies in the leading countries have done better at turning ideas into revenue.

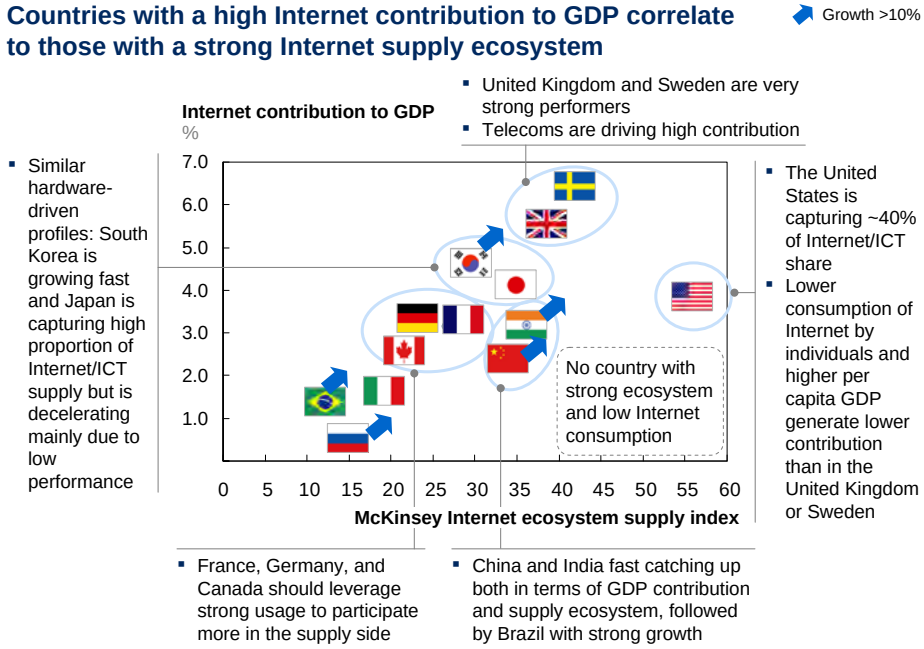
- **Japan and Sweden are investing in the future, but other players are rapidly emerging.** Innovation is important in Japan and Sweden. Each country has strong R&D investments and a high number of patents per capita.

Change could come swiftly. As the world has become more wired, developing an Internet ecosystem has taken less and less time. For example, in the 1970s and 1980s it took Israel about 14 years to grow from 50 to 200 new patents a year. Starting in the mid-1990s, it took Singapore about six years to cross this threshold, and most recently the Indian city of Bangalore crossed it in just four years.

We also see an Internet ecosystem that offers contrasts (Exhibit 11). The United States is well ahead in our index, collecting fair contributions to GDP from the Internet and enjoying strong growth in these industries. The United Kingdom and Sweden are also strong performers, very much focused on telecommunications. Canada, France, and Germany could take better advantage of their high Internet usage to gain prominence on the supply side. The developing countries we studied—Brazil, China, and India—are growing quickly, as is South Korea, while Japan is having difficulty capitalizing on its relatively high importance to the Internet supply ecosystem because of performance challenges.

Exhibit 11

Countries with a high Internet contribution to GDP correlate to those with a strong Internet supply ecosystem



SOURCE: McKinsey analysis

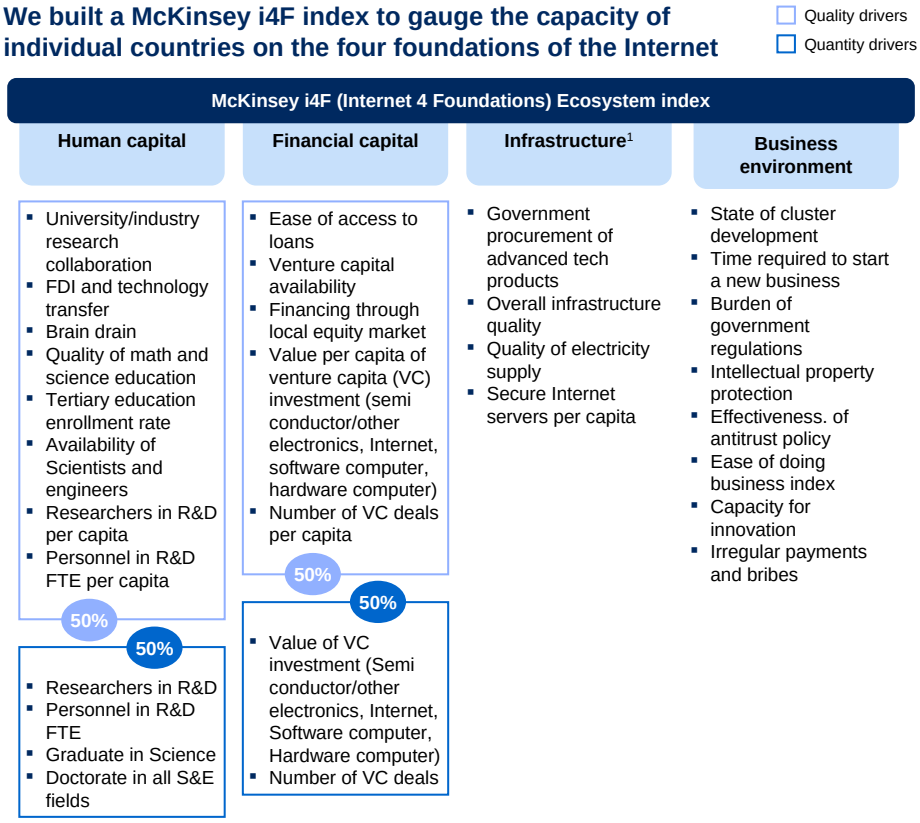
A detailed look at consumption and supply tells the same story. Beneath the flashy successes of Google, Facebook, eBay, and other megasites and bolstered by uncounted smaller efforts, the Internet has become a sizable contributor to national economies, giving economic growth a much larger push than most observers might guess.

1.4. Public and private should focus on four critical areas to build a strong supply ecosystem

To develop a strong Internet ecosystem, public and private attention must be focused on supply and in particular on four areas critical to the development of the network. Infrastructure is obvious and usually receives the bulk of public and private investment, but the other areas—human capital, financial capital, and the business environment—are also important components of a healthy and vibrant system. The McKinsey i4F (Internet 4 Foundations) index (see Exhibit 12) takes these areas into account.

Exhibit 12

We built a McKinsey i4F index to gauge the capacity of individual countries on the four foundations of the Internet



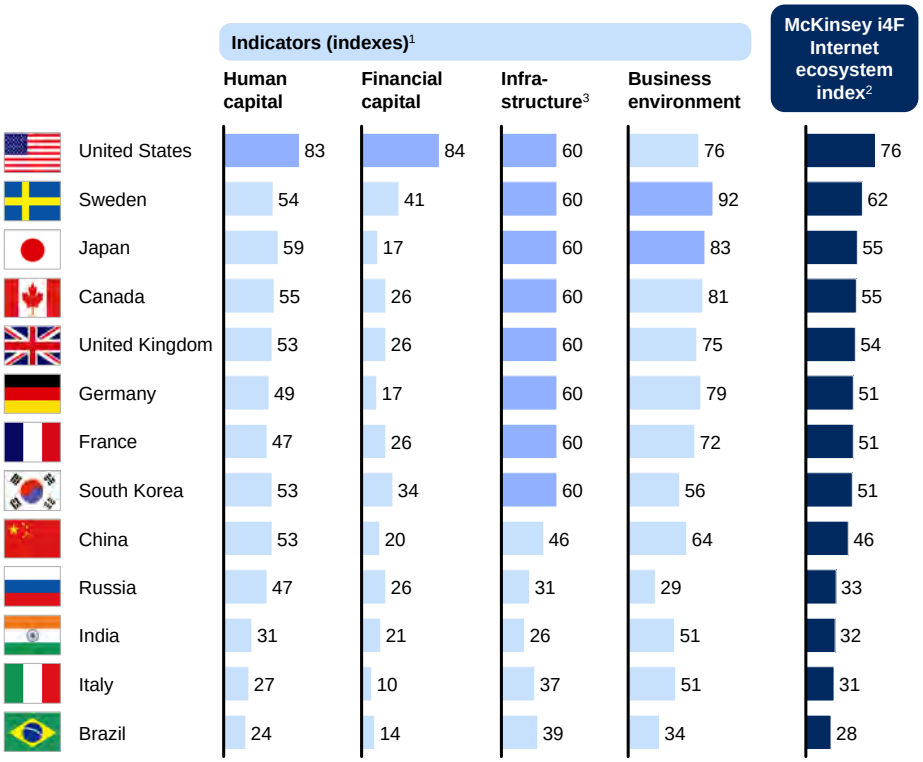
1 Infrastructure is viewed as being a "threshold" factor where increases above a certain threshold do not confer additional advantage. All ratings above 60 (our defined threshold) are set to 60.

SOURCE: World Economic Forum; United Nations Educational, Scientific and Cultural Organization; Venture Expert; International Institute for Management Development; World Bank; McKinsey analysis

Countries such as Sweden and the United States that rank high across the board (Exhibit 13) are also the ones that generate the most value from the Internet. Indeed, we see a correlation between Internet i4F indicator and Internet McKinsey Supply Leadership Index showing how important it is for a country wishing to build a strong Internet ecosystem to focus on these four areas (Exhibit 14).

Exhibit 13

The United States and Sweden are outperforming the McKinsey i4F index



1 Each index is the average of component sub-indexes. See appendix for detail on sub-indexes.
2 Arithmetic mean of the four indicators.
3 Infrastructure is viewed as being a "threshold" factor where increases above a certain threshold do not confer additional advantage. All ratings above 60 (our defined threshold) are set to 60.

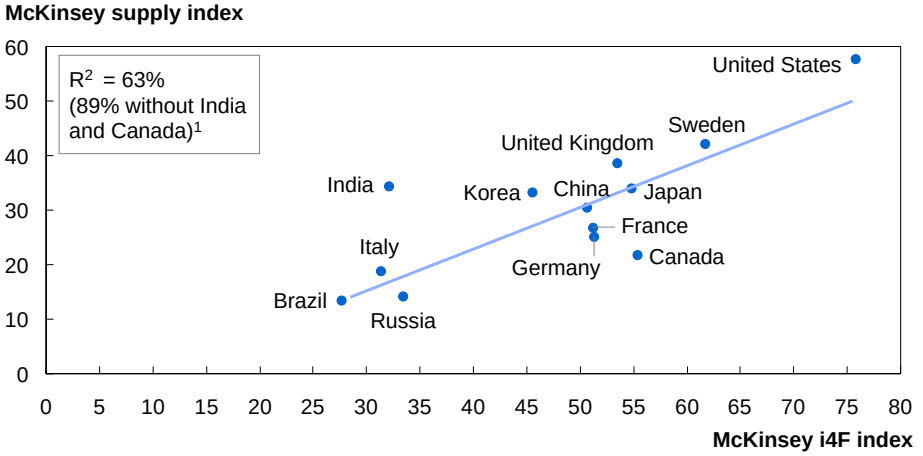
SOURCE: Organisation for Economic Cooperation and Development; McKinsey Internet-related top 250 firm database; McKinsey analysis

Exhibit 14

The correlation between our i4F and supply indexes shows that a favorable environment enables a strong performance in Internet supply

Correlation between i4F index and McKinsey supply index, 2009

%



1 Canada: Low score mainly due to Nortel collapse. India: High McKinsey supply leadership index mainly due to Bangalore and not whole India.

SOURCE: World Economic Forum; United Nations Educational, Scientific and Cultural Organization; Venture Expert; International Institute for Management Development; World Bank; McKinsey analysis

- **Human capital has been a clear advantage for the United States.** The United States has historically produced and attracted a large quality and quantity of trained professionals to provide the talent required by its Internet ecosystem.

  — Focusing on education: The breadth and depth of education, particularly in math and sciences, is among the key indicators in this area. The United States, which ranked highest on this indicator, is home to some of the world's top universities, attracting high-potential domestic and foreign scholars. For example, 43 percent of all doctoral candidates in US science and engineering programs are foreign students brought to the country by the strong reputations of its universities, a scholastic marketing program targeting foreign students, opportunities to earn high salaries, and administrative processes that ease their integration into the programs. In Sweden, the government has started several initiatives to increase the number of highly-qualified ICT graduates, including a program that provided IT training to 75,000 primary and elementary school teachers, who then brought these skills to students at all levels. The Swedish government also increased the capacity of university science and engineering programs, allowing a 7 percent increase in graduate students studying science between 1998 and 2004, and helped to finance new positions in the Royal Institute of Technology. However, even the US now faces potential shortfalls in creating the talent needed in the STEM (Science Technology Engineering and Mathematics) disciplines that are critical to the Internet ecosystem.

  — Bringing in talent: Countries also deepen their talent pools by bringing in skilled workers from abroad. For example, compared to other countries, US immigration policy has historically created a favorable climate for attracting ICT foreign workers, allowing employment visas to be distributed based on employment and educational qualifications and for employers to sponsor incoming employees. And the Internet ecosystem has been a disproportionate beneficiary of these policies. In 2003, for example, 40 percent of H-1B nonimmigrant visas were granted to ICT workers.

  — Creating technological clusters: Technology clusters can create a virtuous cycle for the creation and attraction of talent–examples include Silicon Valley in the United States and Bangalore in India. Some technology clusters have emerged naturally, while others have benefited from proactive policies and private-public partnerships. For example, to increase the number of high qualified ICT graduates, Sweden developed a research center in new technologies. However, the success record of setting up technology clusters has been mixed and many of the lessons learned well documented.

  — Diversifying the employer landscape: Countries benefit by bringing in foreign multinationals that help build human capital through knowledge and technological exchanges.

- **Efficient access to financial capital has helped many countries gain prominence in the Internet ecosystem.** Access to appropriate funding—through loans, venture capital investments, or other means—gives SMEs and other entrepreneurial efforts a chance to compete with their ideas in the market. Countries that launched incentives to promote financing both from traditional sources such as banks or self-investment and from investors with a more specialized approach, such as venture capital funds, are performing well on our index.

  — Promoting private investment: The United States, for example, launched financing mechanisms targeted at supporting the growth of technology firms. One of these programs, created in 1990, was the Advanced Technology Program, which was designed to organize cofinancing between public and private sources for high-risk research and development projects. Between 1990 and 2004, the program led to the funding of $576 million in electronics projects and $504 million in ICT projects. South Korea offered loan incentives to promote investment in carrier infrastructure and has encouraged significant investment in local research and development, resulting in a 9 percent annual increase in investment between 1997 and 2007.

  — Encouraging Internet-focused venture capital: For example, Israel, though not in our study sample, famously advanced its IT sector about 20 years ago by creating alliances with Silicon Valley venture capitalists, who today have access to the country's superior ICT R&D. In East London, a technology ecosystem is being developed with the involvement of 60 venture capital firms specializing in new technology are 21 specialize in technology.

- **Infrastructure investment is essential, and most developed countries have already created an efficient Internet infrastructure.** Investment in the supply infrastructure goes well beyond plugging the Internet into everyone's homes, although that is obviously a critical component. Infrastructure is the essential backbone for the entire ecosystem. It creates the platform upon which users, and organizations experience the Internet, and upon which entrepreneurs and businesses innovate. Using research we conducted with the World Economic Forum—the "Innovative Heatmap"—we established a threshold in our index.[14] Once countries pass this quality and penetration milepost—as most developed countries have—infrastructure is no longer a differentiating component.

  — Facilitating deployment of infrastructure by the private sector: In Japan, for example, the development of a fiberoptic network by private telecommunications players has been encouraged in several ways, and by 2007 the penetration of the fiberoptic networks rivaled that of the DSL network, 40 percent and 46 percent, respectively. Some of the policies applied included: tax incentives such as tax reductions on assets and favorable income tax rates; advantageous credit facilities such as government-guaranteed credit for private telecommunications companies, enabling them to access to lower finance costs, and more leverage while building the country's Internet infrastructure; and market deregulation, which created competition in the telecommunications market, leading the incumbent, NTT, to invest in a fiberoptic network.

14 McKinsey's Innovation Heatmap partnership with the World Economic Forum.

  - Direct public investment in infrastructure, especially in areas with limited profitability: The Swedish government, for example, has promised Internet access to everyone and backed this with a €570 million project to bring broadband to low-density areas.

- **Creating the right business environment is critical**. An attractive business environment can accelerate the growth of a vibrant Internet ecosystem, while the wrong environment could stifle growth. A wide range of factors from tax incentives and the level of corruption to encouragement of innovation work together to create a nurturing environment for developing an Internet ecosystem.

  - Promoting deregulation: Deregulation often brings increased competition, which can motivate established companies to increase their investments or push for greater innovation. In the United States, deregulation triggered a series of new offers from incumbents AT&T and Verizon, while in Japan NTT moved forward with building a fiberoptic network.

  - Creating an appropriate legal framework: Protecting intellectual property rights and strengthening antipiracy laws, as South Korea did in the late 1990s, can contribute to an attractive business environment.

  - Offering a favorable taxation environment for specific industries: India, for example, gives hardware and IT companies a tax holiday of up to five years to encourage entrepreneurship, while the United Kingdom offers partial tax relief to investors in specific businesses.

France offers a fitting example of how our analysis can help countries consider ways to gain a stronger presence on the global Internet ecosystem and increase the contribution the Internet delivers to the national economy (see Box 4, “The French experience”).

Box 4. The French experience

Though France sits in the middle ranks of the McKinsey Internet Supply Leadership Index, the country is moving forward with clear strengths. It has a strong user base, solid infrastructure, and quality math and science education. It is also one of the countries with higher contribution of Internet to growth and among mature countries, one of the countries where Internet contribution is growing the most.

France could build on these advantages while targeting areas that remain underdeveloped to create a more powerful ecosystem. Specifically, analysis based on the i4F indicator suggests that a focus on three areas—improved research collaboration between academia and industry, more aggressive development of technology clusters, and clear policies to attract top talent in the country—could bring substantial improvements. Some efforts have begun including, for instance, new tax credits for research (a 30 percent tax reduction for an R&D investment of up to €100 million and a 5 percent reduction above that threshold), and greater autonomy for universities. However, further work on these areas are likely to deliver promising results. In addition, efforts to build a critical mass and take advantage of the European large size could be accelerated.

2. Leveraging the Internet to revive the engine of growth

Understanding how much the Internet contributes to national economies and how this value is created lays a solid foundation for moving national policy and business strategy forward in a way that maximizes the benefits gained. Initiatives can be championed by government policy makers, by business executives, or by a partnership between the two groups, but in every instance the goal should be strengthening the domestic Internet ecosystem—consumption and supply—and delivering as much value to the economy as possible.

2.1. Public decision makers should act as catalysts to unleash the Internet's growth potential

Public spending can be used as a catalyst to boost both usage and ecosystem. Public expenditures are a proven vehicle for getting more people and businesses online. Countries that have the highest public investment in the Internet as share of GDP tend also to gain the greatest contribution to GDP from the Internet. The United Kingdom, the United States, Sweden, and South Korea posted the highest average levels of investment in the Internet between 2000 and 2009, and each rank among the highest on the McKinsey Internet Supply Leadership Index and in contribution to GDP from the Internet. Sweden has pushed the development of e-government services and was ranked first in e-government advancement index in 2008 by the United Nations.

Public policy leaders could work to stimulate Internet usage among individuals, businesses, and government bodies. This can be accomplished by providing government-sponsored training sessions that instruct individuals and businesspeople on how to access the advantages offered by the Internet, offering incentives to the private sector to expand and improve infrastructure, and encouraging public agencies to develop e-government applications, allowing people and businesses to access government services and conduct business with the government online. The government's own usage encourages citizen use, and government e-transformation creates a large-scale, complex demand that stimulates the supply ecosystem (see Box 5, "Pushing Internet usage on three fronts").

Box 5. Pushing Internet usage on three fronts

Sweden and South Korea have both focused intense public energy on encouraging Internet usage on all fronts: individuals, businesses, and public bodies. These efforts are among the reasons these countries ranked high in many of the categories we examined while determining the economic impact of the Internet.

Sweden initiated numerous programs to push **individual usage**. Among the many efforts, it invested about €570 million to bring broadband Internet services to small towns and areas with low population densities, it launched an IT in Schools program to train 75,000 elementary and secondary teachers, it was quick to liberalize the telecommunications markets, and it offered subsidies to promote broadband expansion.

The government also focused attention on bringing the Internet to **businesses**. One program, financed jointly by the government and private sources, focused on teaching IT capabilities to businesses with fewer than ten employees. In another, the National IT Training Program, the government sought to teach IT skills to unemployed workers who lacked such training.

The **government** also turned the mirror on itself. In an effort called the 24/7 Agency, the government moved to modernize public administration and bring government services online. The diverse approach included allowing digital transmission of medical prescriptions and developing the world's first "virtual embassy" in the online environment Second Life. In 2008, Sweden was ranked first on the e-government advancement index by the United Nations.

In South Korea, the government launched a program called Ten-Million-People Internet Education, which focused on demographics not usually associated with Web activity, including the elderly, farmers, the disabled, prisoners, and housewives. The program offered government-subsidized training and reached 4 million people in 2000.

The government also encourages infrastructure investment, for example through certification programs for buildings larger than 3,300 square meters stating they are broadband ready and creating a broadband backbone between Seoul and Taejon using a mix of public and private financing. And the South Korean government works to boost Internet usage at schools, for instance by encouraging online homework.

Governments could also create a business environment that promotes technological development and innovation. Using regulations to maintain constructive competition; encouraging the deployment of advanced technologies; building top-level education and training centers in science, engineering, and other relevant fields; pushing companies to target the global market; and publically applauding successes are among the themes public leaders can embrace to put together an attractive environment.

Public officials could also focus some of their attention on SMEs, which as we have seen are critical to job creation and can garner large advantages from Internet proficiency. This can be done by assuring high-speed and very-high-speed access to the Internet and adopting policies that encourage SME owners and managers to invest in digital technologies and to become adept at exploiting them.

These are among the many measures that will cultivate the four core areas of Internet ecosystems: human capital, financial capital, infrastructure, and the business environment (see Box 6, "Strength in the four critical areas is at the core of Bangalore's ecosystem").

Box 6. Strength in the four critical areas is at the core of Bangalore's ecosystem

India has become synonymous with taking advantage of IT and the Internet for economic growth, and Bangalore is at the epicenter. India accounts for more than two-thirds of IT services imports to developed countries from developing countries, and Bangalore, a city of 5.5 million people, accounts for just more than a third of it.[1] This success was built on a thriving Internet ecosystem supported by public policy and private investment across all four critical areas.

To develop **human capital**, the region established a broad network of premier technical and business educational institutions, including 12 universities, 98 engineering colleges, and 107 medical colleges. The effort included the opening of national institutes for advanced studies, which have become leading research and development centers.

Among its **infrastructure** initiatives, India helped create IT and electronic business clusters, such as Software Technology Parks created in 1991 and Electronic City. In addition, private investment led to such world-class campuses as the DBS Business Center in Bangalore. The introduction of incubators and datacom services, along with efficient transportation networks, create convenient locations for new companies.

Favorable tax policies, such limited-time exemptions on taxes for computer hardware and IT companies, and subsidies, including guarantees and favorable rates for electricity, contributed to an attractive **business environment**.

The government nurtured **financial capital** by leveraging the Bangalore stock exchange and promoting the growth of domestic venture capital funds. Bangalore offers strong financial support to entrepreneurs through several state government institutions, including the Karnataka Information Technology Venture Capital Fund (KITVEN), Bangalore.

1 Deepak K. Sareen, Innovation and IT in India (Bangalore case study), presentation at the 2nd International conference on the process of innovation and learning in dynamic city regions, July 2005, Bangalore.

2.2. All business leaders, not just e-CEOs, should put the Internet at the top of their strategic agenda

Business leaders, including those leading companies that are not directly involved with the Internet, must be proactive in taking advantage of benefits the Internet offers. This is especially true for entrepreneurs leading SMEs. With technology changing so rapidly, executives must regularly review their businesses, looking for ways the Internet can help them innovate more aggressively or reach new markets more rapidly. They must in particular be prepared to reinvent their business models to capture productivity and performance improvements unlocked by the Internet.

Managers also must not let the distractions of day-to-day business prevent them from contemplating the future. They must find time to consider the changes new technologies could soon bring to their businesses. Up-and-coming trends such as distributed co-creation and networks as organizations could radically change the way talent and work are organized. Operations are also evolving thanks to ideas such as the Internet of things, where chips create highly efficient networks from almost any physical product, and wiring for a sustainable world, where technology is put up against the world's environmental challenges.

The Internet is also spawning innovative business models such as innovation from the bottom of the pyramid, in which new ideas come from efforts to serve the lowest-income households, and multisided models that look for additional value from assets created operating a core business, such as selling market data. The Internet can also create opportunities in social goods, such as using new technologies to solve community problems (see Box 7, "Two trends to follow for decision makers").

Box 7. Trends to follow for decision makers

Developments occur quickly around the Internet. And while it is important that businesses work diligently to squeeze as much benefit as they can from today's technology, leaders must also keep a watchful eye on new ideas that could drastically change the environment, lavishing advantages on the prepared, and perhaps taking from those caught unaware.

In our research we have been tracking many of these trends (See "Clouds, big data, and smart assets: Ten tech-enabled business trends to watch"). Here we highlight three developments seem particularly promising.

Cloud computing. Cloud computing separates IT resources, such as files and programs, from the devices used to access them. This can create many advantages, such as resource pooling and a near unlimited ability to enlarge or reduce available resources rapidly. By 2015, cloud computing could represent a $70 billion to $85 billion opportunity, with the market doubling every two years. Some technology watchers forecast that by 2015 cloud computing infrastructure and applications could account for 20 percent of total spend in these areas.

Fast movers in this technology could quickly gain substantial market share, displacing incumbents with new cloud-based solutions and reaching into new markets. The impact could reach 20 to 30 percent of the total IT budget for businesses willing to leverage this new technology.

Internet of Things.[1] In a rapidly developing trend called the Internet of Things, sensors and actuators embedded in physical objects—from roadways to pacemakers—are becoming linked through wired and wireless networks, often using the same Internet Protocol (IP) that connects the Internet. These networks churn out huge volumes of data that flow to computers for analysis. This merging of the physical and virtual worlds creates news ways of capturing value. Customer buying preferences can be associated in real time at a specific location, enabling more timely and relevant offers to be provided. Sensors on objects can enable companies to turn product sales into services sales, including everything from proactive maintenance, to selling usage instead of a capital good (e.g., car-sharing services in urban areas). Instrumenting complex systems such as electrical grids allows them to be operated with higher levels of efficiency and reliability, and can even be used to introduce dynamic pricing to further manage peak demand. Remote health monitoring can reduce the costs of treating patients while simultaneously improving their health outcomes. The numerous benefits of this trend result in an estimated growth rate of connected nodes on the Internet of Things of 35 percent annually for at least the next five years. As this trend continues to accelerate globally, companies and governments that move first into using the Internet of Things stand to gain knowledge that will enable competitive advantage.

Big data[2] **.** Companies with the capability to use the Internet, including the Internet of Thngs, to collect operational, consumer, and market data, could find their databases quickly overflowing with information. And while the Internet may no longer be "a wasteland of unfiltered data," as Clifford Stoll once feared, these databases, if left unmanaged, could become mammoth junkyards of useless bytes.

Big data is a movement toward finding ways to manage databases that have become so massive that conventional tools are not adequate for capturing, storing, searching, sharing, analyzing, and visualizing this information. Enterprises that develop expertise in handling big data will find rich opportunities in areas such as creating transparency around these databases, reducing search time and easing concurrent processes, sifting through the data to uncover variabilities and areas for potential performance improvements, and segmenting large populations into usable groups based on a broad range of variables.

Looking at how advances in big data might affect various industries, we estimate the US health care industry could see annual productivity improvements of almost 1 percent over the next decade, creating potential value of more than $300 billion. The public sector in developed European countries could witness annual productivity gains of about 0.5 percent with a potential value of €255 billion.

1 Michael Chui, Markus Löffler, and Roger Roberts, "The Internet of Things," *McKinsey Quarterly*, March 2010.

2 *Big data: The next frontier for innovation, competition, and productivity*, McKinsey Global Institute, May 2011 (www.mckinsey.com).

2.3. All stakeholders should take part in a continuous and fact-based public-private dialogue

In addition to the individual efforts by government and business leaders, there are initiatives that require public-private dialogue for the greatest impact from the Internet ecosystem. Within individual countries and globally, open discussions between government and businesses are needed to make progress across a variety of issues, such as intellectual property in the digital age or data privacy.

To spur consumption, public and private leaders should explore solutions to such pressing issues as standards for legally valid digital identities, which would create even greater efficiencies in online business transactions, and intellectual property protection, which would unleash new markets and encourage greater creativity. The supply side also requires attention from all parties on vexing topics including net neutrality, talent availability, and the overall business environment.

A strong and continuous public-private dialogue is necessary to assure optimal conditions within each country and internationally.

3. Monitoring the progress of the Internet using four critical indicators

Putting a numerical value on the benefits that the Internet delivers to national economies requires sorting volumes of data from divergent sources. To ease the analysis and provide a "language" and tools to discuss the impact of the Internet, we developed four indexes that examine separate parts of the picture and together provide the full panorama. The first two—the e3 index and the iGDP—examine input and output indicators centered on expenditures and consumption. The next two—the McKinsey Internet supply leadership index and the i4F indicator—examine input and output indicators focused on data related to the supply side. Countries earnestly wishing to strengthen their domestic Internet ecosystem could review their progress against these indicators at least annually and make whatever adjustments are needed to assure a steady course.

As part of our effort to closely track how the Internet is affecting national economies, we plan to publish an annual report that follows and analyzes changes in these indexes. In addition, we have made public the details of our methodology of our indicators in an effort to encourage open-source-type improvements. We welcome any criticisms and suggestions on how our analyses can be improved.

We will receive all contributions, synthesize them, and publish them to improve the way we measure the impact of the Internet.

3.1 The consumption indicators

The e3 index measures the maturity of a country's Internet ecosystem by considering input indicators linked to consumption. Data are collected in three essential areas: engagement, environment, and expenditures. Engagement, which weighs heavily in the index, covers private, corporate, and government use and gathers data on aspects such as number of personal computers in use, number of companies with a Web site or high-speed access, and number of government departments that can be reached online.

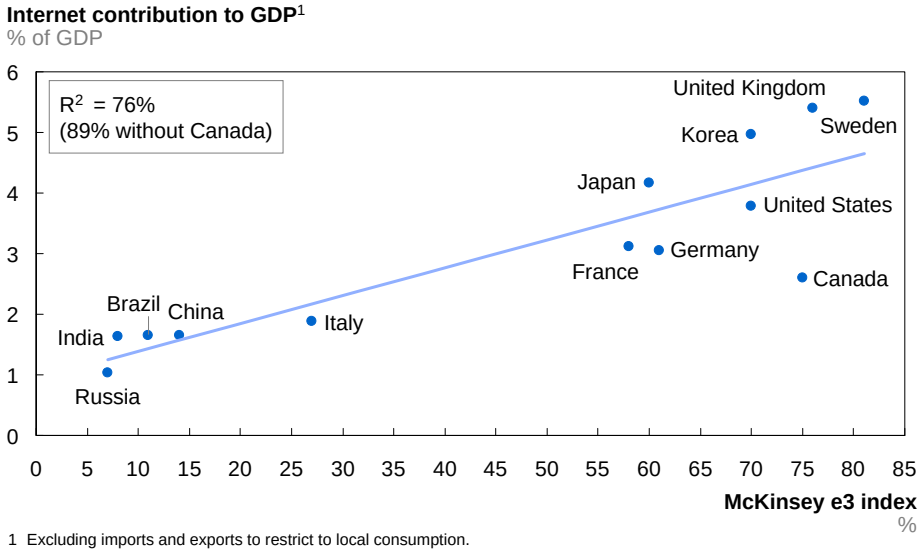
The iGDP indicator, reflecting direct Internet contribution to GDP, also examines consumption but in addition looks at output. Data gathered for this indicator help determine the overall contribution the Internet makes to a country's economy.

Our e3 index and contribution to GDP are correlated (Exhibit 15).

Exhibit 15

Internet maturity is measured through internal consumption and correlated to the Internet contribution to GDP

Correlation between McKinsey e3 index and Internet contribution to GDP, 2009



1 Excluding imports and exports to restrict to local consumption.

SOURCE: World Economic Forum; McKinsey analysis

3.2 The supply indicators

The McKinsey Internet Supply Leadership Index, as we've noted, measures a country's overall participation in the global Internet ecosystem by examining supply-side inputs. The analysis is broken down into four key sections: current importance to the global ecosystem, performance within the ecosystem, recent growth, and activities that prepare a country for future developments. Taken together, these data represent each country's power within the dynamic Internet ecosystem and can help predict how the system might evolve

Supply outputs are gathered into the i4F indicator, which offers a valid representation of the vibrancy of a country's ecosystem. This indicator focuses on the four core areas of Internet development that we discussed earlier: human capital, financial capital, infrastructure, and the business environment.

Conclusion

Common sense tells us that the Internet is a vital part of a modern, healthy, growing economy. And while previous studies have examined parts of the picture, McKinsey research for the first time shows the full extent of the Internet's economic power. And that power is massive.

In the 13 countries we studied, the Internet has contributed on average 3.4 percent to GDP, weighting more than agriculture, energy, and other better-established industries, and it adds considerable vigor to economic growth. Perhaps surprisingly, the brunt of this impact—about 75 percent—is from industries that are not directly linked to the Internet, except of course by their computers. This value comes primarily from increased productivity.

Understanding just how much the Internet contributes to national economies should spur government and business leaders to seek ways to optimize their participation in the global Internet ecosystem. Encouraging usage is an unavoidable first step in leveraging public spending, but leaders must also focus on providing human capital, financial capital, infrastructure, and the appropriate business environment.

Postscript

by Martin N. Baily and Christian Saint-Etienne

The global economy is emerging from the deep recession that followed the recent financial crisis and, in the advanced economies, growth remains weak. One response to slow growth and persistent unemployment might be to hunker down, avoid change, and discourage innovative ideas and the spread of new products and services. This study by McKinsey has taken a different view, documenting for the first time the substantial contributions to past growth made by the Internet and the potential that this exciting, and still relatively new, technology will contribute to future growth.

Embracing new technology is the right way for the G8 economies to move forward. The reality of severe budget constraints has made it impossible to launch a new fiscal stimulus; indeed, many in the G8 have decided they must start fiscal consolidation. So if traditional pump-priming fiscal policy is not available, what will power a stronger recovery? An important part of the answer is that new technologies will encourage investment and hiring, generating new demand by consumers and businesses even as they expand supply. Increasing access to the Internet and developing its applications form a vital part of the latest technological revolution that can contribute to recovery and rising living standards. It is important not to overstate what technology by itself can do, as we learned in 2001 when many computers and fiberoptic cables sat idle after the high-tech bust. It is not enough to buy the software and hardware—it is what we do with technology that counts, particularly in the case of the Internet, which is an enabling technology. But innovation and new technology do provide the opportunity to grow, and, if the G8 countries are able to seize the opportunity, they will generate a new growth cycle based on a firmer footing than the finance-driven bubble that burst in 2007.

Last year, a pioneering study of the impact of the Internet on the French economy was released by the French office of McKinsey. This work has now been expanded in this study to cover all of the G8 economies, a fearsome task that has been completed in record time with fascinating results. Having worked with McKinsey, we appreciate the power that comes from combining traditional economic data with business knowledge and insight. This report points to important correlations between economic growth and Internet investment and usage, and it documents that companies that use the Internet are the ones that grow more rapidly and are more profitable. But it also describes the ways in which businesses are using the Internet to streamline processes, manage supply chains, and create new services for consumers that were not even imagined a few years ago. Rapid changes in technology can be bewildering, so it is very welcome to get from this report a new understanding of both the nature and the potential of the Internet.

There are important lessons for government policy makers from this report. It shows that countries that helped put in place the Internet infrastructure and promoted usage reaped the benefits of their efforts and saw a larger growth contribution. The dynamism of the private sector has been key to the speed of deployment of the Internet and to developing its applications, but the origins of the Internet and its transition into a global network also owe something to the contributions of governments. Governments as users are also a key catalyst to the spread of Internet technologies. The future growth of the Internet will require cooperation among governments and the right kind of smart regulation and support, at both the national and international levels. Another important lesson for policy is that the Internet is one of the emerging technologies that is forcing economic change and that demands flexibility. This report finds that the Internet is a net job creator but that it has contributed to some job losses as well as job gains. Countries can take advantage of new technologies only if they can manage and facilitate the migration of economic activities induced by innovation.

It is a wonderful opportunity for learning and the exchange of ideas by convening the e-G8 meeting prior to the formal meeting of G8 leaders. This report from McKinsey provides a powerful tool to push forward the economic debate and to better understand the power of technology to add to growth.

Martin N. Baily
Schwartz Chair and senior fellow of the Brookings Institution
Former chair of the US President's Council of Economic Advisers

Christian Saint-Etienne
Professor of business economics at the Conservatoire National des Arts et Métiers in Paris
Member of the Conseil d'Analyse Economique reporting to the French prime minister

May 2011

Appendix: Methodology and approach specifics

1. THE INTERNET'S CONTRIBUTION TO GDP

Although there are three different methods for calculating the contribution a sector makes to GDP, none take into account the total value contributed by the Internet to the overall economy of a country or a society. These are the three common methods:

- **Production method** measures the value added by companies by producing goods and services
- **Revenue method** measures the gross revenues of institutional sectors, including employee pay
- **Expenditure method** measures the total spending by consumers and government on goods and services

The contribution a sector makes to GDP is usually measured by calculating production. However, to quantify the Internet's contribution in detail using this method, we would have had to obtain data on the proportion of revenue attributable to the Internet with associated margins for all companies in all sectors. Such an approach would have required too many unreliable estimates.

We therefore decided to use the expenditure method based on OECD data.

This method looks at four factors: private consumption, public expenditures, private investment, and trade balance. We included for the contribution of each of these factors all categories of goods and services enabled by the Internet and attributed an underlying portion of this to the Internet.

We tried as much as possible to use a same data source for each category across the 13 countries in our study to provide comparable figures. These were:

- **Private consumption.** This is the total consumption of goods and services by consumers via the Internet or needed to obtain Internet access, including electronic equipment, e-commerce broadband turnover of telecoms operators on the retail market, mobile Internet market, hardware and software consumption, and smartphone consumption.[15]
- **Public expenses.** These include Internet spending for consumption and investment by the government (software, hardware, services, and telecoms)[16] at pro rata of Internet.

15 For e-commerce: Retail, Forrester online retail forecast, 2010, Euromonitor from trade sources/ national statistics, 2010, euromarketer database, 2010; Travel : PhoCusWright's, Online travel overview, 2010; gambling : H2 Gambling Capital Consultants, online gambling, 2010. For Broadband private revenues, global connected view forecasts, Yankee, 2010. For mobile data, GlobalMediaForecast, Strategy Analytics, 2010. For PCs : Worldwide Quarterly PC Tracker, IDC, 2010. For smartphones : Top Forecast Mobile devices worldwide, Gartner, 2010.

16 IT spending by industry market worldwide, 2007–2013, Gartner 2010.

- **Private investment.** This is private-sector investment in Internet-related technologies[17] (telecoms, extranet, intranet, Web sites, etc.).

- **Trade balance.** Trade balance includes exports of goods, services, and Internet equipment, plus B2C and B2B e-commerce, from which were deducted all associated imports.[18] We estimated B2B e-commerce based on numbers provided by academic studies,[19] and we developed a methodology based on overall size of e-commerce, Internet maturity of a country, and offline trade balance. We estimated B2C overall trade balance based on academic studies[20] as well as on Internet maturity of a country and size of e-commerce.

For each component of the contribution to GDP, we then looked at the assumptions regarding the underlying portion related to the Internet:

- For electronic equipment (computers and smartphones), we applied a ratio based on the overall time spent on the Internet against the total time using the product.

- For goods and services sold on the Internet, we recognized them at their full e-commerce value because they indicate the importance of the Internet industry as a link in the distribution chain, even though certain Internet transactions might have occurred even in the absence of the Internet.

- For Internet mobile and fixed subscriptions, we took 100 percent of individual expenses.

- For ICT goods and services investments and trade balance, we used a bottom-up analysis based on the description of each subcategory (software, hardware, services, and telecoms) made by McKinsey TMT database 2009. This allowed us to allocate the part of Internet within ICT goods and services (70 percent for software and services, 40 percent for hardware and telecoms).

All exchange rates used were extracted from Organisation for Economic Cooperation and Development StatExtracts database.

17 Organisation for economic cooperation and development StatExtracts data projected in 2009 using IT spending by industry market worldwide, 2007-2013, Gartner 2010, growth.

18 Organisation for economic cooperation and development StatExtracts data and e-commerce sources.

19 For example, *Evaluer l'impact du développement d'Internet sur les finances de l'Etat*, study on the behalf of the French Senate, October 2009.

20 For example, European Commission Flash Eurobarometer, *Consumer attitudes towards cross-border trade and consumer protection*, September 2010; European Commission Flash Eurobarometer, *Retailers' attitudes towards cross-border trade and consumer protection*, October 2010.

2. THE MCKINSEY INTERNET SUPPLY LEADERSHIP INDEX

To help understand how a country fits into the global Internet ecosystem, we developed the McKinsey Internet Supply Leadership Index, which considers a country's participation in the global network across four essential areas: its importance to the network, its overall performance within the network, recent growth rates, and how the country is preparing for the future.

- **Importance.** This measure looks at a country's overall contribution to the global ecosystem. Among the data considered are the share of the world's top 250 Internet companies that are headquartered in the country and the share delivered by that country of the world's gross Internet output,[21] including hardware, software, services, and telecommunications pro-rata of share of Internet.

- **Performance.** The quality of a country's Internet contribution is measured under this metric. Net income per employee from the top 250 Internet companies, comparative dividend payments, and economic surplus per capita[22] generated by Internet-related companies are among the data collected here.

- **Growth.** To look at a country's dynamism within the ecosystem, we also examine growth trends within a country's Internet industry. Growth rates between 2000 and 2009 of the top 250 Internet-related companies within a country is a key indicator.

- **Preparation for the future.** We also try to ascertain how well a country is preparing for the future. To do this, we look at, on a per capita basis, the number of Internet-related patents[23] granted in recent years, research and development expenditures,[24] and relevant publications[25] over the past ten years.

Principal sources used in compiling the index were OECD data and the McKinsey top 250 Internet-related companies.

Top 250 ICT firms

To build our top 250 Internet-related firms (see Exhibit 16), we used different database sources and aggregated a final list of ICT firms based on revenue. We considered public and private companies that were not subsidiaries. In particular, to avoid double counting, we took care to check across the database to ensure that each company was independent and did not belong to a parent already included in our listing. We wanted to reflect the "supply side" of the Internet and therefore excluded e-commerce or content companies and included as "Internet-related supply companies"[26] every software, hardware, services, and telecommunications company.

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21 Organisation for economic cooperation and development StatExtracts data projected in 2009 using IT spending by industry market worldwide, 2007–2013, Gartner 2010, growth.

22 Organisation for economic cooperation and development StatExtracts data projected in 2009 : office accounting, computer and related activities, and telecommunications, using IT spending by industry market worldwide, 2007–2013, Gartner 2010, growth.

23 OECD database 2010; share of Patents ICT Internet from 2000 to 2007.

24 OECD database 2006: office accounting, computer and related activities, and telecommunications.

25 Thomson Scientific, 2006.

26 Including search engines such as Google and Yahoo.com.

We used several databases to compile the list and used Bloomberg database to extract data we needed for each company and other sources (mainly annual reports) when Bloomberg data were unavailable:

- Top 80 ICT firms: "OECD Information Technology Outlook 2010 Highlights"
- Top 50 telecommunications firms and IT firms: "OECD Key ICT Indicators," 2003
- Top 330 IT services firms: Gartner, "Market Share: IT Services, Worldwide, 2006–2008"
- Top 100 ICT firms: "BusinessWeek Info tech 100," 2009
- Top 250 IT companies, 2004 hardware companies: "CBR Executive Focus 2005"
- Top 300 telecoms firms, top 300 hardware companies: "Hoovers, 2011"
- Forbes 2000 biggest companies
- Top 10 ICT firms in each category: OECD Information Technology outlook report, 2010

Exhibit 16

McKinsey top 250 Internet-related firms database

Company	Primary country
3M	United States
Accenture	Ireland
Acer Incorporated	Taiwan
Adobe	United States
Advanced Info Service PCL	Thailand
Advanced Micro Devices, Inc.	United States
Affiliated computer services	United States
Agfa-Gevaert N.V.	Belgium
Agilent	United States
Alcatel-Lucent	France
Amdocs	United Kingdom
América Móvil, S.A.B. de C.V.	Mexico
American Tower Corporation	United States
Apple Inc.	United States
ASUSTeK Computer, Inc.	Taiwan
AT&T Inc.	United States
Atos Origin S.A.	France
AU optronics	Taiwan
AutoDesk Inc	United States
Automatic data processing	United States
BCE Inc.	Canada
Bearing point	Netherlands
Belgacom SA	Belgium
Bharti Airtel Limited	India
BMC software	United States

Company	Primary country
Bouygues Telecom	France
Broadcom Corporation	United States
Brocade Communications Systems, Inc.	United States
Brother Industries, Ltd.	Japan
BT Group plc	United Kingdom
Byd Electronic	China
CA technologies	United States
Cable & Wireless Worldwide plc	United Kingdom
Cablevision Systems Corporation	United States
Canon	Japan
Cap Gemini S.A.	France
Capita group	United Kingdom
Casio Computer Co. Ltd.	Japan
Cellcom Israel Ltd.	Israel
CenturyLink, Inc.	United States
CGI Group Inc	Canada
China Mobile Limited	China
China Unicom (Hong Kong) Limited	China
Chunghwa Telecom Co., Ltd.	Taiwan
Cisco Systems, Inc.	United States
Cognizant Technology Solutions Corporation	United States
COLT Group S.A.	Luxembourg
Comcast	United States
Commscope	United States
Compal electronics	Taiwan

Exhibit 16

McKinsey top 250 Internet-related firms database (continued)

Company	Primary country
Computacenter	United Kingdom
Computer Sciences Corporation	United States
COMSYS Holdings Corporation	Japan
Convergys Corp	United States
Crown Castle International Corp.	United States
CSK HOLDINGS corporation	Japan
Dassault Systemes SA	France
Dell Inc.	United States
Deutsche Telekom AG	Germany
Diebold, Incorporated	United States
Dimension data holding	South Africa
DISH Network Corporation	United States
DST systems	United States
Electronic Arts	United States
Elisa Corporation	Finland
Elpida Memory, Inc.	Japan
EMC	United States
Emerson Electric	United States
Everything Everywhere Ltd.	United Kingdom
Far EasTone Telecommunications Co., Ltd.	Taiwan
First Data	United States
Fiserv	United States
Flextronics	Singapore
Foxconn Technology Co., Ltd.	Taiwan
France Telecom	France
freenet AG	Germany
Freescale Semiconductor	United States
Frontier Communications Corporation	United States
Fujitsu Limited	Japan
Gemalto	France
Global Crossing Limited	Bermuda
Google Inc.	United States
Group Bull SA	France
Groupe Steria SCA	France
Harris Corporation	United States
HCL Technologies	India
Hellenic Telecommunications Organization S.A.	Greece
Hewlett-Packard Company	United States
Hitachi, Ltd.	Japan
Hon Hai Precision Industry	Taiwan
HTC	Taiwan
Huawei	China
Hynix Semiconductor Inc.	South Korea
Idea Cellular Limited	India
IDT Corporation	United States
Iliad S.A.	France
Illinois Tool Works Inc.	United States
Imation Corp	United States
Imtech N.V.	Netherlands
INDRA	Spain

Company	Primary country
Infineon Technology	Germany
Infosys Technologies Limited	India
Intel Corporation	United States
International Business Machines Corporation	United States
Intuit	United States
Inventec	Taiwan
Israel Telecommunications Corp. Limited	Israel
Itissalat Al-Maghrib	Morocco
Juniper Networks, Inc.	United States
Jupiter Telecommunications Co., Ltd.	Japan
KDDI	Japan
Konami	Japan
Konica Minolta Holdings, Inc.	Japan
Koninklijke KPN N.V.	Netherlands
KT Corporation	South Korea
KYOWA EXEO CORPORATION	Japan
L3	United States
Leap Wireless International, Inc.	United States
Lenovo Group Limited	China
Level 3 Communications, Inc.	United States
Lexmark	United States
LG Electronics	South Korea
LG Uplus Corp.	South Korea
Liberty Global, Inc.	United States
Logica plc	United Kingdom
Logitech Internation SA	Switzerland
LSI Corporation	United States
Manitoba Telecom Services Inc.	Canada
MasTec, Inc.	United States
Matsushita Electric	Japan
MEDION AG	Germany
MegaFon OAO	Russia
MetroPCS Communications, Inc.	United States
Micron Technology, Inc.	United States
Microsoft Corporation	United States
Micro-Star International Co., Ltd.	Taiwan
Millicom International Cellular S.A.	Luxembourg
Mitsubishi Electric	Japan
Mitsumi Electric Co., Ltd.	Japan
Mobile TeleSystems OJSC	Russia
Motorola Solutions, Inc.	United States
MPS Group Inc	United States
MTN Group Limited	South Africa
NCR Corporation	United States
NEC Corporation	Japan
NetApp, Inc.	United States
NII Holdings, Inc.	United States
Nippon Telegraph and Telephone Corporation	Japan
Nokia Corporation	Finland
Nortel Networks	Canada

Exhibit 16

McKinsey top 250 Internet-related firms database (continued)

Company	Primary country
NS Solutions	Japan
Nividia	United States
NXP semiconductors	Netherlands
OI, Brasil	Brazil
Oki Electric Industry Company, Limited	Japan
Oracle Corporation	United States
Otsuka Corporation	Japan
P.T. Telekomunikasi Indonesia Tbk.	Indonesia
PAETEC Holding Corp.	United States
Panasonic Corporation	Japan
PCCW Limited	China
Philippine Long Distance Telephone Company	Philippines
Pioneer Corporation	Japan
Pitney Bowes Inc.	United States
Portugal Telecom, SGPS, S.A.	Portugal
QUALCOMM Incorporated	United States
Quanta computer	Taiwan
Qwest	United States
Reliance Communications Ltd.	India
Renesas Electronics Corporation	Japan
Research In Motion Limited	Canada
Ricoh	Japan
Rogers Communications Inc.	Canada
Rostelecom	Russia
Royal Philips Electronics N.V.	Netherlands
Sage Group plc	United Kingdom
SAIC, Inc.	United States
Samsung Electronics Co., Ltd.	South Korea
SanDisk Corporation	United States
Sanyo Electric	Japan
SAP	Germany
Seagate technology Corp	United States
Seiko	Japan
SES S.A.	Luxembourg
Sharp	Japan
Shaw communication	Canada
Siemens	Germany
Singapore Telecommunications Limited	Singapore
SK Telecom Co., Ltd.	South Korea
Softbank	Japan
Sony Corporation	Japan
Sony Ericsson Mobile Communications AB	Japan
Sopra	France
Sprint Nextel Corporation	United States
Stmicroelectronics	Switzerland
Storage technology Corporation	United States
Sungard data systems	United States
Swisscom	Switzerland
Symantec	United States
Taiwan Mobile Co., Ltd.	Taiwan

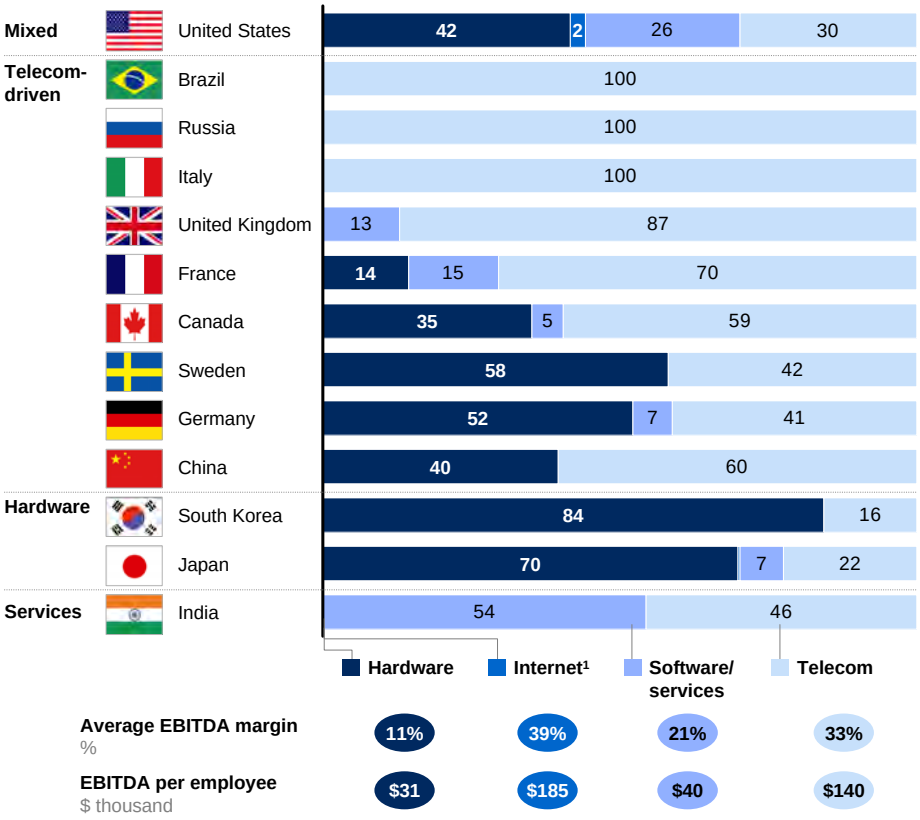
Company	Primary country
Taiwan Semiconductor Manufacturing	Taiwan
TalkTalk Telecom Group PLC	United Kingdom
Tata consultancy services	India
TCL Corporation	China
TDC Denmark	Denmak
Tech Data	United States
Tele2 AB	Sweden
Telecom Corporation of New Zealand Limited	New Zealand
Telecom Italia S.p.A.	Italy
Telefonaktiebolaget LM Ericsson	Sweden
Telefónica, S.A.	Spain
Telefonos de Mexico	Mexico
Telekom Austria AG	Austria
Telekom Malaysia Berhad	Malaysia
Telekomunikacja Polska S.A.	Poland
Telenor ASA	Norway
Telephone and Data Systems, Inc.	United States
TeliaSonera AB	Sweden
Telkom SA Limited	South Africa
Tellabs Inc	United States
Telstra Corporation Limited	Australia
TELUS Corporation	Canada
Tencent Holdings Limited	China
Teradata Corporation	United States
Texas instrument	United States
Thomson Reuters	United States
Tieto	Finland
Tokyo electron	Japan
Toshiba Corporation	Japan
Total Access Communications PLC	Thailand
True Corporation Public Company Limited	Thailand
Unisys Corporation	United States
United Internet	Germany
Veritas	United States
Verizon Communications Inc.	United States
Vimplecom	Russia
Virgin Media Inc.	United Kingdom
Vivendi	France
Vivo Participações S.A.	Brazil
Vodafone Group Plc	United Kingdom
Western Digital Corporation	United States
Wincor-Nixdorf	Germany
Wind telecommunicazioni	Italy
Windstream Corporation	United States
Wipro Limited	India
Wistron	Taiwan
Xerox	United States
Yahoo Japan	Japan
Yahoo! Inc.	United States
ZTE Corporation	China

Annual revenues of companies in our database range from $1.5 billion to $123 billion. This list enabled us to understand the importance (revenues), performance (as net income per FTE or as percentage of revenues, dividends), and growth of each country's companies present in the 250 top Internet-related firms and to understand the underlying mix among hardware, software and services, and telecoms in each country (Exhibit 17).

Exhibit 17

The United States is the only fully mixed ecosystem whereas European countries are telecom-driven

Split by sector of the revenue share of the top 250 Internet-related companies
%



1 Pure Internet players excluding e-commerce.
SOURCE: McKinsey Internet-related top 250 firms database; Bloomberg; Hoovers; McKinsey analysis

3. E3 INDEX

The e3 index measures Internet connectivity in a country and allows comparisons between countries.

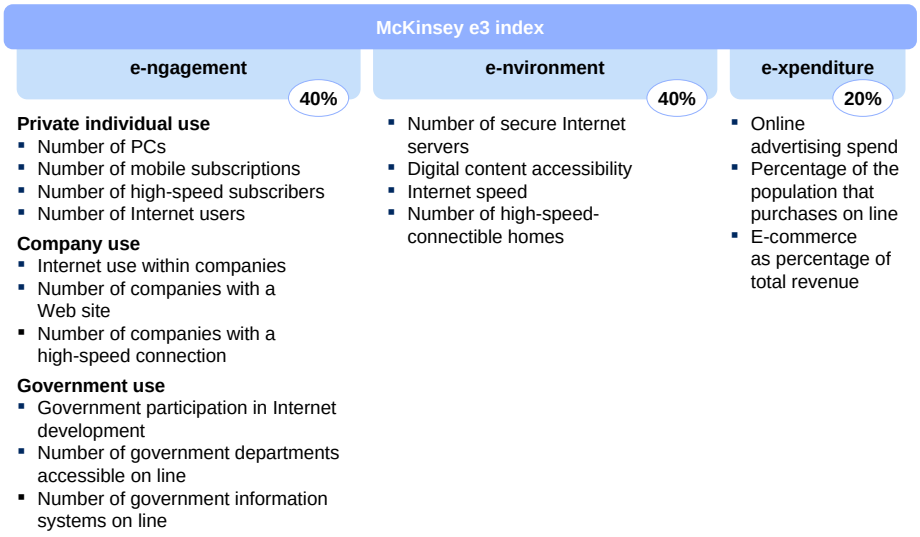
The index is based on three components (see Exhibit 18):

- **e-ngagement**: usage of the Internet by individuals, companies, and the public bodies
- **e-nvironment**: infrastructure quality and speed and Internet penetration of the home
- **e-xpenditure**: expenditure on the Internet, including advertising and e-commerce

The strength of each component is computed using 17 different indicators, most of which are taken from the WEF Global Information Technology Report's Networked Readiness Index. The index takes into account each component by giving a 40 percent weighting each to e-ngagement and e-nvironment and a 20 percent weighting to e-xpenditure. The score for each component is its indicator's average.

Exhibit 18

Our McKinsey e3 index measures accumulation of means and Internet usage in a specific country



SOURCE: Networked Readiness Index; The Internet economy 25 years later 2010; Pyramid data tracker; Strategy Analytics; World digital media trends; Forester research online; Organisation for Economic Cooperation and Development; McKinsey analysis

4. I4F INDEX

The i4F index measures the Internet-enabling ecosystem in a country and allows comparisons between countries.

The index is based on four components:

- **Human capital**: education and research quality and power in a country. The score is divided between the quality of the human capital (50 percent) and the power of the human capital in terms of quantity (50 percent).
- **Financial capital**: available financing for Internet and ICT companies. The score is divided between per capita availability (50 percent) and global financing opportunities (50 percent).
- **Infrastructure**: infrastructure quality and the penetration of Internet-enabling infrastructure.
- **Business environment**: regulatory and societal effects on country's attractiveness to businesses.

The strength of each component is calculated using 31 different indicators, most of which are taken from the WEF Global Competitiveness Report. Other sources include the World Bank database, IMD world competitiveness, UNESCO database, and Venture Expert. The index takes into account each of the four components, giving them equal weight. The score for each component is its indicator's average.

We established a threshold at 60 percent for the infrastructure component, because infrastructure is a differentiating parameter for only those countries that have not reached a certain level of infrastructure development and quality.

5. SME SURVEY

In May 2011 we surveyed a sample of SMEs in 12 countries (Canada, China, France, Germany, India, Italy, Japan, Russia, South Korea, Sweden, the United Kingdom, and the United States). The purpose of the survey was to determine the significance of Internet technologies on performance and industrial dynamism for SMEs with fewer than 250 employees and turnover below €250 million. More than 4,800 SMEs completed the survey. Selected companies have all invested in Internet technologies.

- **Representative sample.** To select our sample, we checked with local statistical agencies in each country to ensure we approached a representative sample of the SME population in each country, with appropriate distribution in terms of region, sector, and number of employees. This assured that for each country, our respondents were representative of the local economy.

- **Technologies considered.** The survey considered e-mail, intranet, extranet, Web sites, Web 2.0 technologies, and online marketing.

- **Survey questionnaire.** There were four parts to the survey: company details, key figures and the company's position in its sector, Internet technology penetration of the company, and the impact of Internet technologies on the company's development and performance. The section considering the Internet's impact on economic performance was based primarily on a 2002 survey by US economist Hal Varian.

- **The SME Internet Maturity Index.** We then produced an index reflecting the penetration and usage of Internet technologies, which we called the "index of SME Internet maturity." This index shows penetration of Internet technology and its usage by employees, clients, and suppliers, weighted for the importance attributed to each technology by our sample.

On the basis of the index, we placed each of the companies in our sample in one of three categories:

- **Low Web intensity**: companies with a score of 0–20 percent on the Internet index (43 percent of the sample)

- **Medium Web intensity**: companies with a score of 20–40 percent on the Internet index (30 percent of the sample)

- **High Web intensity**: companies with a score of more than 40 percent on the Internet index (27 percent of the sample)

6. CONSUMER SURPLUS

Scope

McKinsey and Company published a white paper[27] offering primary market-research-based estimates of the value of online services, derived from an online survey administered in the spring of 2010 in six countries: France, Germany, Russia, Spain, the United Kingdom, and the United States. The survey targeted the current broadband population. The value of Internet services was estimated from a list of 16 services clustered in three major blocks: communication (e.g., e-mail, social networks), entertainment (e.g., gaming, podcasts), and information services (e.g., search/comparison, wikis).

The original sample size encompassed 4,500 online interviews, representative of the online population. The questionnaire included sociodemographic elements, Internet usage, stated services interest, and willingness to pay as well as a conjoint-analysis-based trade-off of services with price and privacy risk.

Definitions

The paper addressed the value of online services through the concept of service surplus. For the consumer, the service surplus is the value to the consumer of the online services minus any costs associated with using those online services (e.g., paid services) and any form of pollution.

The consumer service value is the value of the benefit consumers derive by being able to consume a product or service for a price lower than the most that they would be willing to pay.

The pollution factor is the negative value consumers assign to advertising interruption and private information collection while using Internet services. This pollution effect is measured by calculating the amount a consumer is willing to pay to avoid being disturbed by advertising formats and to limit private-information abuse while using ad-funded Internet services.

Therefore, the consumer service surplus is the value derived by the consumer from Internet services usage that is not countered by pollution.

27 Internet Advertising Board, *Assessing the consumer benefits of online advertising*, July 2010.

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Relevant McKinsey Global Institute publications

Big data: The next frontier for innovation, competition, and productivity (May 2011)

Big data will become a key basis of competition, underpinning new waves of productivity growth, innovation, and consumer surplus-as long as the right policies and enablers are in place.

Growth and renewal in the United States: Retooling America's economic engine (February 2011)

To match the GDP growth rates of the past 20 years, the United States needs a 34 percent acceleration in productivity growth to a rate not achieved since the 1960s. Three-quarters of the necessary productivity growth acceleration can come from companies adopting best practice and implementing emerging business and technology innovations. The remaining one-quarter—and more—can come from government and business working together to address barriers that today limit productivity growth.

Beyond austerity: A path to economic growth and renewal in Europe (October 2010)

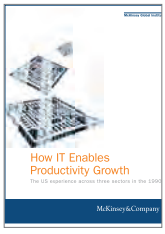
With multiple pressures on growth and constrained public finances, Europe needs structural reform even to match past GDP growth rates. Parts of Europe have begun to reform with demonstrable success. If the rest of Europe emulated their best practice, the region could add 4 to 11 percent to per capita GDP, without cutting holidays and leave.

Clouds, big data, and smart assets: Ten tech-enabled business trends to watch (August 2010)

Advancing technologies and their swift adoption are upending traditional business models. Senior executives need to think strategically about how to prepare their organizations for the challenging new environment.

The Internet of Things (March 2010)

More objects are becoming embedded with sensors and gaining the ability to communicate. The resulting new information networks promise to create new business models, improve business processes, and reduce costs and risks.



How IT enables productivity growth (October 2002)

Looking at the retail banking, retail trade, and semiconductor sectors in detail, MGI finds that while IT enabled productivity gains in each sector, its impact was complex and varied. IT applications that had a high impact on productivity shared three characteristics: they were tailored to sector-specific business processes and linked to performance levers; they were deployed in a sequence that allowed companies to leverage their previous IT investments effectively; and they evolved in conjunction with managerial innovation.

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