The European Attractiveness Scoreboard

ESCP-EAP
European School of Management

HEC PARIS

Invest in France Agency

INVEST IN GERMANY

Preface

Europe – the name alone conjures up a thousand different images. It is the world's largest economy and its largest single economic area. As such, Europe accounts for almost a third of the global economy, proof positive that the European vision is alive and kicking. This is the result of a dynamic integration process carried out by the 27 member states of the European Union. The existence of a market of open borders, unified by a set of common rules and a common currency facilitates the smooth flow of business across the continent.

To itensify this integration, the investment agencies of France and Germany came together in 2006 to collaborate on the creation of the "European Attractiveness Scoreboard". Both countries realize the value of creating a united endorsement front to maintain Europe's leading position.

We are delighted to present you with the second edition of the scoreboard. In this year's report you will find a comprehensive range of data and analysis highlighting the strengths of Europe in terms of market and business vitality, human resources, infrastructure, and innovation. This year's scoreboard also includes the introduction of an industry analysis component to underline the respective competitiveness of a range of different European industries. The integration and consolidation dynamic at play within the European market has created what is now the world's leading economic region and the largest market place worldwide.

One fact becomes clear. The European Union stands out in a number of categories when considered as a single entity. Europe offers global investors a stable and secure business environment, a large and highly trained labor force, and outstanding infrastructure to investors from all over the world. It provides unparalleled potential for innovation and growth opportunities in a diverse number of business sectors. The present strength of the euro provides fresh evidence of the confidence that international financial operators place in the robustness of the European economy and its capacity to face present and future challenges.

Europe is eager to welcome exciting new talents and projects from all over the world, specifically your talents and projects. We encourage you to contact us if you wish to tap into the dynamism and unleashed potential of the world's most thriving economic region.

Philippe Favre
President, Invest In France Agency

Michael Pfeiffer
Managing Director, Invest in Germany

What is the European Attractiveness Scoreboard?

With a GDP of over USD 16 trillion in 2007 and a population of 495 million, the European Union forms the largest market in the world today: ahead of the United States, and well in front of Japan, China, and India. Of the 27 member states, 15 countries share the euro as a common currency. Shared economic and policy objectives lay the groundwork for the creation of a robust, stable and forward-looking economy geared to meet the challenges of a globalized world. Within Europe, the European Economic Area (EEA) promotes the free movement of goods, persons, services, and capital among EEA member countries – as well as to European countries that are not part of the EU.

The arguments for a Europe-wide evaluation of the region's overall economic attractiveness are overwhelming. For that reason, it is imperative that this attractiveness is marshaled and evaluated in an empirically objective fashion.

The European Attractiveness Scoreboard provides a transparent and objective benchmark comparison of Europe with other major economic regions of the world based on the most reliable data sources available. This year marks the second publication of the European Attractiveness Scoreboard after last year's highly successful introduction. Specifically created to demonstrate the attractiveness of Europe as an investment destination using hard quantitative data, the European Attractiveness Scoreboard emphasizes Europe's competitiveness as an international economic force.

Rigorous academic methodological standards set by two of Europe's leading business schools, the ESCP-EAP European School of Management in Berlin and the HEC School of Management in Paris, ensure that the scoreboard forms a credible platform for the promotion of Europe. Once again, they have lent their services to ensure the scoreboard's validity and efficacy.

Drawing on an exhaustive set of more than 60 objective economic and industry indicators based on internationally recognized statistics, the European Attractiveness Scoreboard is a wholly impartial guide to European performance levels. Important investment consideration factors reviewed include:

- **Economy and Market Vitality**
- **International Trade and Investment Location**
- **Human Resources**
- **Research and Innovation**
- **Infrastructure**
- **Business Environment**
- **Sustainable Development**

Above and beyond this, significant industry outlook indicators have also been added to provide an overview of individual market climates. For the first time, the competitiveness of different industries is assessed. These include:

- **Automotive**
- **Chemicals**
- **Food and Beverage**
- **Information and Communication Technology**
- **Medical Technology and Pharmaceuticals**
- **Renewable Energy**

The European Attractiveness Scoreboard provides an invaluable comparative analysis of Europe in relation to other leading global economies. By adopting a macro-analytical perspective, it allows international investors to obtain a sense of the "bigger picture" within Europe for focused business and investment decision making. By throwing light on the individual factors decisive to Europe's continued economic success, we believe that the unique and profitable investment opportunities will become evident to international businesses ready to invest in Europe.

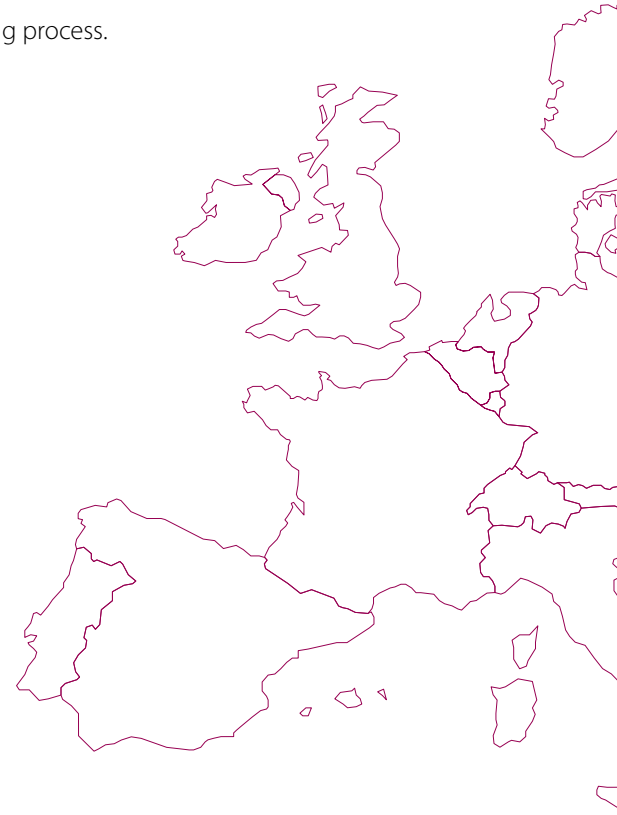
Table of Contents

Chapter **01**

Economy and Market Vitality

Introduction

Market access is by far the major motivation guiding international investment decisions by corporations. To locate their activities, companies take into account not only the size of the market, but also its dynamism and growth prospects. The analysis of the structure of the consumer's population by groups of age or purchasing power also plays a crucial role in the decision making process.



Market Size

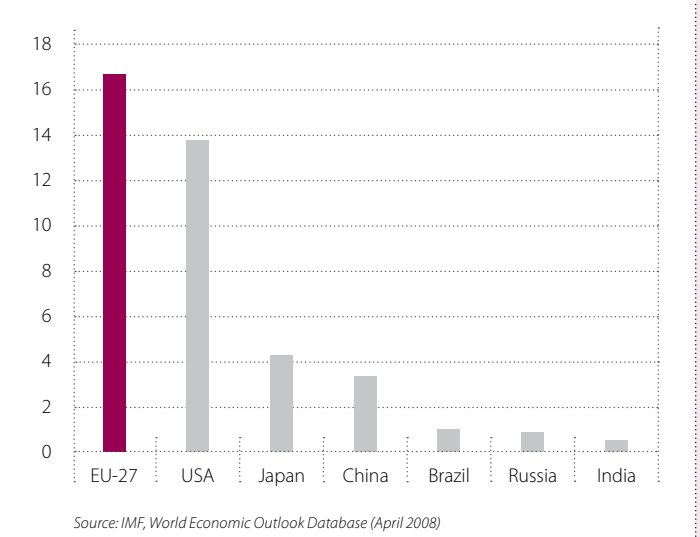
The size of Europe's economy is a major factor in attracting inward investment. Most investors know that the European Union's (EU) economic performance fuels the biggest market in the world. With **GDP at current prices** of USD 16.8 trillion in 2007, it is more than 20 percent bigger than the US market (USD 13.8 trillion). Even the EU-15 (the EU before its recent enlargement to 27 nations) makes up a larger market than the USA.[1]

Measuring Europe's **GDP at purchasing power parity** (PPP) clearly demonstrates that the region is equal to the USA and well ahead of other regions. But this approach also tends to accentuate the weight of developing countries as the price of an average basket of consumption goods, expressed in USD, is lower in these markets than in the most advanced ones. In terms of PPP, China occupies the third place in the world economy after the EU-27 and the USA, but ahead of Japan.

Market Growth

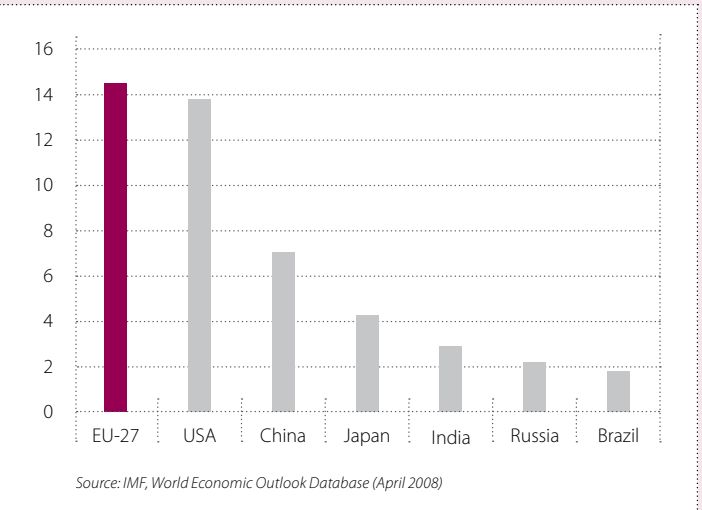
Europe has been a major powerhouse of world market growth in recent years. This growth is due to three major factors. First, the growth of EU-27 GDP in real term has been strong, even though it is inferior to that of emerging countries.

GDP at current prices (2007)
[trillion USD]



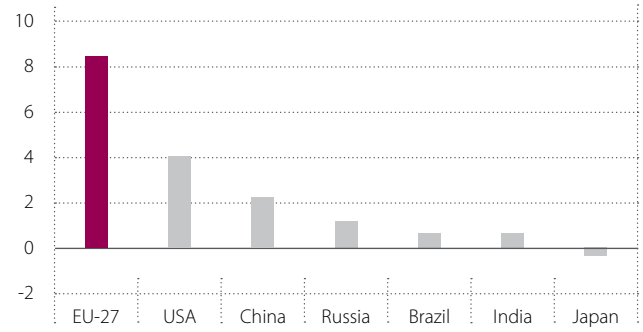
Source: IMF, World Economic Outlook Database (April 2008)

GDP at purchasing power parity (2007)
[trillion USD]



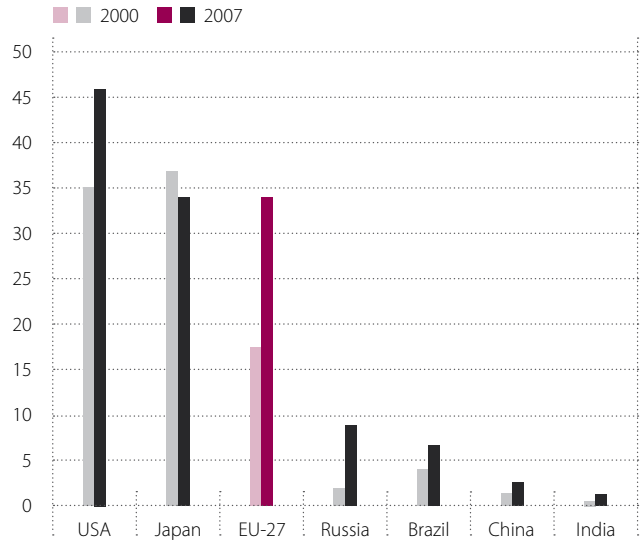
Source: IMF, World Economic Outlook Database (April 2008)

GDP expansion at current prices (2000 – 2007)
[trillion USD]



Source: IMF, World Economic Outlook Database (April 2008)

GDP per capita at current prices
[thousand USD]



Source: IMF, World Economic Outlook Database (April 2008)

Second, because of its large size, one point of growth in the EU-27 is equivalent in terms of **GDP expansion** to as much as five points of growth in China. Third, the sharp increase of the exchange rate of the euro over the past five years, considerably enlarged the size of the EU-27 market in current dollars terms.

The numbers speak for themselves. With a yearly growth rate well over two percent in real terms, the EU-27 GDP increased in value of two trillion euros between 2000 and 2007. Because the euro increased in value, this expansion amounted to more than USD 8 trillion. In comparison, the USA added USD 4 trillion, China and India combined added USD 2.7 trillion, and Japan receded by USD 0.3 trillion over the same period. Moreover, during 2007 alone, the EU market's value increased nearly four times more than that of the USA and China respectively, and 10 times as much as that of India.

Europe is a sophisticated market and its consumers are among the wealthiest in the world. Furthermore, **GDP per capita** is growing faster in many EU countries than it is in other developed economies. This is particularly true of the new member states, all of which are engaged in a catch-up process.

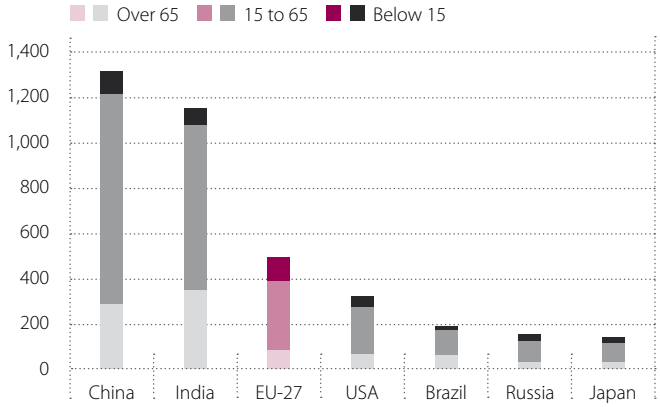
The diversity within its internal market is one of Europe's specific advantages, combining a wealthy and mature market in the west with a dynamic market in an emerging economy in the east.

Population and Consumers

The total EU **population** in 2007 was 495 million. This is one of the world's largest populations; considerably lower than those of China and India of course, but still greater than those of the USA, Brazil, and Russia. This large population provides in itself a considerable labor force and significant consumer market potential. Nonetheless, it is important to focus on some European specifics regarding income and age structure.

Regarding age structure, Europe's aging society means that Europeans are living longer. Older people in Europe enjoy greater purchasing power than their peers in most other geographical regions. To service this aging population, new markets in special health products and care services are springing up. The European Union still has a young population[2] of 80 million – which remains less than for Asian and Latin America countries, but still 25 percent more than the USA. This young population should fuel the future growth of the European economy.

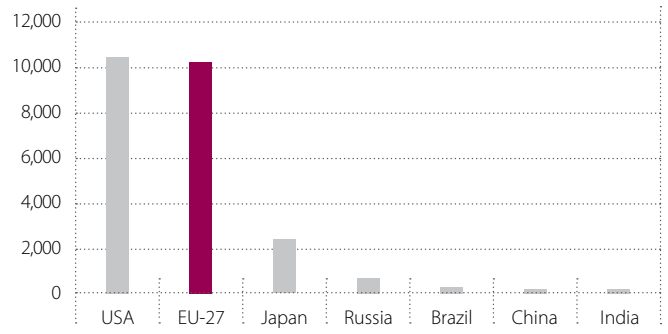
Population (2007)
[millions of persons]



Source: IMD based on Global Market Information Database (2008)

Note: Estimates for all data

Total income of households earning more than USD 10,000 per year (2007)
[billion USD]



Source: The Economist Intelligence Unit (2008)

Note: EU-27 excluding Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta and Slovenia

Companies are also drawn to the rapidly growing middle classes of emerging economies. As a matter of fact, the middle and upper class segments of the population are the only ones which can afford products such as cars and luxury goods. Yet most **households earning more than USD 10,000** per annum are still to be found in Europe and North America. In 2007, according to data from the Economist Intelligence Unit, some 95 percent of European and US households earned more than USD 10,000 per annum – compared with only 2 percent of Chinese households, and 3 percent of Indian households.

Arguments for Europe

The fact that the European Union market is the largest in the world (outstripping the USA and Chinese markets) is well established. Less well-known is the vision of Europe as the global region which has experienced the largest expansion of GDP in current dollars terms during the past five years.

01

A large group of consumers with significant high purchasing power capacity awaits international investors and their products in the EU-27 region. In addition, the EU's internal market is highly integrated, with a number of barriers having been successfully eliminated.

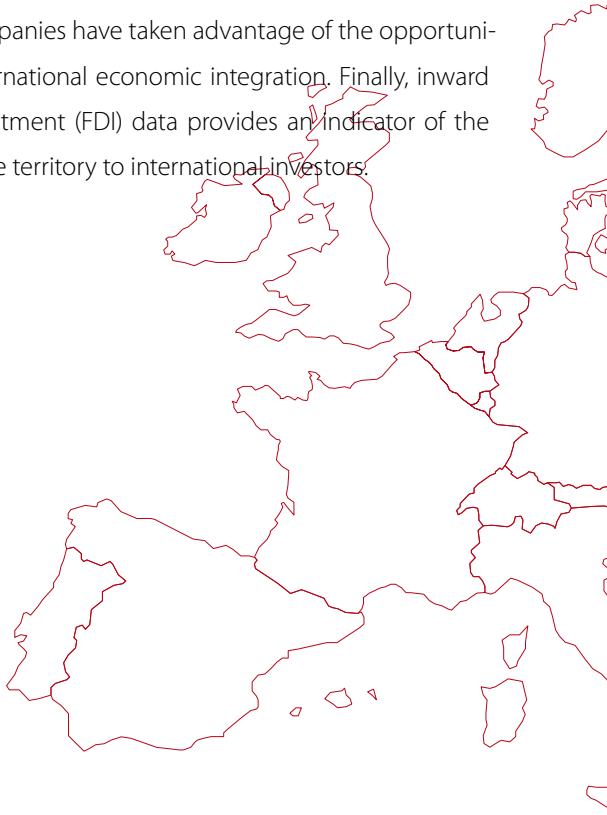
Although language, regulations, and consumer tastes obviously differ from country to country, competitors all play by fair rules. No matter where a company is set up within the EU, companies have unrestricted access to the unified European market.

Chapter 02

International Trade and Investment Location

Introduction

Within the context of ongoing globalization, the well being of an economy largely relies on its capacity to efficiently integrate into the international division of labor. This capacity can be measured by various indicators. The global share of exports provides an insight into the competitiveness of domestic products. The number of domestic-based large multinational corporations demonstrates how well local companies have taken advantage of the opportunities offered by international economic integration. Finally, inward foreign direct investment (FDI) data provides an indicator of the attractiveness of the territory to international investors.



International Trade

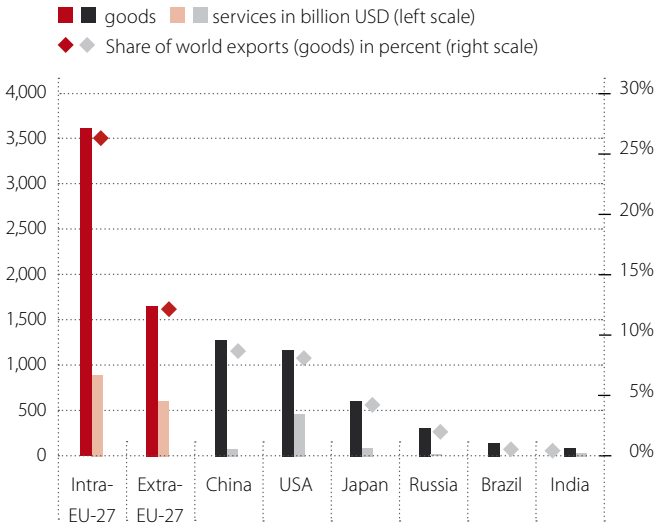
The European Union is the world's **leading exporter** of goods and services. In 2007, its extra-EU exports totaled USD 2.3 trillion, far ahead of the USA (USD 1.6 trillion), China (USD 1.3 trillion) and Japan (USD 0.8 trillion).

The value of trade among EU member states is almost twice as high as trade outside the EU (extra-EU), reflecting the extent to which the internal market has been integrated. This is further proof that a base in any of the member states provides easy access to the whole European market and beyond.

The volume of **high-technology exports** is significantly larger in Europe than in the USA and China. Europe is the most important production base for high-tech products, with a highly diversified range of activities. Aerospace, chemicals, and pharmaceuticals are among the sectors where Europe holds the strongest positions at an international level.

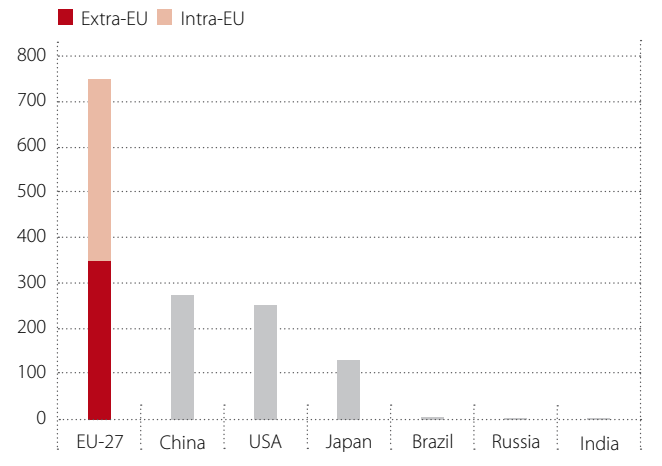
Being present in the European market in these fiercely competitive and highly challenging sectors is a significant advantage for an investor; as it allows active participation in the dynamics of the market, ensuring that product quality is kept at the highest possible level. For that reason, almost all of the world's top high-tech firms already have research facilities in Europe.

Leading exporters and share of world exports (2007)



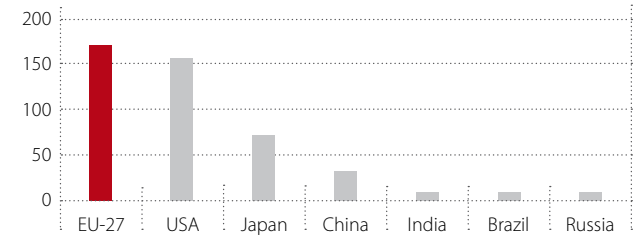
Source: WTO, World Trade Report (2008)

High-technology exports (2006)
[billion USD]



Source: World Bank, World Development Indicators database (April 2008), Eurostat (2008)

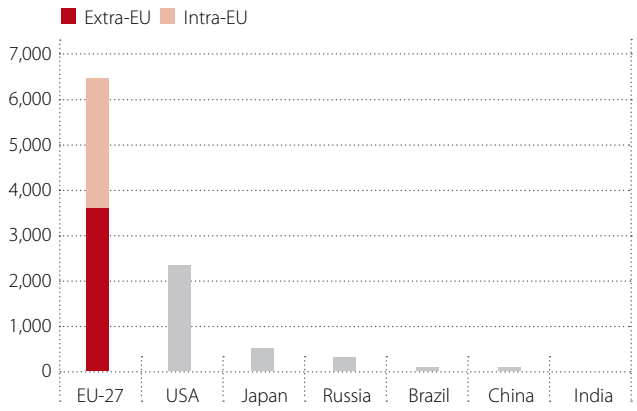
Top 500 global companies (2008)
[absolute numbers]



Source: Fortune Global 500 (July 2008)

Note: Companies by country of headquarter

Outward FDI stocks (2006)
[billion USD]



Source: UNCTAD FDI/TNC database (2007), Eurostat (2008)

Activities of Multinational Companies

Europe is one of the two main home regions of the **top 500 global companies**, along with the USA. Around one-third of the top 500 multinational corporations (groups of companies which have at least one affiliate abroad) are European. This figure is marginally superior to that of the USA, and well above any other region or country in the world. European market integration has paved the way for the restructuring of European industry and the formation of large European-based multinational corporations.

These companies are now engaged in worldwide expansion strategies. European companies are well ahead of their foreign counterparts in terms of both **outward FDI stocks** and flows. With more than USD 3,600 billion worth of FDI stocks overseas, the EU-27 companies are the largest investors in the world. And in addition to this amount, the USD 2,800 billion worth of intra-European investment stocks provide further evidence of the ongoing trend towards European integration.

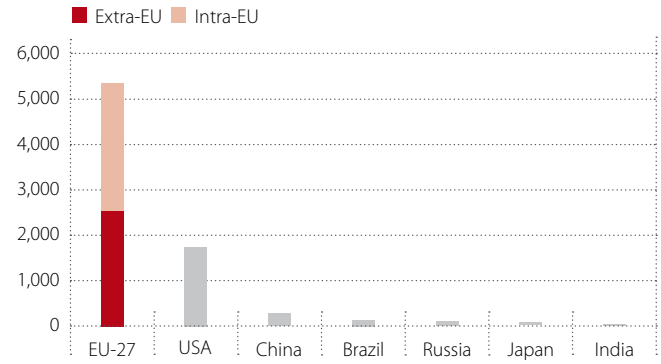
Attractiveness for International Investment

The various indicators available for the measurement of international investment all show that Europe is one of the most attractive regions in the world. Historically, the EU-27 has attracted the largest share of foreign direct investment. As a result, it therefore ranks first in the world for **inward FDI stocks** – considerably ahead of the USA and China.

Major developments have taken place in the last 10 years, with the emergence of new countries such as China and India competing to attract FDI. Nevertheless, data on **inward FDI flows** show that, even in recent years, Europe has remained a major international investment destination worldwide. When only extra-EU FDI flows are taken into account, the EU-27 ranks practically on the same level as the USA for this indicator. Intra-EU inflows of FDI have also increased tremendously during the last four years due to the rapid pace of European integration and enlargement.

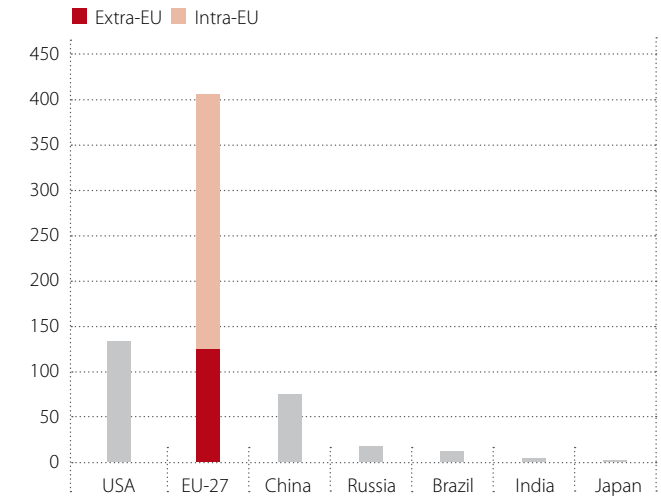
Europe is a vibrant market where numerous foreign investment projects are launched every year. The huge number of greenfield **inward FDI projects** from other parts of the world proves Europe's attractiveness for overseas international investors. The region ranks first in the world in this respect; pulling clear ahead of China, the USA, and India.

Inward FDI stocks (2006)
[billion USD]



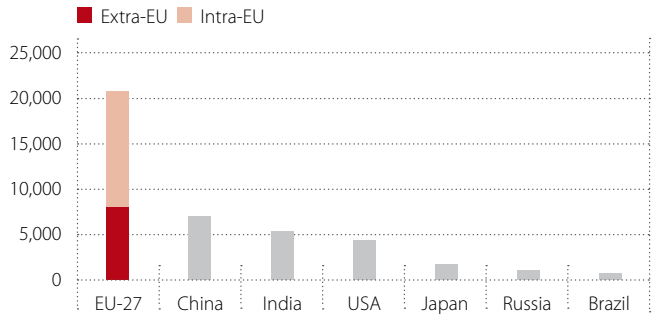
Source: UNCTAD FDI/TNC database (2007), Eurostat (2008)

Inward FDI flows (average 2004 – 2006)
[billion USD]



Source: UNCTAD FDI/TNC database (2007), Eurostat (2007)

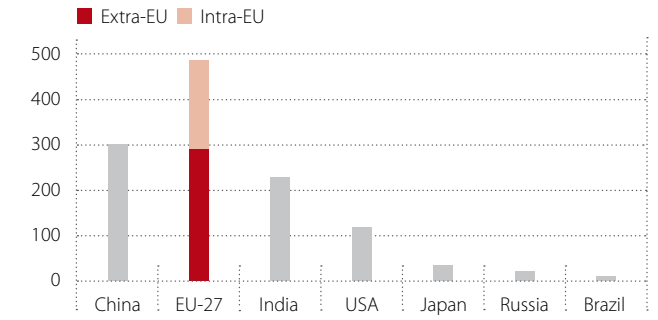
Inward FDI projects (January 2003 – May 2008)
[absolute numbers]



Source : fDi Markets (July 2008)

Note: FDI projects include only greenfield and expansion investments

Inward FDI projects in R&D (January 2003 – May 2008)
[absolute numbers]



Source : fDi Markets (July 2008)

Note: FDI projects include only greenfield and expansion investments

Foreign investment is evolving at a steady pace, with an increasing shift away from manufacturing into services. Europe is especially attractive for these kinds of investments. For example, it is among the leaders in attracting **inward R&D projects**. Comparisons of extra-European projects show that the EU-27 occupies second place behind China. The quality of European researchers and scientific competence centers is widely acknowledged throughout the world and makes Europe a hub for investments in this field.

Arguments for Europe

In the past few years, the EU-27 has played a primary role in the trend towards the integration of the world economy, through three different channels.

First, the EU-27, thanks to its many competitive companies – SMEs as well as large multinational companies – is the major exporter of goods and services, especially in the high-tech industry. It is also the major source of FDI outflows, as multinational European groups have set up large scale expansion strategies overseas.

Second, it is also the major importer worldwide and the major recipient of FDI inflows. In particular, the large size of the European market and the talent pool available there have acted as magnets for attracting foreign projects.

And last but not least, the completion of the European integrated market has fuelled large intra-European investment flows for various reasons. European companies have set up sales and distribution activities in neighboring countries to support exports from their home country. They have also developed stand-alone production capabilities in other European countries to serve the local market. And, many of them have developed region-wide integrated production and distribution networks, with sites located in different countries working together to produce and deliver a given final good. This means more trade – through the flows of intermediary products and components between these different sites – and more international investment – through the creation and/or extension of sites abroad in order to complete and improve the existing network.

For these reasons, companies eager to take advantage of the opportunities brought about by globalization cannot afford to neglect the EU-27 as a top destination for their international investment strategy.

Chapter 03

Human Resources

Introduction

Without a readily available, qualified and flexible labor force, it would be a struggle for a company to realize its strategic and development goals, even in a well-chosen location. The right mix of human resources drives leadership and development in a company, which in turn strongly influences its growth and competitiveness.

A diverse labor pool with specific skill sets and educational backgrounds, particularly in science and technology, is a driver of knowledge-based economies. One observes a thriving region where there is a sustained strong capacity for innovation coupled with productivity.

The recipe for the high level of stability and productivity for long-term planning that companies rely on comes from striking the right balance of flexibility and consistency for their work force. Work hour structure, quality of industrial relations and compensation are some of the key factors that sustain a highly qualified labor force.

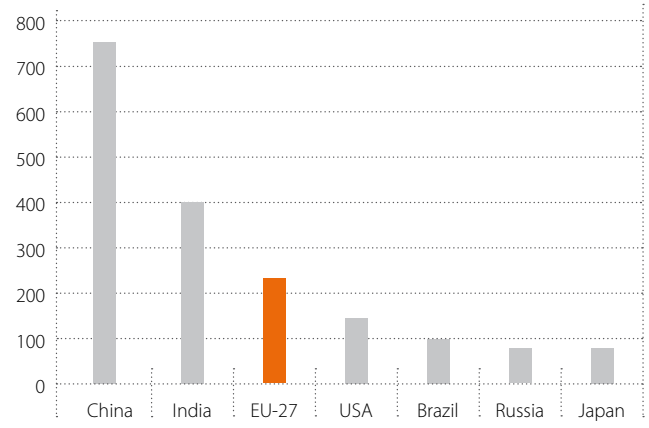
Structure of the Workforce

As seen in the first chapter, the world's most populated countries can be found in Asia, specifically in China and India. The EU-27 countries make up the third largest population just ahead of the USA. In relation to the total population of a country is the **economically active population**. It reflects the real availability of the labor supply within an economy. The European labor force, at 233 million people, is higher than that of other developed countries, but smaller than that of China (761 million people), and India (402 million people) respectively. The USA has an economically active population of 151 million people.

Generally speaking, a high **population growth** rate contributes to the availability of labor. The EU-27 growth rate lies at 0.6 percent – the same growth rate as China. Together with the USA (growth rate of 0.9 percent), it ranges in the middle field between high population growth countries such as India (1.4 percent) and Brazil (1.2 percent), and negative population growth countries such as Japan and Russia. The main source of population growth in the EU is migration from countries outside the EU: during the period 2002 to 2005, migration contributed more than 80 percent to EU population growth.[1]

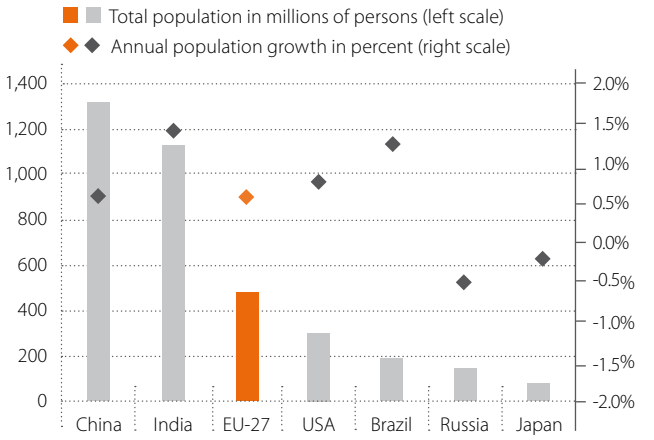
This leads to a high diversity in the labor supply with an increase in multicultural and multilingual backgrounds and capacities.

Economically active population (2006 or latest available year)
[millions of persons]



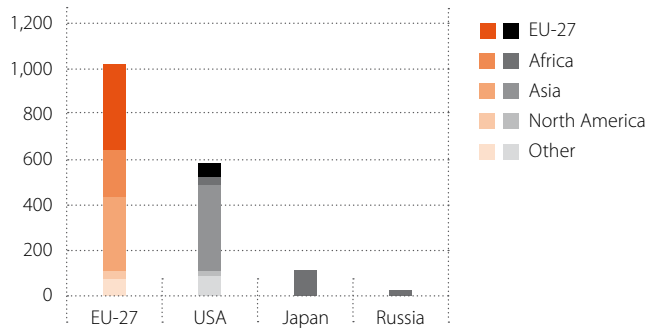
Source: ILO, Laborsta (2008)

Population (2006) and population growth (2000 – 2006)



Source: World Bank, World Development Indicators (2007)
Note: EU-27 excluding Cyprus, Latvia and Malta

Foreign students in tertiary education by host country (2005)
[thousand students]



Source: OECD, Education at a Glance (2007)

Note: EU-27 excluding Bulgaria, Cyprus, Latvia, Lithuania and Romania; no data available for Brazil, China and India; other includes Oceania and South America

Student mobility is an indicator of the perceived quality of the education system in target countries.[2] With 640,000 students from outside Europe, the EU-27 has the highest number of **foreign students in tertiary education**. The USA is home to 575,000 foreign students, while Japan has 125,000 foreign students at its universities. While the majority of foreign students in the USA and Japan come from Asia, Europe enjoys the widest variety of foreign students. For example, Asian and African students both have a share of around 20-30 percent within the foreign student community in Europe. Reasons for the great appeal of the European university system for foreign students include the close match to international standards and the development of programs and courses in foreign languages. Exchange programs, such as the Erasmus Program (European Community Action Scheme for the Mobility of University Students), encourage and support academic mobility among higher education students and teachers within the European Union. This system contributes to highly qualified, independent, flexible and open-minded students able to easily overcome cultural barriers. On an economic level, it contributes to an increased availability of highly qualified people – important for all companies and investors in the region.

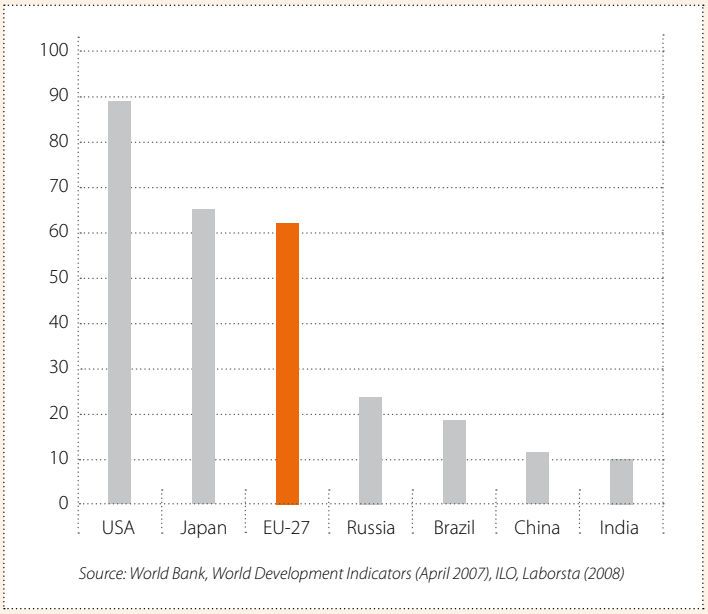
Productivity

Productivity data provides invaluable insight into the competitiveness of an economy and its capacity for economic growth. Specifically, labor productivity alludes to employees' skills and efficiency, as it shows how much output can be produced within a work hour. High productivity levels are a reflection of many social and economic factors, but more specifically of high levels of education, innovative technologies, and efficient production processes. Thus, productivity is an important measure for investment location decisions.

Specific productivity data shows that the USA is leading in terms of GDP per person employed, with an output of USD 88,808 per employee. Japan and the EU-27 follow, with similar levels at USD 63,976 and USD 62,249 respectively. Due to the heterogeneity of EU countries, there are differences in the level of productivity. In fact, some western EU countries belong to the world-leading economies in terms of productivity. The labor productivity in BRIC countries[3] is less than USD 25,000 per employee, indicating lower rates of output per employee.

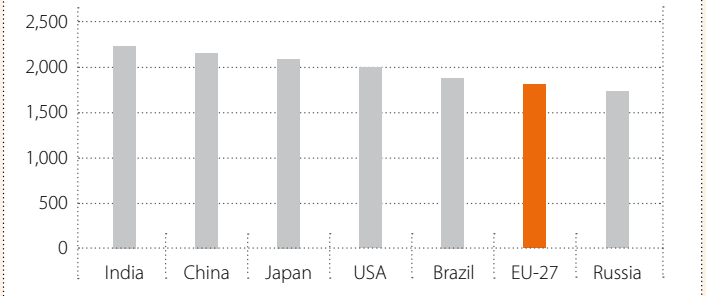
Workers in Asia lead the way in terms of hours worked (particularly in Korea and China). The USA and Japan have comparable numbers of yearly **working hours**; lower than those of the emerging Asian countries.

Productivity as GDP per person employed (2006)
[thousand USD]



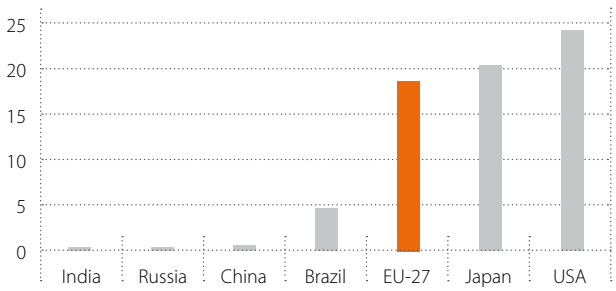
Source: World Bank, World Development Indicators (April 2007), ILO, Laborsta (2008)

Working hours (2006)
[number of hours per year]



Source: IMD based on UBS Prices and Earnings (2006)
Note: EU-27 excluding Cyprus, Latvia and Malta

Total hourly compensation for manufacturing workers (2006 or latest available year)
[USD]



Source: ILO, Laborsta (2008)

Note: EU-27 excluding Cyprus, Greece, Latvia, Malta, Romania; compensation comprises wages and supplementary benefits

Workers in Europe tend to work fewer hours per year than workers in other regions, yet have experienced steadily rising productivity levels.[4] In recent years, working regulations and working times have been liberalized to reflect the increased manpower and flexibility needs of companies and an increase in life expectancy. On average, companies can expect a full-time worker in the EU to work between 39 and 45 hours per week.[5]

Along with individual economy productivity levels, comparisons of **total hourly compensation for manufacturing workers** show correlative results. Indian, Russian and Chinese wages and benefits lie at low levels, below USD 1 per hour. Brazil's workers earn USD 4.6 per hour, while the average worker compensation level in the EU-27 countries lies at USD 18.7. Japan and the USA account for the highest worker compensation levels at USD 20.6 and USD 23.7 per hour respectively. Again, differing levels of productivity and the diversity between the European countries have to be filtered into this comparison. After the last two waves of enlargement, the EU now offers a whole range of price-efficiency mixes for business; from low-cost labor countries to high-cost and high-quality locations.

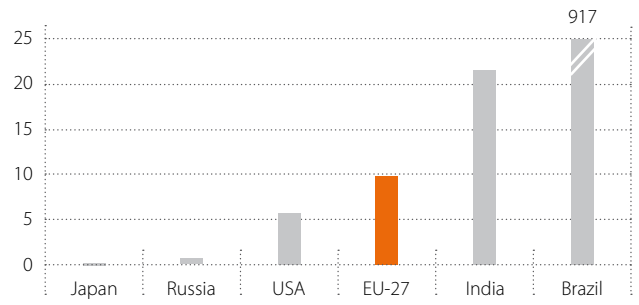
The lowest wage level within the EU is comparable to the average Brazilian wage. The highest levels in western member states are above those in the USA.

Working days lost due to strikes in the EU-27 remains at a fairly low level when compared to countries like India and Brazil. This implies solid industrial relations in Europe. Russia and Japan record extremely low rates of strike activity.

Capacity for Innovation

High labor force productivity rates are based on an excellent education system and technological innovation advances. **Tertiary graduates in the science and technology** sectors play a particularly important role in driving innovation and technological progress. With their knowledge, these graduates make a significant contribution to innovative projects in the knowledge-intensive industries. Statistics show that Japan, the EU-27, and the USA all have similar levels of science and technology graduates (equivalent to around 12 students per 1,000 inhabitants aged 20-29). While Japan leads this group of economies, European economies are second and have recorded high growth rates between 2001 and 2005. Mobilizing highly skilled science and technology trained personnel is always a challenge, and with increasing rates, Europe is particularly well positioned in this field. The USA saw only a minor increase be-

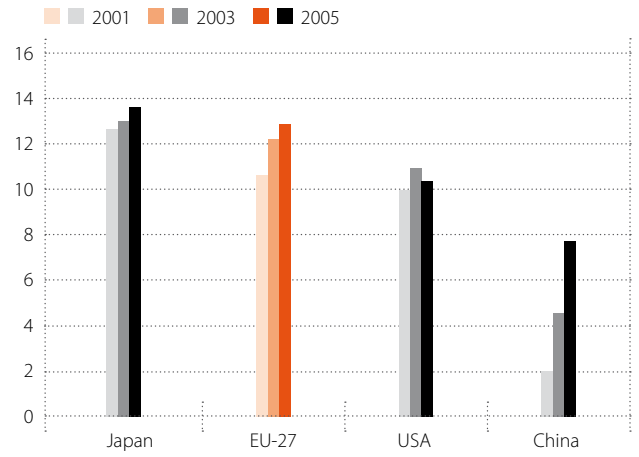
Working days lost due to strikes (average 2004 – 2006)
[days per 1,000 inhabitants per year]



Source: IMD based on ILO, Laborsta (May 2008)

Note: EU-27 excluding Bulgaria, Cyprus, Czech Republic, Greece, Latvia and Malta; no data available for China

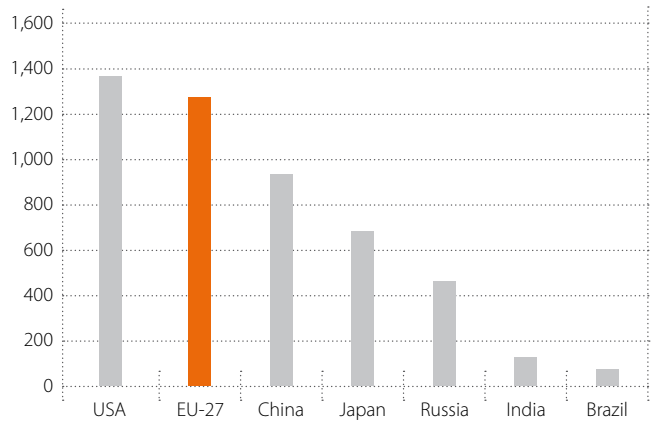
Tertiary graduates in science and technology
[per 1,000 inhabitants aged 20 – 29 years]



Source: Eurostat (2006), Chinese Ministry of Science and Technology (2002, 2004, 2006)

Note: No data available for Brazil, India and Russia

Researchers (2005 or latest available year)
[thousands]



Source: UNESCO (2007)

Note: Researchers in full-time equivalent

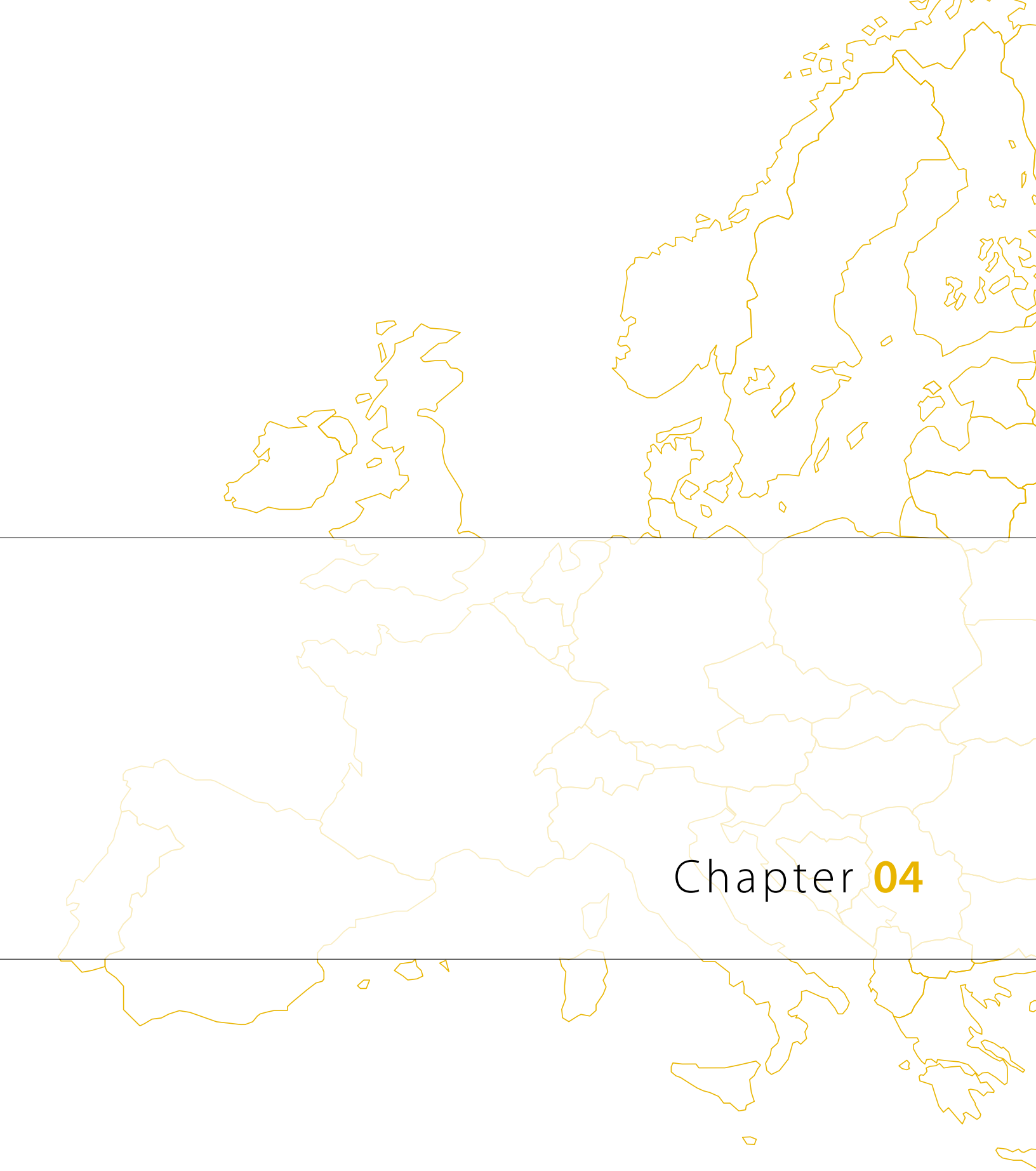
tween 2001 and 2005. At present, China records lower rates (eight graduates per 1,000 inhabitants aged 20-29) in science and technology. However, the high growth rate recorded in the number of Chinese graduates between 2001 and 2005 demonstrates an impressive effort to close this technology gap.

Alongside science and technology graduates advancing the technology level within companies, established **researchers** are seeking out new scientific and technological methods within research institutes and companies. Highly qualified and experienced researchers are the engine driving the large number of innovations in the EU. With over 1.3 million researchers, the EU accounts for the second highest number of researchers worldwide just behind the USA. Foreign investors can profit in two ways: they can hire researchers for their own companies or take advantage of one of the many research clusters and partnerships between domestic and foreign companies and research institutes and universities to tap into and develop available knowledge. Asian economies also show dynamic potential with nearly one million researchers in China, and 0.7 million in Japan. Russia is fast approaching the half million level, while India and Brazil record significantly lower levels (around 0.1 million researchers).

Arguments for Europe

In Europe, investors and companies profit from a large supply of labor. The heterogeneity of countries in the EU and the freedom of movement enjoyed by EU citizens have led to greater mobility for the creation of a large labor pool with a multiplicity of language capabilities and cultural and educational backgrounds. European governments keep in mind the sustainable development of labor conditions while equally recognizing and addressing business needs for a flexible workforce. As a result, highly skilled personnel work productively for reasonable salaries. Due to the heterogeneity of European member countries, investors will also find a wide range of wage and qualification levels to fit the needs of their specific business activity.

European universities and research institutes facilitate this landscape; they are highly competitive to attract talented students and contribute to the availability of a highly qualified, flexible and open-minded labor force.



Chapter 04

Research and Innovation

Introduction

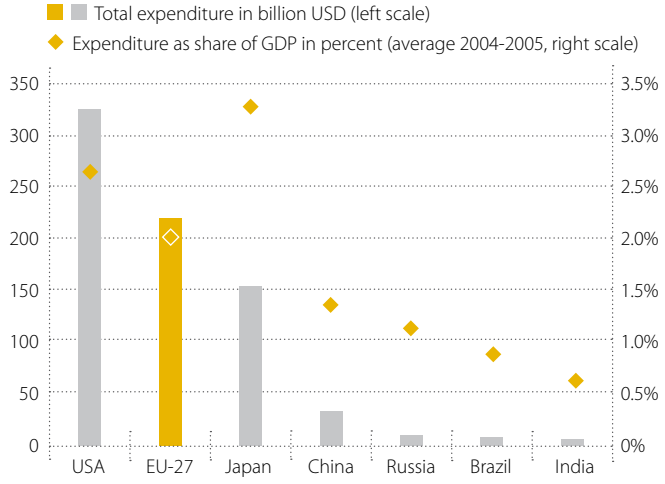
Research and development (R&D), together with innovation, form the crucible for economic growth and performance. R&D covers every step from basic research through applied research to experimental development; while innovation describes further development to improve products, processes and new methods.[1] Both are driven not only by private but also by public actors since they are closely related to the economic well being of a country. In return, investors profit from an innovative environment by advancing their products and processes, thus increasing their productivity and competitiveness in the international market.

Many factors influence a country's capacity for research, development and innovation. High-quality infrastructure formed by the expertise of private and public players is the starting point. Beyond this, the interaction and cooperation of all players convey groundbreaking results where spill-over effects from public to private partners and vice versa are key.

R&D Expenditure

The **total research and development (R&D) expenditure** of an economy reflects its efforts to strengthen its innovative power: an innovative environment is crucial for productive and high-tech companies in global competition. Within a network of R&D centers, universities, institutes and pioneering enterprises, companies are able to swiftly absorb recently acquired knowledge to build on their existing knowledge base. These new insights can be quickly transferred to their own R&D centers and partners. With USD 218.5 billion, the EU is second behind the USA, but ahead of Japan, in terms of total public and private R&D expenditure. Concerning the share of R&D expenditure, Europe invests around 2 percent of its GDP in research and development, and ranks third in terms of R&D intensity. Japan comes first with 3.2 percent, while the USA occupies second spot with 2.6 percent of GDP investments in research and development. To encourage R&D, the European Commission has set very ambitious goals as can be seen within the Lisbon Strategy for Growth and Jobs. Within this framework, European leaders have agreed to increase R&D investment to 3 percent of GDP by 2010.[2] In doing so, investors will be able to benefit from an innovative environment and excellent research and innovation infrastructure.

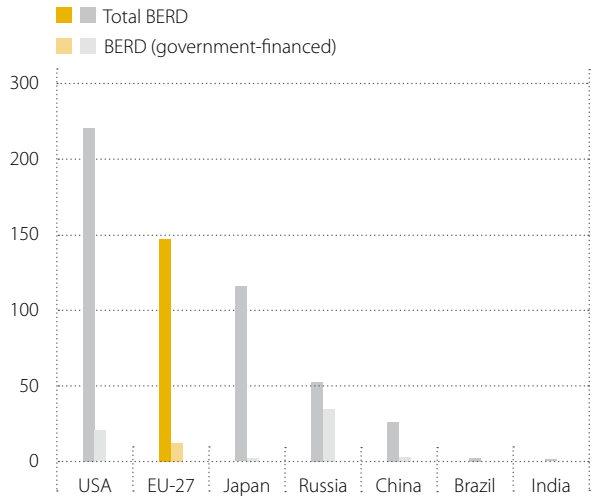
R&D expenditure (2005)



Source: OECD, Main Science and Technology Indicators (2007)

Note: EU-27 excluding Bulgaria, Cyprus, Latvia, Malta and Romania

Business expenditure on R&D (BERD, 2005)
[billion USD]



Source: OECD in Figures (2007)

Note: BERD (government-financed)

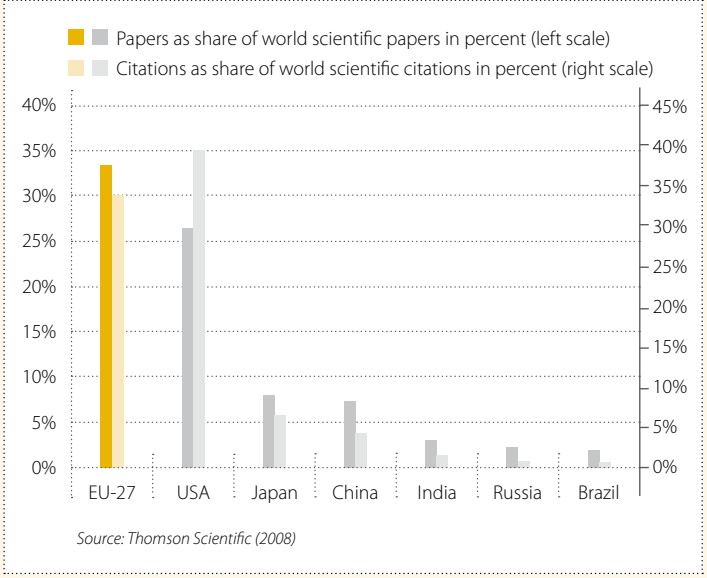
Industrial R&D is closely linked to the creation of new products and production techniques directed at the development of marketable products. Thus, **high business R&D expenditures** reflect an agglomeration of innovative enterprises within an economy which new investors can tap into. The 2005 statistics show that European countries rank second behind the USA (USD 227 billion) with USD 148 billion business R&D expenditure. Japan ranks third with USD 116 million business R&D expenditure. China reaches 14 percent of the level of the EU-27 countries. Brazil and India show lower rates.

The volume of government-financed business R&D reflects one way that companies can expect support from governments. For this indicator, Russia is in first position with 54 percent government-financed business R&D. The EU ranks third with 8 percent, right after the USA with a share of 10 percent government-financed business R&D. The Chinese government is supporting business R&D with 5 percent. These figures demonstrate that the EU not only provides an extensive network of highly innovative enterprises and clusters, but that investors can expect governmental support in their European R&D activities.

Scientific Output

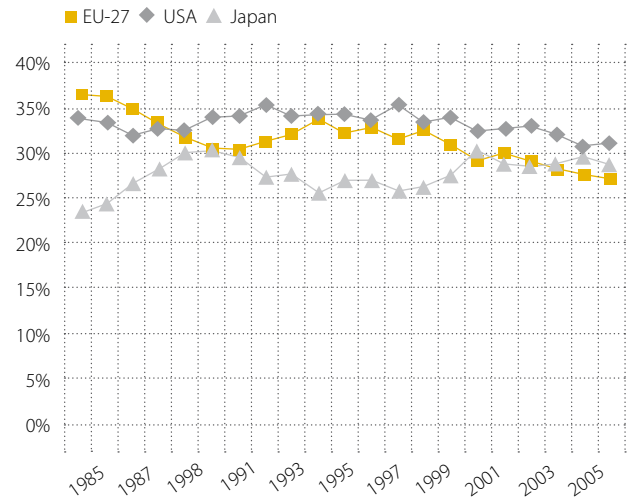
Excellent research infrastructure is exemplified by outstanding researchers, universities and institutes. The publication of major findings and their discussion is one of the main products of innovative research activity at universities and research institutes. One can measure the importance of an article or a researcher by the attention he or she receives within the worldwide research community through citations of major works. Europe and the USA are clearly leading the **scientific production measured by papers and citations**. One third of all international scientific papers originate in Europe and are highly respected, as one-third of all scientific citations worldwide refer to works produced in Europe. The USA is also producing high quality research, claiming over one quarter of internationally produced scientific papers and 38.6 percent of the world's scientific citations. This shows the significant importance of US-based research activity and the reputation of its own scientific journals. Japan and China follow with around 7 percent respectively, while India, Russia, and Brazil are behind with around 2 percent of internationally produced scientific papers. Investors in Europe and the US are able to make use of excellent research institutes to optimize their own innovative capacity; using the results from fundamental research and improving and advancing their own products and technologies.

Scientific production measured by papers and citations (2006)



Source: Thomson Scientific (2008)

Development in triadic patents (1985 – 2005)
[percent share of all triadic patents]



Source: OECD, Patent Database (June 2007)

Note: By country of residence of the inventors; no data available for Brazil, China, India, and Russia

Patent indicators are used to measure the inventive performance across a country, an industry or a company. The presence of a highly innovative environment with knowledge-intensive enterprises and institutes typically results in high patent activity.[3] Patents protect inventions and their originators and are thus an incentive for further innovation. More importantly, they allow for the spread of knowledge through the detailed publication of the inventions. For international comparisons, the OECD has introduced the concept of triadic patent families – patents applied for at the three major patent offices in Europe (EPO), the United States (USPTO), and Japan (JPO). The figures show that **triadic patents** are registered in almost equal measure between the USA, Europe and Japan, with the USA and Japan enjoying an advantage. The emerging countries in Asia in particular experienced a strong upsurge,[4] as they can build on the inventions of industrialized countries. Patent figures prove that increased R&D and a highly supportive environment lead to outstanding inventions for the advancement of the company and society.

Arguments for Europe

Investors can expect a highly innovative environment in Europe, not only in terms of R&D spending where Europe ranks second. Renowned universities and institutes provide basic research whose credibility and value is confirmed by a significant number of citations. According to these results, innovation processes led by public and private European research institutes are leading to the creation of valuable patents. An important benefit is the spillover effect which gets higher with proximity.[5] Here Europe's clusters – where a strong link exists not only between companies and research institutes, but also between clusters – come into play, supported by European research policy to connect the diversity of the member countries.

The EU has set the yardstick even higher for the years to come. The European countries anticipate that there is room for improvement leading to continued emphasis on research and development and innovation processes. The EU's Lisbon Strategy for Growth and Jobs is facilitating cooperation between companies and universities and is providing more financial resources to companies and institutes for R&D conducted in high-tech areas.

Chapter 05

Infrastructure


©Behörde für Bau und Verkehr Hamburg

Introduction

Infrastructure typically refers to the assets that support an economy including roads, electricity supply, water systems, telecom services, and public transportation. The investment in these assets is made with the intention that benefits will come from increased productivity, improved living conditions, and greater prosperity.

The quality of physical infrastructure is an important consideration for firms deciding their FDI location in general and for efficiency-seeking production in particular. Investment in these assets improves the FDI investment climate. Executives often focus on the quality of a market's infrastructure when deciding where to locate a production site for export goods and services. Information and telecommunication infrastructure provides companies with the ability to spread their information faster. A reliable electricity supply contributes to stable production processes and helps eliminate downtime, saving business and consumers from investing in expensive alternative systems.

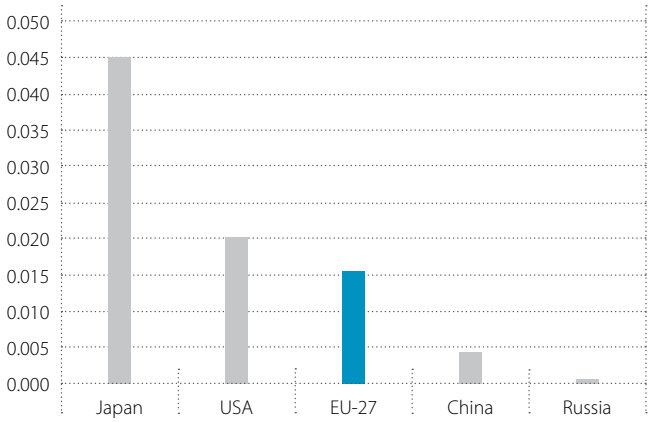
European policy's stated aim is to build a fully integrated basic transport infrastructure, transforming networks originally built to meet national considerations into an efficient and sustainable Europe-wide infrastructure system. This network of motorways, railways, waterways, ports, and airports is intended to link the 27 member states to one another and with the countries within the wider European community.

An Integrated Transport Infrastructure Network

By contributing to regional cohesion, the **motorway network** plays a major role in the geographical distribution of economic growth. Industries require direct and easy access to their suppliers, customers, and employees, hence the reason why industrial zones are generally located near roads, and why roads themselves are so important to regional development (for example, tourism, business location decisions, etc.).

With 0.016 km motorway per km^2 surface, Europe ranks third behind Japan and the United States. The appropriate density of motorways depends on population distribution and geographical characteristics. The high level of motorway per square kilometer is conclusive proof that European locations are well connected with excellent motorway access: companies can reach their clients easily from anywhere in Europe.

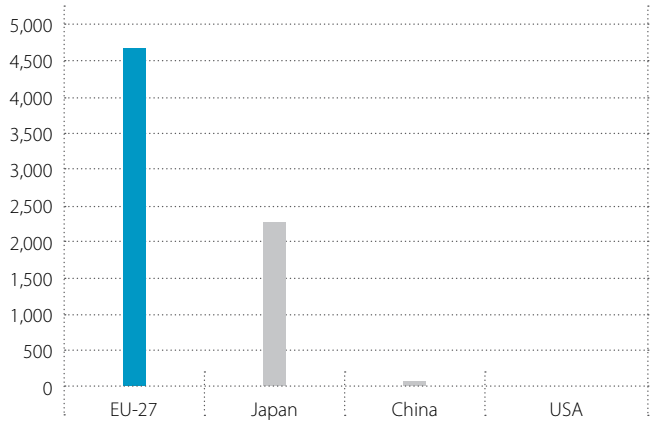
Motorway network (2005)
[km motorway per km^2 surface]



Source: European Union Road Federation, European Road Statistics (July 2008)

Note: No data available for Brazil and India

High speed railway (2008)
[km]



Source: International Union of Railway (2008)

Note: No data available for Brazil, India and Russia

With a **high-speed railway** network covering 4,672 km, Europe is a leader for high-speed trains (tracks supporting 250 km/h or more). The expansion of the trans-European high-speed rail network remains a key objective at the heart of European policy. It represents an effective response to both the public's demand for mobility and in terms of economic and sustainable development objectives.

The development of the European High Speed Network involves the construction of new projects. The East Europe High-Speed Train Line opened its first section in March 2007. The completion of this line is a wonderful bridge to the heart of Europe: creating a 1,500 km route that cuts through Europe, connecting Paris to Budapest (via Strasbourg, Stuttgart, Munich, and Vienna) by 2015.

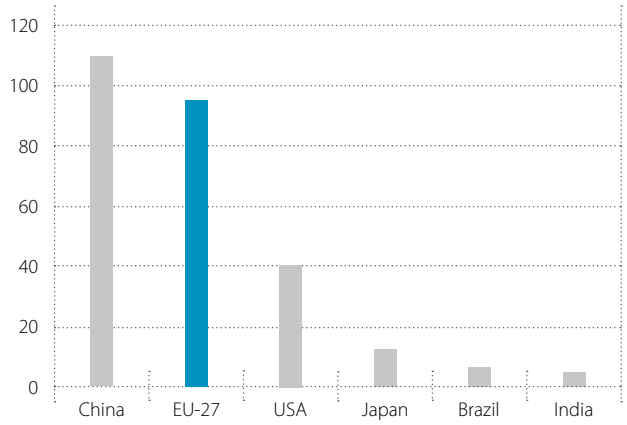
Outside the EU, only Japan with its Shinkansen network of bullet trains can challenge Europe's leadership. The USA does not yet have the infrastructure capable of supporting high-speed trains, although initiatives to remedy this situation are underway. Other countries, such as China, are likewise looking at expanding high-speed railways.

Due to the expansion of international trade, maritime transportation has recorded high growth rates in recent years. Container shipping has been the fastest-growing sector of the maritime industries in the last two decades. The total throughput handled by the world's container ports grew at an average rate of 11 percent per year in the last five years.[1] Major drivers are increased transshipment traffic and the high growth rates in Asian/Chinese container ports. However, a considerable number of European container ports are also recording higher digit growth figures.

European **container port traffic** represented nearly 95 million TEU (twenty feet equivalent units) in 2006, putting the region in second place just behind China and considerably ahead of the USA whose port container traffic is almost 40 million TEU (less than half the port container traffic in Europe).

Europe and Asia, specifically China, have strong mutual maritime trade connections. In 2006, Asia-Europe container trade amounted to 15.8 million TEU and is expected to double by 2016.[2] This forecast growth will also see Europe serve as a hub for the trade between Asia and the USA. As a result of its international significance, Europe's harbors are particularly well-equipped for national and international shipping.

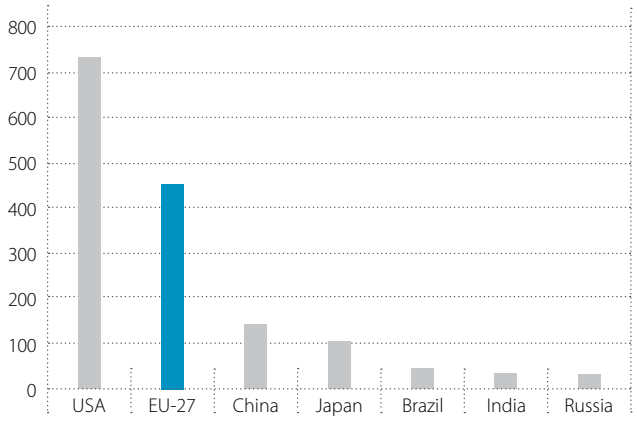
Container port traffic (2006)
[million TEU - twenty feet equivalent units]



Source: ISEMAR, Institut Supérieur d'Economie Maritime (2008)

Note: EU-27 excluding Austria, Hungary, Lithuania, Luxembourg, Malta, Czech Republic, Slovakia and Slovenia; EU-27 figures include intra- and extra-EU container port traffic

Air transportation measured by passengers carried (2005)
[millions of passengers]



Source: IMD based on International Civil Aviation Organization and national sources

Note: EU-27 excluding Cyprus, Latvia and Malta; passengers carried by main companies; data based on estimates

In an age of just-in-time and efficient production methods, **air transportation** allows fast and efficient interconnection between important economies and far-flung regions. Air transport is vital to many businesses, whether for transporting goods or for business travel. Air transport makes global business possible: it transports goods to global markets, brings tourists, and provides employment opportunities.

In terms of number of passengers carried by the main companies, the United States has the world's highest number of passengers ahead of Europe, China, and Japan. A broad domestic market and the importance of migration within the country are factors contributing to the USA's leadership. Europe takes second place with 466,010 passengers carried by the main companies in 2005. As such, this places Europe among the leaders – far ahead of China and Japan.

Connection and Access to Information

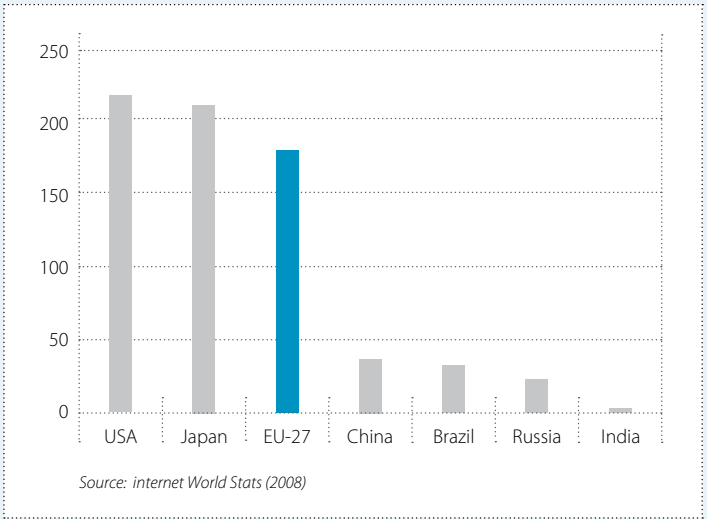
Telecommunications infrastructure is crucial for doing business. It creates an important basis for information to be used effectively (to improve productivity) and to make it accessible to business actors. As such, it clearly becomes indispensable for firms and clients who need to be contactable to develop pro-business activities.

The advent of the internet created a telecommunications revolution. According to internet world statistics, there were some 1.32 billion global internet users in December 2007. The internet provides investors with considerable access to information, playing a knowledge-incentive role which would appear to influence investor location decisions. This holds particular weight for international investors who require more information about the possibilities of implementing an activity in a particular region and the associated costs. The internet is also important within the operational processes as a part of the infrastructure that they can find at the investment location.

The internet promotes increased flexibility and new work methods such as international teams and home offices. In addition, it also helps improve the cooperation between companies and significantly reduces reaction times. In this, the information communications technology (ICT) infrastructure in Europe promotes electronic commerce activities, which represent a growing amount of national and international trade transactions.

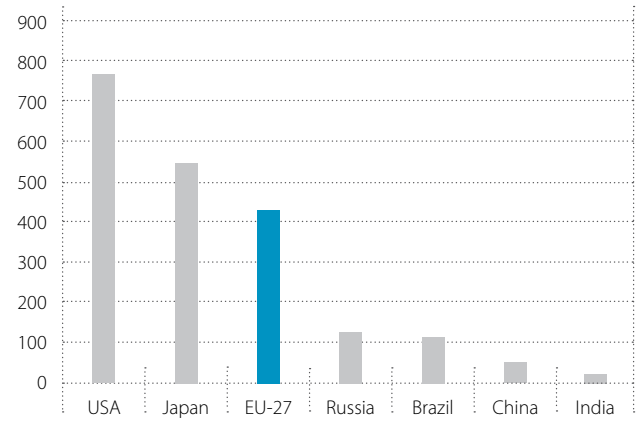
Broadband internet penetration (high-speed internet access - any connection to the customer of 256 Kbit/s or more) is important for economic, social, and cultural reasons. It opens doors to new market opportunities and fosters growth through innovation and productivity increases.

Broadband internet penetration (2007)
[Subscribers per 1,000 inhabitants]



Source: internet World Stats (2008)

Personal computers (2005)
[Computers per 1,000 inhabitants]



Source: World Bank, ICT at Glance (2007)

Broadband internet penetration can also improve the efficiency of administrative sectors such as healthcare and education, as well as facilitating the implementation of international companies and their business activities in Europe.

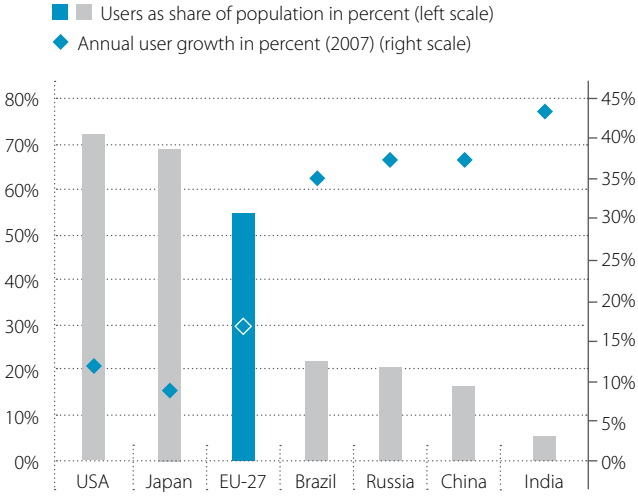
The EU-27 ranked in the top three regions for broadband internet penetration in 2007: with 184 inhabitants per 1,000 having access to high-speed internet. The EU-27 is behind the USA and currently finds itself in an important catch-up phase. The European growth rate of broadband internet penetration between 2005 and 2007 was 52 percent – interestingly higher than the rate of China, and twice the rate of USA and Japan. The other BRIC countries are catching up in terms of their internet infrastructure with growth rates of around 80 percent.

Personal computer ownership reflects access to hardware and a population's capacity to participate in the digital economy. The EU-27 was behind the USA and Japan for the number of personal computers owned per 1,000 inhabitants in 2005. But, in the period 2000 to 2005, the number of people with access to a personal computer increased sharply in the EU – from 240 to 422 per 1,000 inhabitants (76 percent increase) according to World Bank data.

Europe ranks among those regions where internet and PC usage is very high, a fact which is a further aid to the distribution of information and e-business. 55.7 percent of the EU population uses the internet regularly, trailing the USA (71.4 percent), and Japan (68.7 percent). Of these three leaders, the EU-27 is the region with the highest average user growth for the period 2000 to 2007 (16.4 percent).

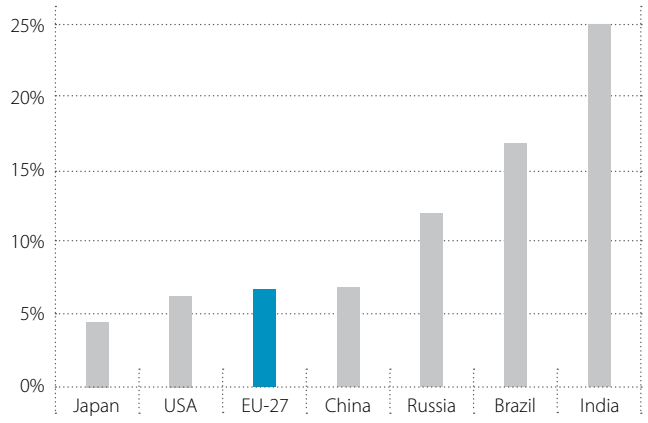
The percentage of **internet users** in the domestic population is growing very fast in countries such as Brazil, Russia, China, and India. High levels of communication services such as broadband internet penetration and internet users clearly facilitate information flows and create business opportunities.

Internet users (2007) and user growth (2000 – 2007)



Source: Internet World Stats (March 2008)

Electricity transmission and distribution losses (2005)
[Losses as share of total electricity production]



Source: International Energy Agency, Energy Statistics (2008)

Stable Energy Supply

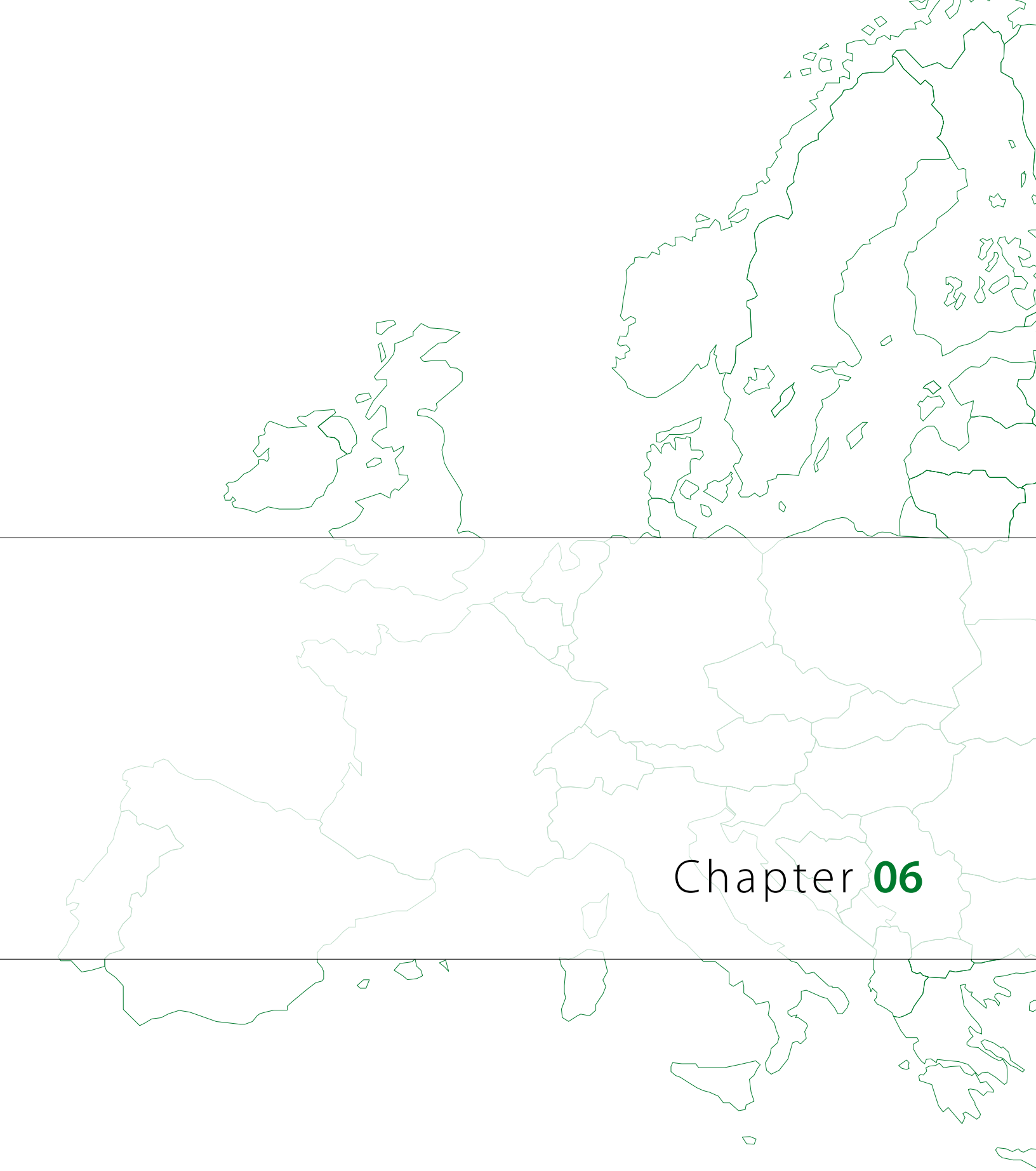
The International Energy Agency (IEA) provides energy statistics including **electricity transmission and distribution losses**. Alongside outages, transmission and distribution losses are an indication of the overall quality of a nations or region's power infrastructure. Electric power transmission and distribution losses include losses in transmission between sources of supply and points of distribution and in the distribution to consumers including pilferage.

In 2005, the EU-27 was among the best-performing regions thanks to minimal electricity transmission and distribution losses of just 6.7 percent. In BRIC countries there are problems with the management and the physical quality of the infrastructure which is best demonstrated by the electricity losses in these countries. Conversely, the overall quality of the power system is much better in industrialized countries due to the low level of losses. Weather-related problems are the chief cause of disruptive power outages in the USA and Europe. Power supply quality level has a direct impact on the competitiveness of the industrial consumer. As an example, the International Bank for Reconstruction and Development estimates that power outages caused by damage to materials in process, downtime and ruined equipment cost Indian firms one-tenth of total output value in 2006.[3] To cope with electricity outages and connection delays, firms make use of generators which represent an additional cost.

Arguments for Europe

Europe's central position is optimized by the high-quality of its transportation and telecommunications network. International investors can also count on a highly reliable and competitive energy environment. Physical infrastructure, such as motorway network density, high-speed railways, air transportation, and port container traffic, is a major factor in encouraging investors to do business in Europe. It is crucial for investors to be able to rely on those economic assets in order to settle their business in Europe and develop their activities in the long-term. Well-developed infrastructure is a key determinant in entering an efficient production business process. Modern supply chain management particulary relies on an efficient transport and communication infrastructure.

Today logistics remains a key element of many European businesses seeking to gain a competitive edge over their rivals. The European unified network is the backbone of European logistics companies – some of which are world leaders in this sector. Being connected to each other and having good access to information is an imperative for investors. Europe can place itself among the global leaders in telecommunications and energy supply.



Chapter 06

Business Environment

Introduction

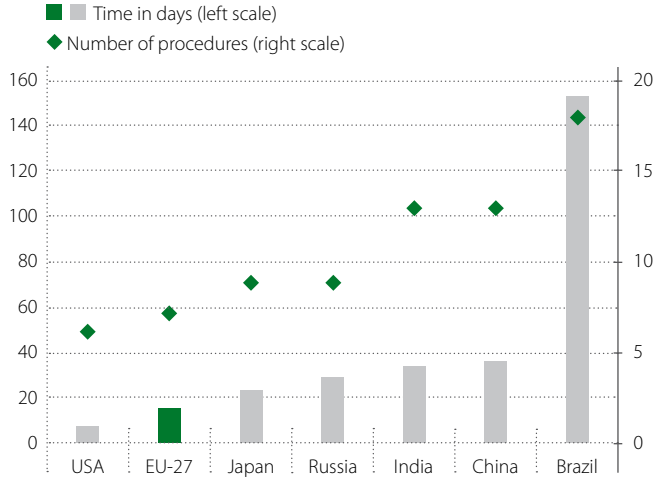
The business environment is one of the most important factors in attracting investments, as it directly influences the individual situation of a company. Entrepreneurs are faced with administrative issues resulting from national regulations and requirements on a daily basis. In this respect, Europe has made and continues to make strong efforts to provide companies with efficient processes combined with the necessary security to conduct their business. This is proven by indicators referring to registration, employment, and taxes etc., mainly provided by the Doing Business report from the World Bank.

Registration Procedures

Establishing and **starting a business** requires several application, registration, and other procedures to be made and carried out within a specific period of time before a company can become fully operational. The World Bank measures the time required to fulfill the necessary procedures in calendar days. Both indicators show a competitive Europe, just behind the USA, with seven required procedures within 17 days. Transparent and defined processes and responsibilities in Europe are the reasons which allow companies to go quickly to market. In this respect, all of the other economies are lagging considerably behind.

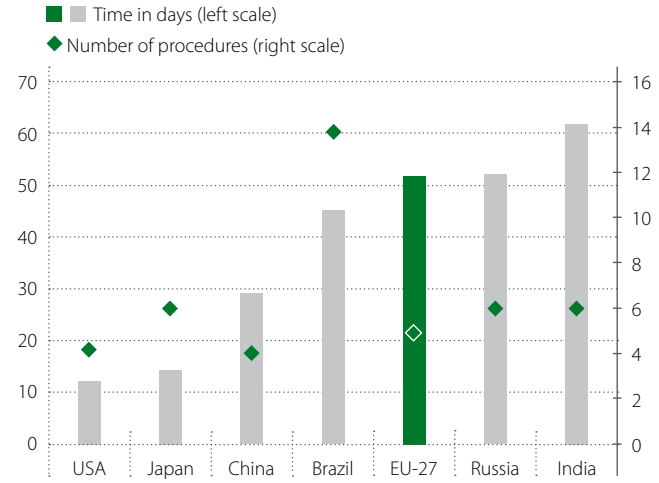
A fast and simple process to **register property** stimulates companies to invest. Land and buildings are not only necessary for business operations, but also for securing mortgages which serve as collateral for the lending banks. Similar to the establishment of a company, the process to obtain formal property title takes time and involves several procedures. The involvement of local property lawyers, agents and notaries make the process more complex, although the use of electronic support helps speed it up. The USA leads the way (with an average of 12 days and four interactions) ahead of Japan, and surprisingly, China. Europe shows a mixed picture, with a few procedures taking more time than those of its competitors.

Procedures for starting a business (2007)



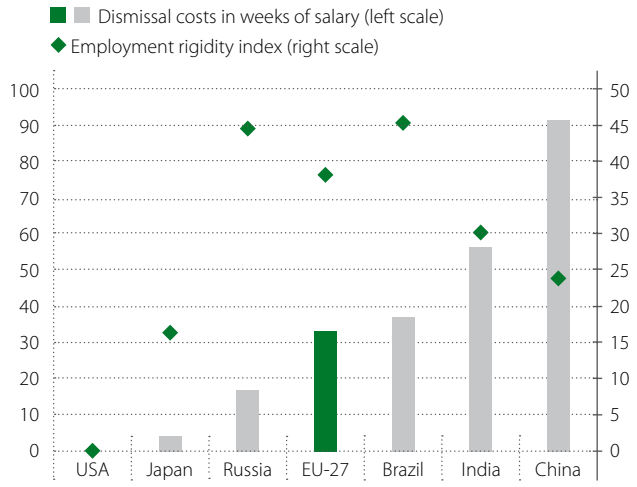
Source: World Bank, Doing Business (2008)
Note: EU-27 excluding Cyprus and Malta

Procedures for registering property (2007)



Source : World Bank, Doing Business (2008)
Note : EU-27 excluding Cyprus and Malta

Labor flexibility (2007)



Source: World Bank, Doing Business (2008)

Note: EU-27 excluding Cyprus and Malta

One possible reason for this might be the fact that the links between the parties involved are not yet as efficient, so that each party requires more time. Moreover, it is also possible that procedures are more complex due to increased security demands. The creation of electronic company registers and the introduction of special fast-track procedures by more European countries will address this current challenge.

Labor Flexibility

For most companies, labor is the number one business factor. When it comes to labor, flexibility is just as important as quality. The Employment Rigidity Index (ERI) provides a general indication of individual country rules on the closing and terminating of labor contracts and working time regulations.

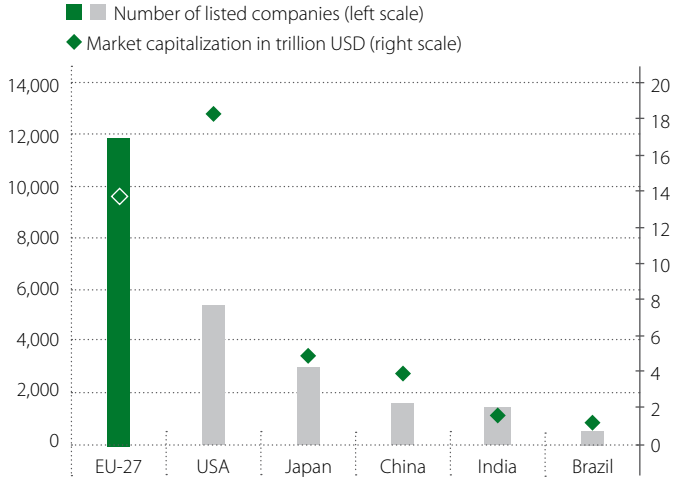
The ERI determines **labor flexibility** according to a 0-100 scale, with zero being the "least rigid" and 100 being the "most rigid". The USA is firmly rooted to the zero end of the scale, with Europe recording an ERI value of 39; an indicator that Europe is attempting to strike the right balance between labor market flexibility and job stability. Job stability viewed as an achievement of developed economies is influenced by hiring and promoting special groups of people (such as disabled people), as well as a reduction in working hours and requirements to finish contracts.

The employment dismissal cost score highlights in some detail the costs incurred by terminating employment contracts. These include severance payments, the costs of advanced notice requirements, and penalties payable when terminating the contract of a worker. The costs are expressed in weekly wages where a score of zero for the USA indicates less than eight weeks of salary. In comparison to the other competitors, Europe records a more moderate picture with a score of 34 representing an employment dismissal cost of 42 weeks salary. The Doing Business report calculates that in China, companies can expect to pay around two years salary in the form of compensation for dismissal.

Financing the Business

Financing is imperative to starting and expanding a business. In order to secure equity financing for a business it is vital that the capital market provides enough money and the company can participate in these resources. Market capitalization – the value of the outstanding shares publicly traded at the **stock market** – provides an impression of the available opportunities to secure equity. Europe is the second-biggest source of public investors. More importantly, Europe tops the list for the number of listed companies. Against the market value background, this shows that Europe also offers sound financial opportunities to smaller companies who opt to go public.

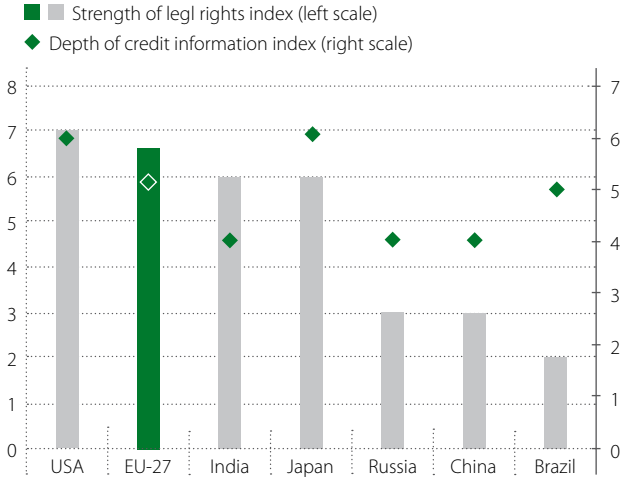
Financing through stock markets (2007)



Source: World Federation of Exchanges (January 2008)

Note: No data available for Russia

Legal security in getting and providing credit (2007)



Source: World Bank, Doing Business (2008)

Note: EU-27 excluding Cyprus and Malta; low scores indicate low security level, high scores indicate high security level

When obtaining financial resources through loans and credits, the **legal security** of the financial partners (borrowers and lenders) is a decisive factor. All parties want to be safeguarded against financial crisis and bankruptcy. The Strengths of Legal Rights Index measures the degree to which collateral and bankruptcy laws protect credit conditions and thus facilitate lending. The index ranges from 0 to 10 (with 0 being the worst value and 10 the best value). With an average score of 6.6, the EU-27 nations are second behind the USA, offering a secure environment in which to obtain and provide credit. Lenders can expect a high rate of repayment secured by the legal framework.

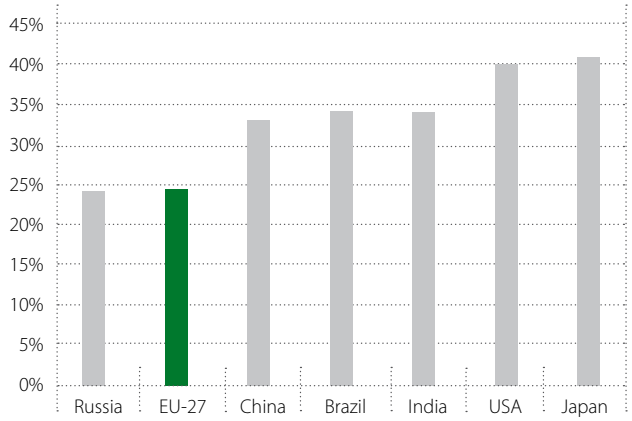
Requirements relating to documentation and open access to information on borrowers act as a further safety feature. Information pertaining to companies and their credit repayment history is of particular significance for lenders. The Depth of Credit Information Index with a best value of 6 measures the scope, accessibility, and quality of credit information provided by company registers. In this respect, Japan leads ahead of the USA, with Europe in third spot just before Brazil.

Taxation

Taxation is a key element in the race to attract foreign investors, as tax rates have a high influence on the cost and profitability of a company. **Corporate tax rate** comparisons make clear that Europe is following the trend of reducing tax rates in order to be a competitive business location. Ninety-two countries participated in the KPMG-conducted tax survey which puts the EU-27 among the leaders with an average rate of 24.2 percent. Although a common European tax policy is not yet in existence, most countries have undertaken a series of reforms to reduce the corporate tax burden. Worldwide, the average corporate tax rate has fallen from 27.2 percent to 26.8 percent in 2007. With a significant average reduction of 1.6 percent, the European countries have reduced tax rates at a significantly higher rate than the global average.

When it comes to taxation, not only tax rates are decisive, but also the efforts made to comply with all of the relevant formalities. In this aspect, the Doing Business Report analyzed **taxation procedures** measured by time and number of tax payments. The time indicator records the number of hours per year needed to prepare, file, and pay or withhold corporate tax, value added or sales tax and payroll taxes (including social contributions). Payments comprise the total number of taxes including methods, frequency and number of agen-

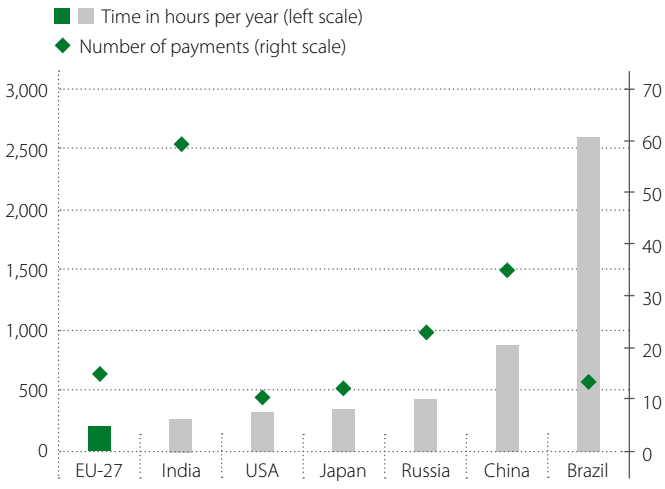
Corporate tax rates (2007)



Source: KPMG, Corporate Tax Rate Survey (2007)

Note: The Corporate tax rate comprises several individual taxes on national level levied on companies' profit

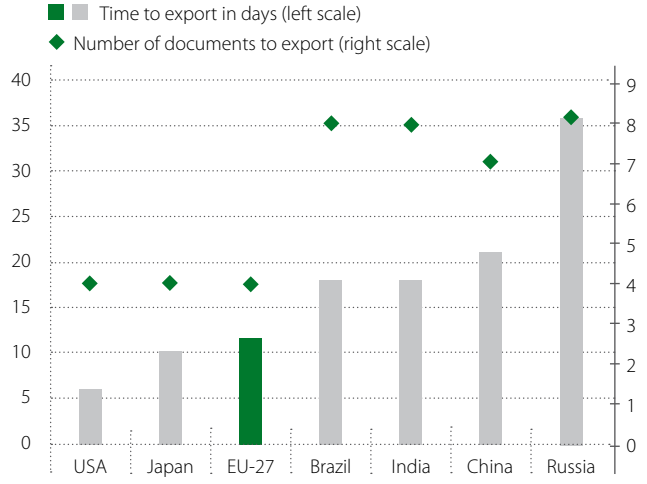
Taxation procedures (2007)



Source : World Bank, Doing Business (2008)

Note : EU-27 excluding Cyprus and Malta

Exporting procedures (2007)



Source: World Bank, Doing Business (2008)

Note: EU-27 excluding Cyprus and Malta

cies involved. The study placed Europe (with 212 hours and 15 payments) ahead of the competitors. This means, that in Europe, the prospective investor can expect a very efficient tax administration system. The divide between time and number of payments (obvious for India and Brazil) highlights differences in tax administration and efficiency. Since many different taxes require substantial information-gathering effort, consolidation of taxes is as important as speed in order to be competitive.

Trading

In order to trade abroad, specific national regulations presuppose the need to satisfy a number of procedural requirements. Effort is necessary to overcome administrative hurdles to import and export activity. The World Bank has measured all of the official **exporting procedures** and documents required. The study assumed a standardized cargo of goods by ocean transport and recorded time and number of documents required for every official procedure. The results are influenced by cargo uploading waiting times and have been improved using online customs declarations. The EU ranks among the leaders with 11 days and 4 documents alongside the USA (6 days, 4 documents) and Japan (10 days, 4 documents). In this respect, the creation of the European single market has allowed for a reduction in red tape between the trading members and associated states.

Arguments for Europe

The institutional framework plays an important role as it confronts companies with both direct and indirect costs borne of information disparities. Business environment indicators show that Europe has learned its lesson in terms of improving its attractiveness. Good examples of this include the combination of lower tax rates and the elimination of a number of taxation formalities. This said, it nonetheless demonstrates that still more reforms are necessary, particularly in the field of flexible labor regulations. Flexible labor regulations are the basis for job creation and the existence of a vital labor market. All things considered, it is essential that a business framework offers the right balance between flexibility and regulation – as an efficient regulatory legal network provides security and helps reduce legal disputes.

Chapter 07

Sustainable Development

Introduction

All decisions made today have a significant impact on the potential well being of future generations. Sustainable development observes this fact and aims at preserving resources for an ecological balance for the future. Sustainability arises foremost from environmental debates criticizing the exploitation of natural resources to the point of their extinction without the possibility of replenishment. The debate has repercussions on many other social and economical issues, and thus influences political strategies in various fields.

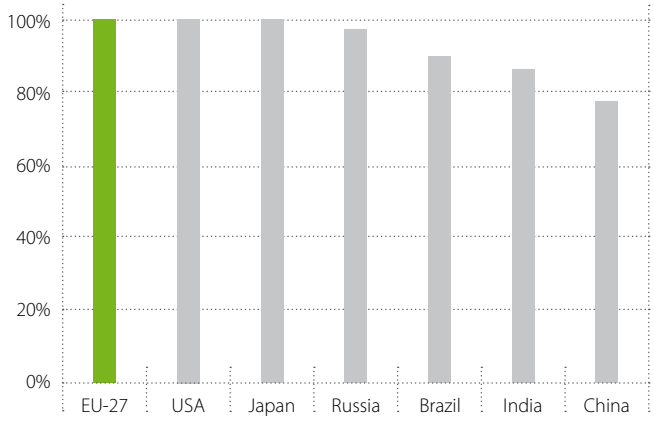
A major milestone in the debate was reached with the United Nations Conference on Environment and Development (UNCED) held in Brazil in 1992. The Rio Declaration on Environment and Development, as it is now called, has since become a basis for political strategies encouraging sustainable development, with the protection of the environment and natural resources at its center.[1]

Political measures and strategies in this field provide an enormous chance for development and investment. It opens windows of opportunity for many companies and partnerships to advance in new and innovative technologies.

Water and Air Quality

Although the populations of most industrialized countries such as the EU-27, USA, and Japan enjoy uninterrupted access to clean and **improved water**, this is not the rule for all world regions. In China, only 78 percent of the population enjoys this "luxury". Even today, worldwide water reserves are being polluted from discharges of fertilizers, pesticides, toxins, pharmaceuticals, and various waste waters from agriculture, industry, and ordinary households. The reformation of aquatic ecosystems for the recovery of building and farm land or the construction of artificial water ways endangers water reserves.[2] As a result, clean drinking water is becoming an increasingly scarce commodity, with some people only having access to contaminated sources of water. The European Union has enacted many programs and policies for the measurement of water standards, the protection of bodies of water, groundwater, potable water and the treatment of waste water.[3] Strict rules have furthered the development of an industry and new technologies for the production and protection of this basic element of life.

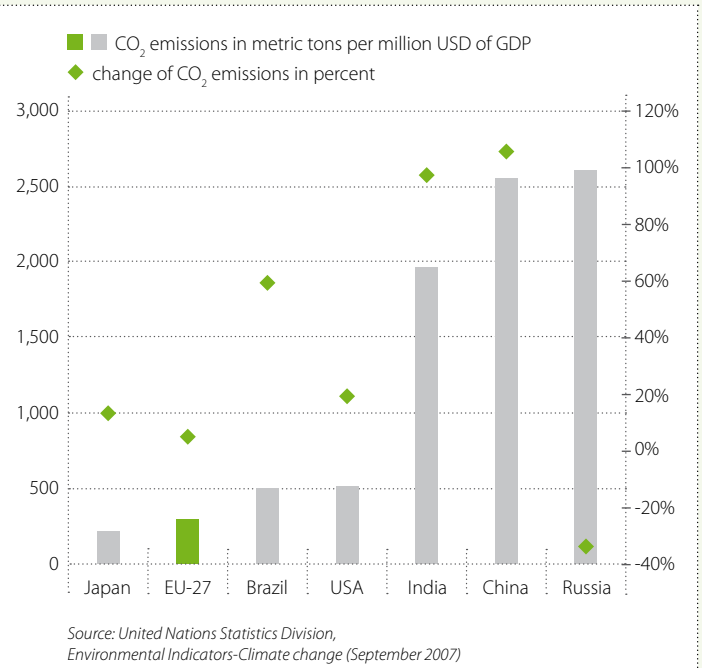
Population using an improved water source (2004)
[share of total population]



Source: UNDP, Human Development Index rankings (2008)

Note: EU-27 excluding Bulgaria and Romania

Carbon dioxide emissions (2004) and changes (1990 – 2004)



Source: United Nations Statistics Division, Environmental Indicators-Climate change (September 2007)

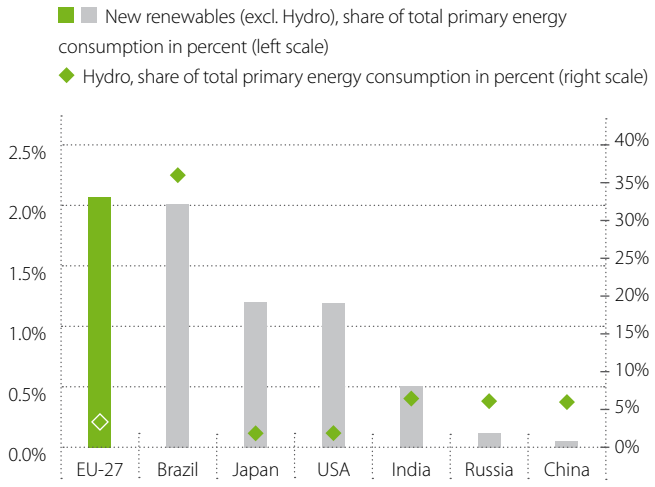
As is the case with water quality, increasing air pollutant emissions have a direct effect on human life and the environment, causing hazardous effects on both health and the climate. Specific greenhouse gases, such as carbon dioxide (CO_2), methane, nitrous oxide, and halocarbon for example, can lead to an increase in average temperatures, a rise in the average sea level, and a shifting of precipitation zones.[4] For this reason, climate protection, specifically the reduction of greenhouse gases, is one of the main goals of the Kyoto Protocol. Measured in terms of their economic size, the EU-27 countries are making progress toward this goal. Their **CO_2 emissions** in 2004 stood at a low of 330 metric tons per million USD of GDP, closely behind the leader Japan with 280 metric tons. While Japan, Brazil, USA, India, and China have increased total CO_2 emissions in a 14 year period, Europe has almost been able to keep emissions at 1990 levels. This was exceeded by Russia which was able to reduce emissions by around 30 percent within the same time frame. In particular, CO_2 emissions from coal consumption have dropped significantly.[5] However Russia, China, and India still belong to the group of high CO_2-emitting countries.

Air traffic is one of the main emitters of CO_2 and other air pollutants, and to date has been one of the industries with the lowest levels of regulation with respect to pollution. The European Union has started to include the air traffic industry in its strategy for sustainable development. Another large pollutant that has already been taken into consideration is the automotive sector. Representatives of the automotive industry are already in detailed discussions with national and European level authorities on how best to reduce emissions. The EU for example, is looking at guidelines to lower CO_2 emissions on new cars[6] and is promoting the development of new industrial standards worldwide.

Renewables as Energy Source

Another sector with great potential for lowering greenhouse gas emissions and improving energy productivity is the renewable energies sector. Europe has been significantly investing in the development of renewable energies and promoting changes in the consumer behavior of private and industrial end users. While the capacities of traditional renewable energy sources such as water (hydro) are greatly utilized, new renewable energies have a high potential for growth and energy efficiency. Small hydro, modern biomass, wind, solar, geothermal, and biofuels belong to the group of new renewable energy technologies.

Primary energy consumption from renewables (2005)



Source: Econsense (2007)

Note: Renewable energies include energy from bio mass, wind, solar, geothermal and biofuels; Primary energy sources consist of fossil fuels, nuclear, hydro and renewables

Europe is the international leader in new renewable energies with 2.1 percent primary energy consumption. Brazil, which already gets 37 percent of its primary energy consumption from hydropower, is also a strong country in terms of new renewable technologies. After Europe, it is a close second with a 2 percent share of primary energy consumption from new renewable technologies. Japan and the USA show similar levels in both technologies. The two countries source 1.2 percent of their **primary energy consumption from renewables**. Hydropower accounts for 3.4 percent in Japan and 2.8 percent in the USA. India, Russia and China each show rather low levels of new renewable energy utilization despite having respectable levels of hydropower of around 6 percent. The development of energy technologies which draw on self-replenishing resources such as wind, water, and solar energy is an important step in maintaining the progress of sustainable development.

Arguments for Europe

The EU is a forerunner in promoting sustainability and high value goals directed at driving sustainable economic development. The indicators discussed have illustrated some aspects of this focus. European policies take into account the pressing need for clean water sources and unpolluted air. European countries are already the second lowest CO_2 emitter after Japan. Along these lines, Europe has become the leader in new renewable energies, accounting for increased shares of energy production from solar and wind energy sources. Policy makers and industry representatives have been able to agree on production and emission standards to develop and promote highly innovative renewable and sustainable technologies. As a result, investors can find a highly exceptional market for products and technologies in the field of energy productivity, efficiency, and sustainability.

Chapter **8.1**

Automotive

Introduction

The automotive industry has historically been a major contributor to the build-up of the manufacturing sector in most advanced countries. This activity, according to a strict industry definition, includes three major types of companies: large carmakers, first tier suppliers who produce integrated equipment and systems, and second or third-tier suppliers who produce spare parts, components and sub-systems.

But the automotive value chain is not just limited to these areas, as a motor vehicle requires inputs from the chemical, plastic, metal and glass industries as well as electronic equipment and software. Many service industries such as logistics or engineering also participate in the production and distribution process. As such, the automotive industry has a very large multiplier effect on the rest of the economy, both in terms of activity and innovation.

In addition, the automotive industry is one of the major playing fields for international investment. Due to the increasing internationalization of companies, worldwide FDI stock in this activity has multiplied by seven between 1990 and 2005 in current dollar terms. This reached USD 430 billion this year (e.g. 15.5 percent of the total outward FDI stock in the manufacturing sector).[1]

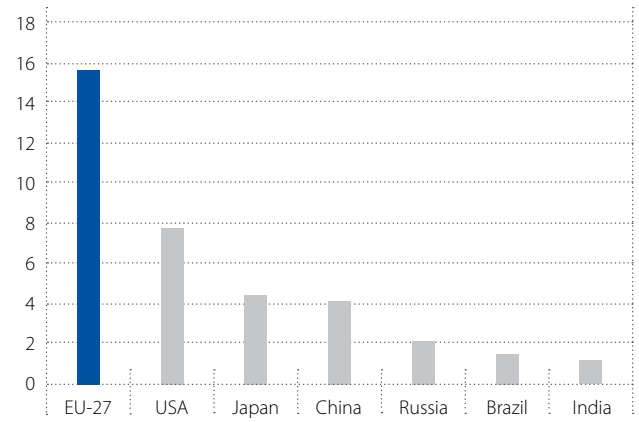
Market Size

The automotive industry is one of the strongest pillars of the European economy. It accounted for around 10 percent of the added value of the EU-27 manufacturing sector in 2006. At that time, its 250 assembly plants across the continent directly employed 2.3 million people and indirectly supported a further 10 million jobs in related activities.[2] In addition, EU-27 carmakers can rely upon an extensive network of suppliers, of which many are world leaders.

Despite a quick growth in demand in the emerging countries and particularly in Asia, the EU-27 region remains the largest automotive market in the world. In 2005, 254 million motor vehicles[3] were in use in the EU-27, compared to just 237 million in the USA. **Registration of new passenger vehicles** in the EU-27 amounted to almost 16 million in 2006; well ahead of the USA and far ahead of any other country or region in the world. It is also a large market for sophisticated vehicles, while the growth within the emerging markets is largely dependent upon the success of economic cars.

The EU-27 remains today by far the largest **producer of motor vehicles** in the world, producing nearly 20 million vehicles in 2007. In marked comparison, 11.6 million motor vehicles were produced in Japan, 10.8 million in the USA, and 8.9 million in China.

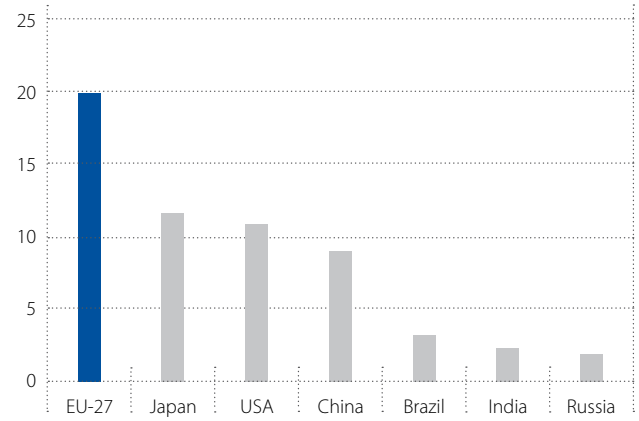
Registrations of new passenger vehicles (2006)
[millions of registrations]



Source : International Organization of Motor Vehicle Manufacturers (2008)

Note : Data for China, India and Russia: based on estimates from Economist Intelligence Unit (2005)

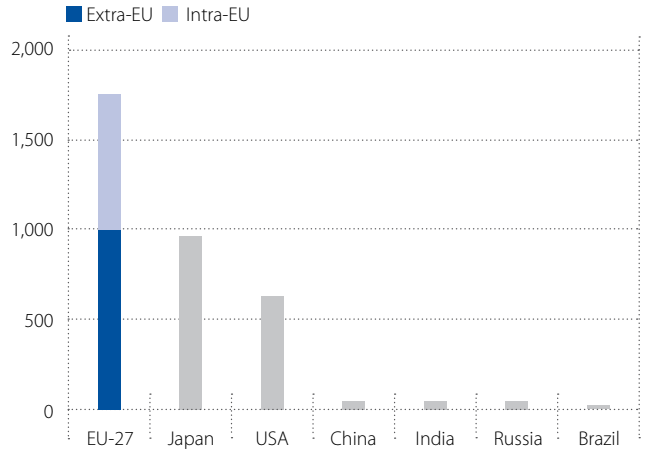
Production of motor vehicles (2007)
[millions of motor vehicles]



Source: International Organization of Motor Vehicle Manufacturers (2008)

Note: Motor vehicles include passenger cars and trucks

Outward FDI projects in the automotive industry (January 2003 – May 2008)
[absolute numbers]



Source: fDi Markets (July 2008)

Note: FDI projects include only greenfield and expansion investments

The EU-27 is also a global technology leader, largely due to its R&D efforts which reached EUR 20 billion in 2006 (equivalent to four percent of industry turnover).[4] Clean technologies rank among the major fields of research. The European automotive industry in particular is investing in sustainability to bring down the CO_2 emissions to a level of 120 g/km. This opens up new opportunities for improved vehicle technology and investments.

Trade and Investments

The EU-27 is the largest exporter of motor vehicles worldwide. Despite a rising level of imports, it still had a positive trade balance of over EUR 41.7 billion in 2007.[5]

European market unification has favored industrial restructuring at the continental level. Consequently, some European companies have become powerful multinational groups. Of the 20 major global car makers with the highest production levels in 2006, six were European.[6]

European companies are major investors worldwide, announcing the completion of more than 1,000 **outward FDI projects** overseas since 2003. This level is slightly higher than that of Japanese companies and well ahead of that of US companies. In addition, no less than 700 FDI projects

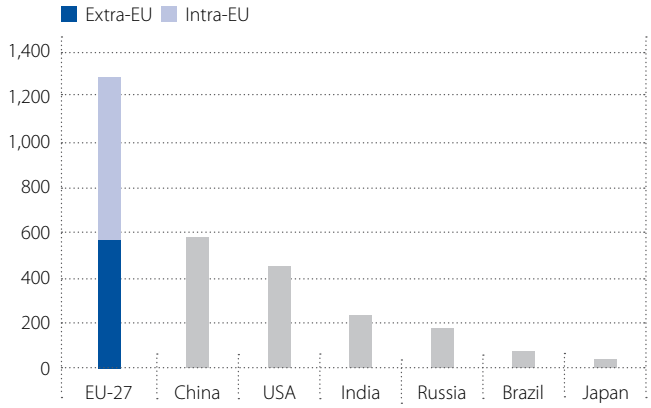
have been announced by European investors in other European countries, giving further evidence of a strong European integration dynamic.

The EU-27 is also among the most attractive regions in the world for **inward FDI projects** in the automotive industry, with 570 greenfield FDI projects announced by overseas investors since 2003. This figure is comparable to the one observed for China, but well ahead of that for any other region in the world.

Arguments for Europe

The attractiveness of Europe to overseas investments draws on many factors. First, the market is huge and offers many fast-growing niches and development opportunities such as clean vehicles. Second, the quality of local resources is high; be it in terms of skilled labor or of a well-developed and diversified supplier base. Third, the European automotive industry is at the forefront of technological innovation and organizational efficiency. For instance, it has more extensive experience with clean mobility than any other region in the world, and has developed very efficient just-in-time production systems. Practically all of the world's 20 leading carmakers – with the exception of the Chinese – have manufacturing sites in Europe.

Inward FDI projects in the automotive industry (January 2003 – May 2008)
[absolute numbers]



Source: fDi Markets (July 2008)

Note: FDI projects include only greenfield and expansion investments

Chapter **8.2**

Chemicals


©Yuri Arcurs – Fotolia.com

Introduction

The chemical industry provides the basic elements for the materials essential to our daily lives. It is a driving force behind many new products in other industries such as the automotive sector, aerospace, cosmetics, food and beverages, and much more. The chemical industry contributes to innovation in high-tech fields, for example, in the creation of lighter and more durable materials.

The chemical industry also receives considerable attention when talking about sustainability, as it works to develop new products to safeguard the environment. Innovative manufacturing processes, cleaner and safer technologies, and strong efforts to increase energy efficiency allow the chemical industry to play a vital role in realizing environmental goals.

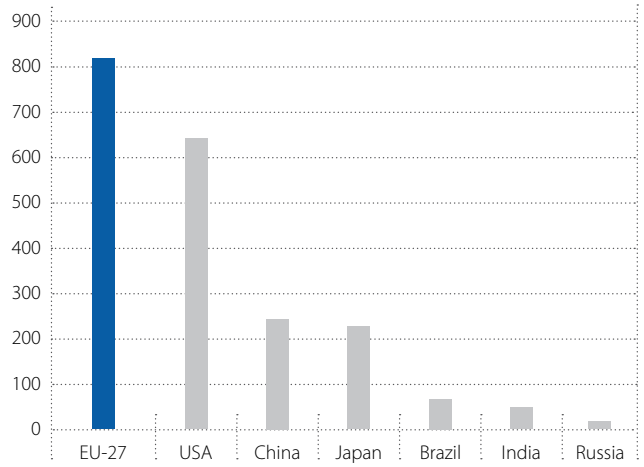
8.2

Market Size

At USD 830 billion, EU **chemical sales** represent 30 percent of total world chemical sales. The EU is the international leader ahead of the USA (23 percent), China, and Japan. Industrialized economies display much higher living standards and a higher demand for special and refined products with a higher turnover. In developing countries, the chemical industry can also expect higher production volumes and sales in the future as a result of growing populations and increases in the standards of living.

The chemical industry is driven by large multinational companies which operate in relatively homogenous markets. Since large multinationals act globally, there is a real sense of interconnectedness between the chemistry markets. Europe, for example, imports raw materials such as petroleum and crude oil. Europe's strength lies in the value-added refinement of these products; particularly in the polymer, fine and special chemical areas. These products do not usually belong to the mass production group but are instead innovative products and new materials within the value-added chain. They are more durable, lighter and less cost-intensive. Europe then exports these highly refined end-products across the globe.

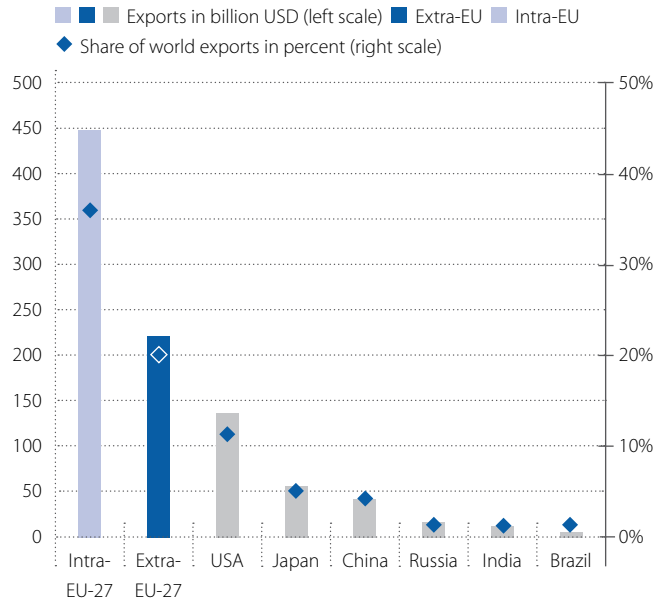
Chemical sales (2006)
[billion USD]



Source: Verband der Chemischen Industrie, Chemiewirtschaft in Zahlen (2007)

Note: EU-27 data includes intra and extra-EU sales; EU-27 excluding Bulgaria and Romania

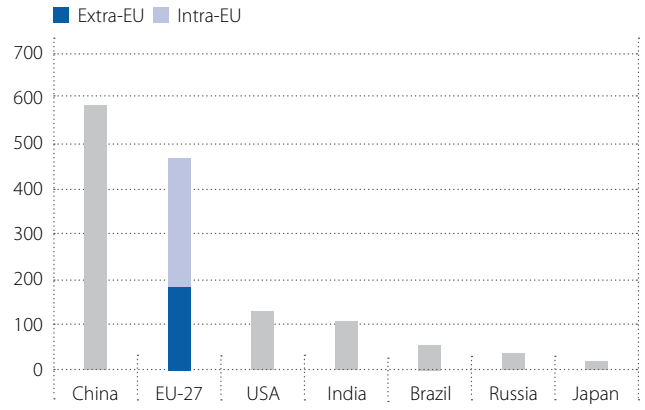
Exports of chemical products (2006)



Source: WTO, International Trade Statistics (2007)

Note: EU-27 excluding Bulgaria and Romania

Inward FDI projects in chemicals (January 2003 – May 2008) [absolute numbers]



Source: fDi Markets (July 2008)

Note: EU-27 excluding Cyprus, Malta and Slovenia; FDI projects include only greenfield and expansion investments

In 2006, extra-EU **exports of chemical products** accounted for USD 234.8 billion, making Europe the leader of the group of selected regions. The USA came second with USD 135.4 billion. Extra-EU chemical exports accounted for 19 percent of world chemical exports, whereas the USA recorded 11 percent, followed by Japan (5 percent), and China (4 percent).

Investments

Investments are one key element in securing the future of the chemical industry, spreading innovative technologies and adapting to the needs of the market place. China currently leads in attracting investments, as the chemical industry in China is at an embryonic stage and a large chemical production base has yet to be established there. This is in significant contrast to Europe, where a large chemical industry base has already been evolving for over 150 years.[1] Due to the importance of its location, Europe ranks second in terms of inward FDI projects in chemicals. Investment projects in the EU and the USA are mainly in the polymer, fine and special chemicals area, while China attracts more investment projects to develop base chemicals, refineries, and chemical infrastructure.

8.2

Arguments for Europe

The chemical industry has its origins in Europe. The large European market, which provides almost 500 million customers with upscale standards, can look back on a legacy of solid growth. The increasing demand for chemical products from growing industrial clients in the European countries is expected to provide substantial market impetus.

Furthermore, European chemical industry infrastructure is unparalleled, providing a complete and extensive network of pipelines for raw materials and chemical products (such as petroleum, ethylene, and propylene). A secure and stable energy supply provides an absolutely safe production environment. Europe has a well-defined legal framework that promotes the research, development, and production of high-quality products with high security standards. The great number of technology clusters and chemical parks allow for strong integration of companies within the industry.

As Europe puts more focus on a sustainable environmental framework, the European chemical industry has also become a research and development leader in resource preserving processes and products. It greatly contributes to climate protection through energy-efficient products and technologies in its own plants and as a supplier of components for many other industries as well as the end user.

Chapter 8.3

Food and Beverages

Introduction

The food and beverage industry refers to the production, processing and preserving of food and drink products. The complex value chain also includes their packaging and distribution. Continuing demographic trends and changes in consumption habits have tremendous impact on the challenges of feeding people. An aging population and changes in lifestyle facilitate the emergence of new consumption patterns, creating new health and convenience food market opportunities. The results of which are stable investments, particularly in innovation-intensive segments of this industry.

As companies in the food and beverage industry become more global, the flow of international investment in this activity steadily rises. FDI stocks in the food and beverage industry have increased sixfold between 1990 and 2005.[1] They currently represent 11 percent of the total FDI stocks worldwide in the manufacturing sector, thus occupying the third position after chemicals/pharmaceuticals and the motor vehicle industry.

Market Size and Structure

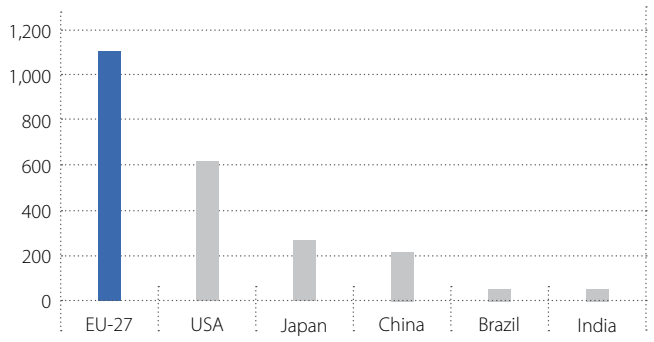
The European food and beverage industry benefits from a strong agricultural base, a huge domestic market that is both demanding and competitive, and a high-quality technical and logistics infrastructure. It accounts for over one-third of worldwide **production** in the sector with USD 1.1 trillion turnover in 2006.[2] Within the food and beverage industry, the EU-27 is the leading exporter worldwide – with 20.8 percent of the world market in 2006 – and the second largest importer after the USA.[3]

The most important sub-segments of the food and beverage industry are meat, dairy products, bread and pastry, and beverages, which amounted to not less than 60 percent of total EU-27 production in 2006.[4]

The food and beverage industry is the EU's leading industrial sector; accounting for some 14 percent of total EU-27 manufacturing turnover in 2006. In the same year, the industry employed 4.3 million people.[5]

Large European **multinational food and beverage companies** are very active in the international market. Nine of these are ranked among the 30 largest global groups. However, the bulk of the industry is made of small-and-medium-sized enterprises (SME): 61.6 percent of the EU-27 jobs in this activity came from companies with less

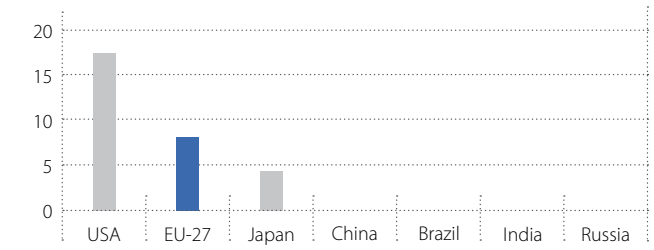
Production in the food and beverage industry (2006)
[billion USD]



Source: Confederation of the Food and Drink Industries of the European Union (2008)

Note: EU-27 excluding Cyprus and Malta; data for India based on estimates from the Indian Ministy of Food Processing Industries; no data available for Russia

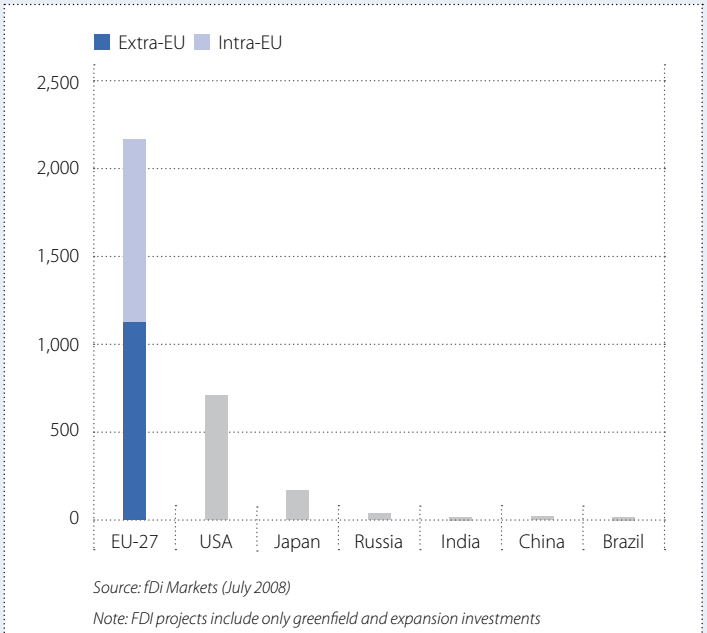
Top-30 multinational food and beverage companies (2006)
[absolute numbers]



Source: Confederation of the Food and Drink Industries of the European Union (2008)

Note: EU-27 excluding Cyprus and Malta; data for India based on estimates from the Indian Ministy of Food Processing Industries

Outward FDI projects in the food and beverage industry (January 2003 – May 2008)
[absolute numbers]



Source: fDi Markets (July 2008)

Note: FDI projects include only greenfield and expansion investments

than 250 people in 2004, a percentage slightly higher than for the manufacturing sector as a whole at 58.9 percent.[6] Due to the number of SME, the European food and beverage industry is a fragmented market with relatively easy access to entry that provides appealing potential for future investors.

Investments

The strength of the European food and beverage industry has enabled companies to put in place ambitious global development strategies, based on two approaches.

One strategy is expanding in Europe itself, in order to take advantage of the local business opportunities such as the creation of a single market and the opening of Eastern European countries. They also carry out an in-depth region-wide restructuring of production and distribution channels, previously restricted by national borders. As a consequence, more than 1,000 intra-EU FDI projects were announced between 2003 and 2008 by European companies in the EU-27 region.

The other strategy is expanding presence overseas in order to increase sales in the large markets of advanced economies, and to take advantage of the new market opportunities popping up in emerging countries. Almost 1,200 extra-EU **outward FDI projects** been have

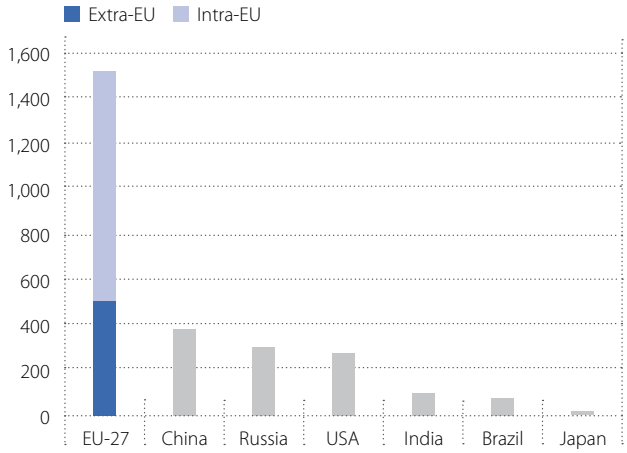
announced overseas by European companies since 2003. As a consequence, EU-27 companies are by far the largest international investors in the food and beverage industry – far ahead of their main followers, the US companies.

During the past five years, the EU-27 has been the leading destination for greenfield investments in the food and beverage industry worldwide, with more than 500 of total **inward FDI projects** announced by investors from outside Europe.

Arguments for Europe

Several factors have combined over the past 15 years to create a very large flow of international investment into the European food and beverage sector. The EU-27 is by far the largest integrated market in the world. It offers interesting business opportunities in some quickly-growing segments such as the growing focus on health and wellness food. In addition, overseas investors can find in Europe a very favorable business environment in many respects: access to large agricultural resources and pools of skilled labor, technical expertise and R&D capabilities, a strong industrial base, and a diversified network of suppliers.

Inward FDI projects in the food and beverage industry (January 2003 – May 2008)
[absolute numbers]



Source: fDi Markets (July 2008)

Note: FDI projects include only greenfield and expansion investments

Chapter 8.4

Information and Communications Technology

Introduction

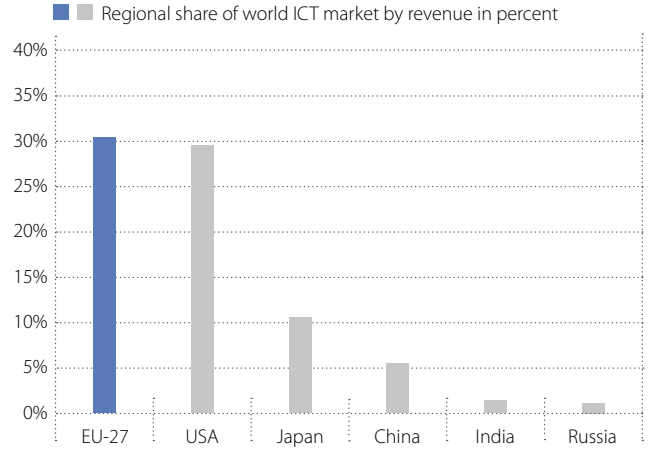
For over 20 years the information and communications industry (ICT) has been effecting structural change and economic transformation within the EU.[1] The ICT industry comprises five major segments: IT equipment, IT services, software, telecom equipment, and carrier services.[2] ICT is a facilitator of organizational innovation and more efficient processes in companies. An efficient ICT infrastructure allows for higher productivity in all company business areas and related sectors, including the public sector. In particular, high-tech and knowledge industries, such as aerospace, pharmaceuticals, or automotive, increasingly rely on ICT to enhance products and competitiveness. These industries are at the forefront of ICT adoption and ICT-enabled innovation, often due to close cooperation with the ICT industry.

Market Size

From a global perspective, Europe has the biggest **ICT market** with a 30.3 percent share of worldwide ICT revenues. The USA follows closely behind with a share of 29.3 percent. The Asian markets of Japan and China currently represent 11 percent and 5.7 percent of global ICT revenues. Per capita ICT spending in countries like China and India is far below European levels, however, given their higher growth rates, these countries are gradually catching up.[3]

With around 60 percent of the overall ICT market, the **market for telecommunications** represents the largest segment.[4] The European countries are leading with a total market share of 28.6 percent, closely followed by the USA with 24.5 percent. The wireless communications sector in particular has established a stronghold in Europe. This trend is set to continue due to new technologies (such as Universal Mobile Telecommunications System - UMTS) and standards (High-Speed Downlink Packet Access - HSDPA) in the European telecommunications market.[5]

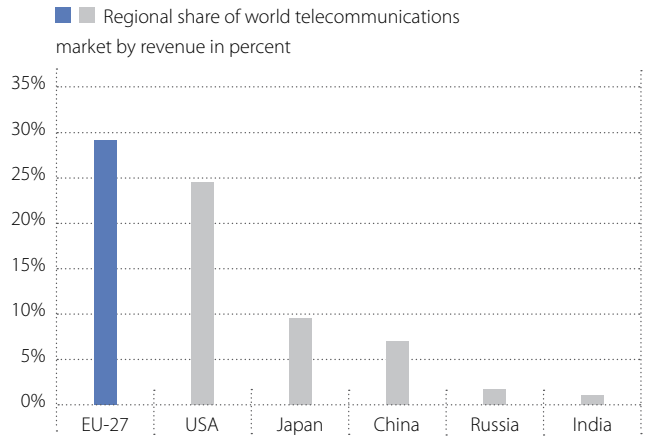
World market for ICT (2007)



Source: European Information Technology Observatory (July 2008)

Note: EU-27 excluding Cyprus and Malta; no data available for Brazil

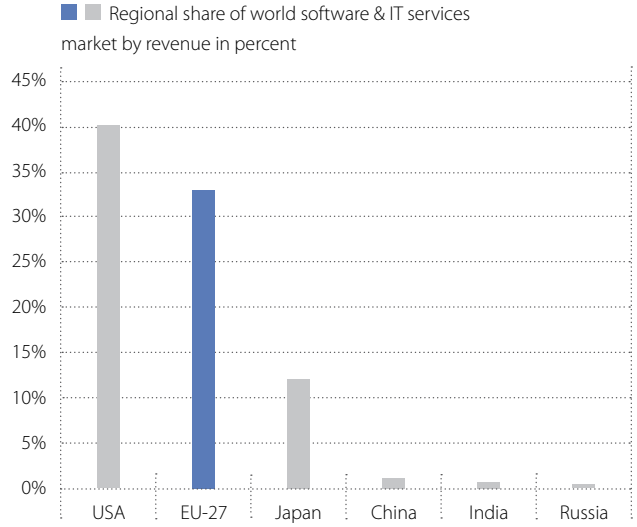
World market for telecommunications (2007)



Source: European Information Technology Observatory (July 2008)

Note: EU-27 excluding Cyprus and Malta; no data available for Brazil

World market for software & IT-services (2007)



Source: European Information Technology Observatory (July 2008)

Note: EU-27 excluding Cyprus and Malta; no data available for Brazil

The European ICT market has experienced steady growth rates which stood at 3.6 percent in 2007.[6] In particular, the European **market for software and IT services** grew at above average levels of 5.8 percent and 6.5 percent (2007) respectively.[7] Software and IT services refer to business services very close to the needs of the customer and support complex operational procedures. These segments are of great importance for companies as they further improvements in business processes. The European market is the second largest market worldwide with a market share of 33.2 percent. The USA is leading the market for software and IT services, generating a global market share of 40 percent. Both regions host many multinational company headquarters dependent upon an excellent ICT software and services network and infrastructure. High safety standards and effective intellectual property protection regimes support the development of this market, especially in Europe.

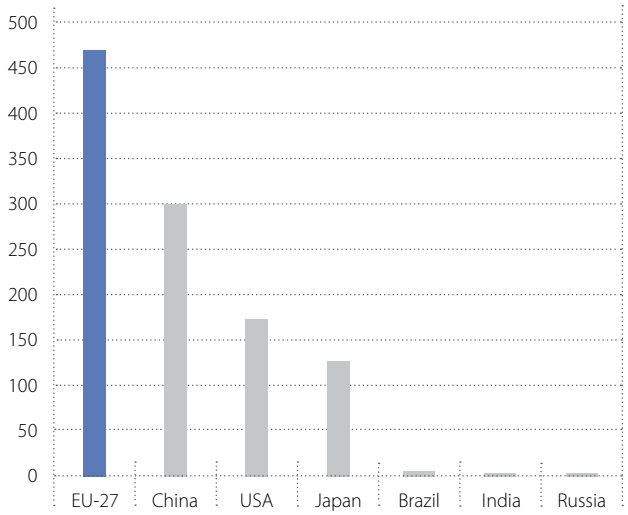
8.4

Exports

ICT goods can be classified into five broad categories: telecommunications equipment, computer and related equipment, electronic components, audio and video equipment, and other ICT goods.[8] Europe leads the way in the **export of ICT goods** with USD 466 billion in 2006. China follows, exporting USD 299 billion of ICT goods. When trade figures are broken down into types of goods, China dominates as an assembler of ICT equipment importing electronic components for the audio, video, computer, and telecommunications equipment it manufactures.[9] The USA and Japan export USD 169 billion and USD 125 billion of ICT goods respectively.

The USA and Europe continue to be technology leaders in most fields of ICT, as they have already invested a significant stake in research and development in this industry. According to OECD statistics, the USA filed some 33.6 percent of ICT-related patents under the Patent Cooperation Treaty (PCT). 25 European member countries took a 27.8 percent share. Japan follows with a 20 percent share, while China lags behind with only 2.5 percent of ICT patents filed under the Patent Cooperation Treaty.[10]

Exports of ICT goods (2006)
[billion USD]



Source: OECD, Economic, Environmental and Social Statistics (2008)
Note: EU-27 data includes intra-EU and extra-EU exports

Arguments for Europe

Market share data on the ICT sectors have shown that Europe provides one of the largest markets for ICT technology and applications. The many national and multinational companies located in Europe correspondingly benefit from excellent telecommunications and IT and software services, provided by many renowned ICT companies which operate in Europe and produce at the highest quality levels.

In addition, the European ICT infrastructure is of a very high standard: IT networks have high data volumes as well as data speed capacities and function without disturbance. Network coverage is high and reaches consumers in all geographical regions. As a result, Europe's internet users – whether private individuals or companies – are highly linked to the ICT infrastructure, and are able to work in a safe IT environment. This safety contributes to the development of new technologies and applications such as embedded systems, biometrics, service-oriented architecture (SOA), Software-as-a-Service (SaaS) and internet Protocol Television (IPTV).[11] The high confidence levels placed in European IT security and innovative payment systems facilitate swift e-business development.

8.4

Because the ICT industry has its origins in the USA and Europe, companies are able to find many well-established research and development centers and highly qualified ICT-related employees, scientists and technicians to further their business growth and innovation. One new trend partly led by research and development in Europe is the field of "Green IT". The term refers to the energy-efficient usage and optimization of IT systems for "cleaner" information and communication technology and a reduction of CO_2 emissions, (for example, from data centers and server farms). Several other fields for development have been identified and are promoted within EU incentive programs to ensure industrial leadership: pervasive and trusted network and service infrastructure; cognitive systems, interactive environments and robots; higher performance and reliable components, subsystems, and embedded systems.[12]

Chapter 8.5

Medical Technology and Pharmaceuticals


©Dirk Reinartz – sanofi-aventis

Introduction

In a globalized world where technology breakthroughs are constantly occurring, developments in science and medicine find ever more effective and innovative ways to deal with disease. These help improve the quality of life in our societies.

Medical technology refers to the diagnostic or therapeutic application of science and technology to improve the management of health conditions. The pharmaceutical industry handles the development, production and supply of pharmaceutical products. The industry's activities cover the full spectrum; from the ultra-high research and development segment through to the production of the generic medicines.

Worth an estimated USD 712 billion in 2007, the worldwide pharmaceutical market is rapidly expanding, experiencing an annual growth rate of around 7 percent over the past three years.[1] Innovation is essential for the survival of pharmaceutical laboratories faced with stiff competition from generic drugs and the introduction of newer pharmaceutical products. Laboratories not only invest heavily in R&D, but also have many international investment projects. These projects are motivated by the necessity of gaining access to the major markets and the best technological and scientific resources.

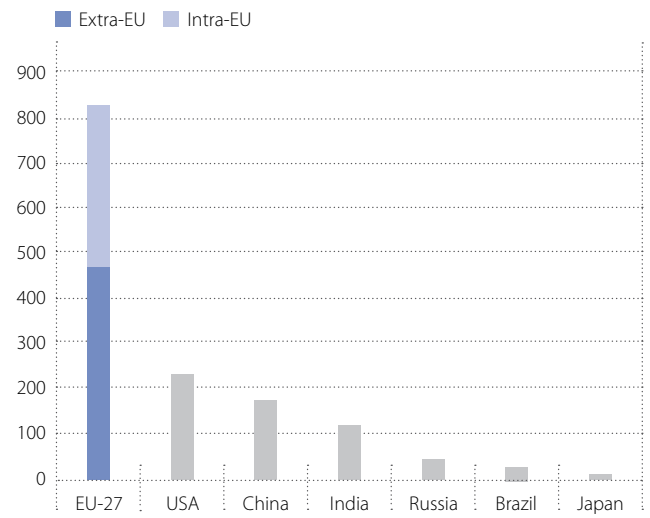
Investments

For the first quarter 2003 to first quarter 2008, the global investment database of fDi markets lists more than 470 extra-EU **inward FDI projects** in the European Union health sector. Intra-EU projects represent about 42 percent of the total international projects in health within the European Union. The results place the EU-27 first, far ahead of the USA (236 projects) and China (170 projects). Out of the three subsectors included in health (medical devices, pharmaceuticals, and healthcare), pharmaceuticals represent more than 55 percent of the European projects and medical devices almost 30 percent. The pattern of distribution is very similar in the USA and in China. India, Russia, Brazil and Japan are a considerable way behind the leaders.

Market Size

According to IMS Health, in 2007 the European Union was the second largest pharmaceuticals market in terms of global demand, representing 30.5 percent. It trailed only the United States (42.7 percent), but far surpassed Japan (8.7 percent). **Expenditures for medication** (equivalent to pharmaceutical expenditures) make up an increasing share of health costs in many developed countries. The main factors explaining this trend are the incremental consumption of medicines re-

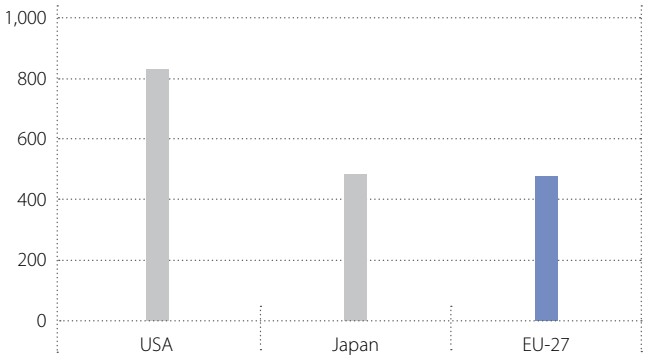
Inward FDI projects in the health sector (January 2003 – May 2008)
[absolute numbers]



Source: fDi Markets (July 2008)

Note: Health sector includes healthcare, medical devices and pharmaceuticals; FDI projects include only greenfield and expansion investments; EU-27 excluding Malta

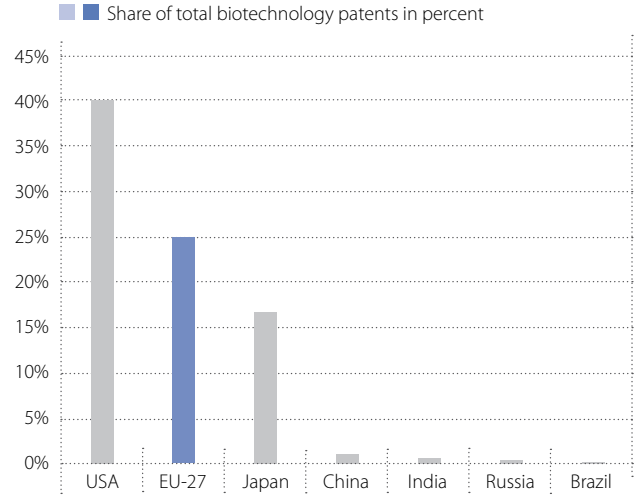
Expenditures for medication per person (2006)
[per person in USD at PPP]



Source: OECD, Health Data (2008)

Note: EU-27 excluding Belgium, Bulgaria, Cyprus, Estonia, Greece, Latvia, Lithuania, Malta, Romania, Slovenia and United Kingdom; expenditures include medication and other non durable medical products; data for Japan is from 2005; no data available for Brazil, China, India, Russia

Biotechnology patents (2005 or latest available year)



Source: OECD, Patent Database (May 2008)

Note: Patents filed under Patent Cooperation Treaty

sulting from demographic aging and the launch of new products. Medical improvements and a higher quality of life contribute to create a population which is living longer than ever before. Correspondingly, this aging population consumes more medicines. According to OECD statistics,[2] pharmaceutical expenditures per person in real value increased 50 percent from 1995 to 2005 in the OECD. With USD 477 per person in 2006, the European Union is close to Japan (USD 489 per person) in terms of pharmaceutical expenditure per person. The United States ranks far ahead with pharmaceutical expenditures per person reaching USD 843 in 2006.

Innovation

Biotechnology refers to any technological application that uses biological systems, living organisms, or derivatives thereof to make or modify products or processes for specific use. It not only plays a major role in health industries, but also in environment, agriculture, food and beverage sectors, and in the application of innovative industrial processes. In addition, biotechnology is a key element in the discovery of new treatments. As research in biotechnology requires important research and development expenditures, **biotechnology patents** have taken on much greater significance. According to the OECD, the EU-27 share of biotechnology patents filed under the Patent Cooperation Treaty in 2005 is around 25 percent.

As such, the EU ranks behind the USA which has a share of around 39 percent. The USA, the EU and Japan share most of the world's biotechnology patents. Conversely, countries like China, India, Russia, and Brazil are well behind. Moreover, it is important to point out that biotechnology patents are particularly significant as they serve a dual function: first of all, the traditional patent function to protect innovation; and secondly, the coordination functions between different players such as firms and academics.

Arguments for Europe

Europe is a global leader in the pharmaceutical industry and is internationally recognized for its skilled researchers, capacity for innovation, and long history of healthcare achievement. Research in life sciences is booming, driven by partnerships between some of the world's best laboratories and biotechnology companies. According to Eucomed, the voice of the medical technology industry in Europe, the European medical technology industry invests USD 4.7 billion in research and development and employs almost 445,000 highly skilled workers.[3] The expansion of the European Union has created further opportunities for pharmaceutical companies seeking to take advantage of these high growth emerging markets.

Chapter 8.6

Renewable Energy

Introduction

One of the major challenges of the 21st century is the enduring supply and economical usage of energy. While the industrialized world and the emerging markets have a growing demand for resources and energy, it remains nevertheless a global objective to minimize energy consumption in order to alleviate the negative impact on the environment (e.g. greenhouse effect) and minimize dependency on energy sources (e.g. oil, gas and coal).

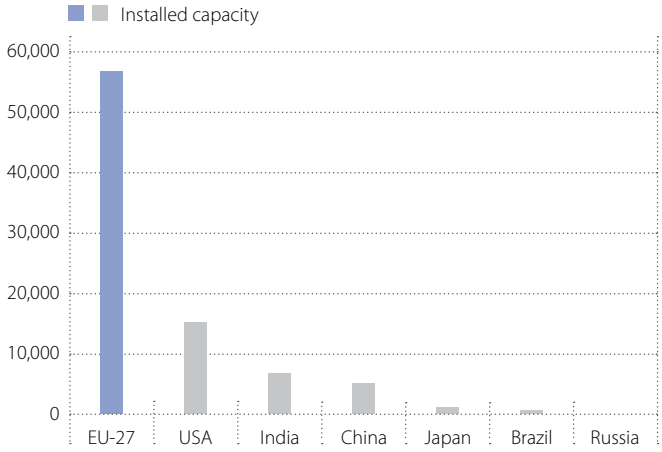
Renewable energy has already become a vital industry worldwide. Global renewable energy capacity has shown tremendous growth rates in the past years. From 2002 to 2006 its capacity grew between 15 to 30 percent on average every year.[1] Today, 18 percent of global final energy consumption is supplied by renewable energy, of which a significant amount is supplied by traditional renewable technologies such as traditional biomass and large hydropower. A quickly growing share of the world's final energy consumption is also generated by new renewable technologies, such as small hydro, modern biomass, wind, solar, geothermal, and biofuels. These areas are seeing marked growth in developed countries and in some developing countries.[2] They are very important, as they account for technologies which mainly use energy sources that replenish naturally, such as wind, sunlight, water, and geothermal heat.

Market Size

Europe in particular has put enormous emphasis on the development of renewable industries and has created the business and regulatory framework for its advancement. The EU has opted for complex environmental targets: one of which is a 20 percent share of its energy supply from renewable energies by 2020.[3] Many market incentive programs in the various European countries account for this target, which help to increase the share of renewable energy substantially. As the capacities of large hydropower become saturated, many economies focus on increasing the share of new renewable energies in the electricity supply. As seen in chapter seven on sustainable development, the EU-27 countries are leading the way with new renewable energies.

Wind power is among the largest components of renewable energy generation capacity and grew by 28 percent worldwide in 2007.[4] Europe has contributed greatly to a higher share of wind power production. In 2007, it installed wind parks with a total capacity of 56,524 MegaWatt (MW), and is thus the leading global market for this technology. The USA follows with a capacity of 16,818 MW. India is leading the Asian markets with an **installed wind energy capacity** of 7,850 MW, ahead of China (5,912 MW) and Japan (1,538 MW). A new technology which takes into account the limited resources of available space for onshore wind parks

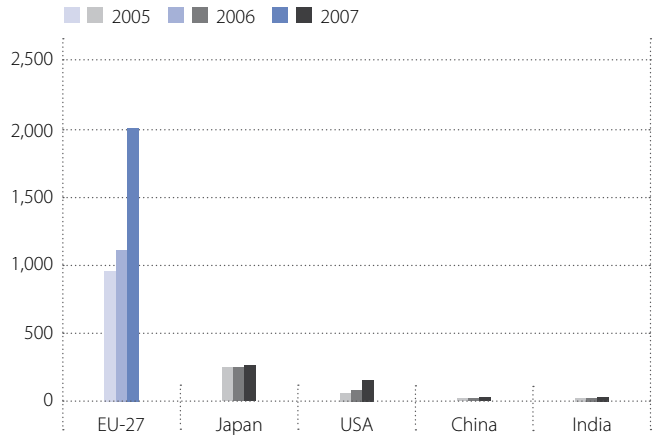
Installed wind energy capacity (2007)
[MW]



Source: World Wind Energy Association (2008)

Note: EU-27 excluding Cyprus, Malta and Slovenia

New installed energy capacities from solar energy
[MW peak]



Source: Sarasin, Solarenergie (2007)

Note: Data for 2007 are estimates; no data available for Brazil and Russia

is currently being explored in Europe. Offshore wind power technologies have become a promising field for the future of wind power. Many European countries have started setting up their first offshore wind parks. Studies have shown that these technologies are ecologically sound and comply with the stricter ecological framework in Europe.

The fastest growing energy technology worldwide is grid-connected solar photovoltaics.[5] Europe has developed to be the leading market for photovoltaic technologies, accounting for 50 percent of the global cumulative installed capacity.[6] In terms of **new installed energy capacity from solar energy**, European countries have installed more than two to three times the amount of new photovoltaic capacities of the USA, China, and Japan together. With its early engagement in the sector and favorable feed-in-tariff systems, Europe has developed to be one of the most important and dynamic markets in photovoltaics. For this reason, many foreign and domestic companies have opened their business doors in Europe in order to be involved in this industry and to benefit from the well-developed market structures. Experienced companies with a long history in photovoltaics have established clusters and research centers and are engaged at all levels of the value chain: from equipment supply to system integration. Currently, Europe is also making significant advances in topics including solar thermal power plants, heat pumps and geothermal energy.

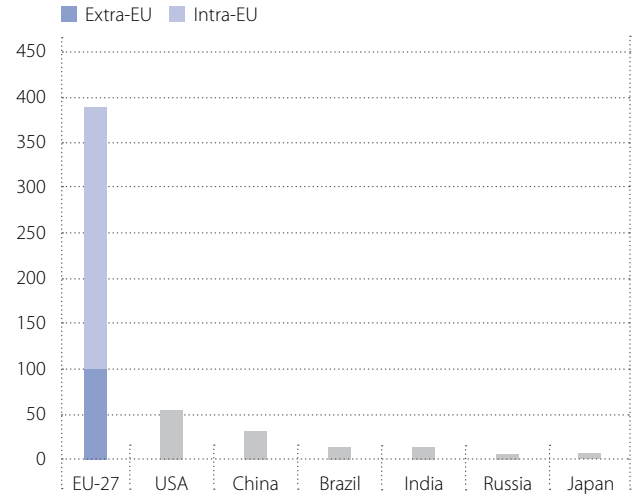
Investments

Asian countries are showing great interest in the industry and are starting to have a significant production base. However, Europe remains the technology leader in the field of renewable energies. Many renewable energy technologies are being researched and explored in Europe. This is witnessed by the many **inward FDI projects in renewable energies** in this region. The USA ranks second and China third in attracting renewable energy FDI projects into their countries.

Arguments for Europe

These examples show that Europe is one of the leading markets for renewable energy technologies. It is a vital machinery and equipment production location, as the environmental framework and climate targets of the EU remain unparalleled. Europe has created an outstanding set of market incentive programs for the renewable energy sector which has inspired a large amount of research and development and project implementations. Investors will find an extensive network of institutes and universities for the development of new technologies and the education and training of many engineers and technicians in renewable energies. Many existing industry clusters make provision for technological cooperation, a network of experienced suppliers, and efficient distribution channels.

Inward FDI projects in the renewable energy industry (January 2003 – May 2008)
[absolute numbers]



Source: fDi Markets (July 2008)

Note: FDI projects include only greenfield and expansion investments

Notes

Chapter 01

[1] Unless otherwise mentioned, all the macroeconomic data displayed in this chapter are taken from the World Economic Outlook Database of The International Monetary Fund (June 2008).

[2] e.g. less than 15 years old.

Chapter 03

[1] Eurostat (2008)

[2] OECD Science, Technology and Industry Scoreboard 2007; Human resources in S&T in non-OECD economies, http://lysander.sourceoecd.org/vl=1025909/cl=12/nw=1/rpsv/sti2007/b-10.htm (2008)

[3] BRIC countries refer to Brazil, Russia, India and China

[4] OECD Labour database, Average usual weekly hours worked on the main job, http://stats.oecd.org/wbos/Index.aspx?DatasetCode=AVE_HRS (2008)

[5] OECD Statistics database, GDP per hour worked index, 2000=100, http://stats.oecd.org/wbos/Index.aspx?DatasetCode=AVE_HRS (2008)

Chapter 04

[1] OECD Glossary, http://stats.oecd.org/glossary/detail.asp?ID=3111; http://stats.oecd.org/glossary/detail.asp?ID=6865 (2008)

[2] EU Lisbon Strategy, http://ec.europa.eu/growthandjobs/key/research-and-development/index_en.htm (2008)

[3] OECD Patent Database, http://www.olis.oecd.org/olis/2004doc.nsf/LinkTo/NT00000EA2/$FILE/JT00160184.PDF (2008)

[4] OECD Science, Technology and Industry Scoreboard 2007, http://titania.sourceoecd.org/vl=547934/cl=23/nw=1/rpsv/sti2007/d-1.htm (2008)

[5] World Bank, Global Integration and Technology Transfer (2006)

Chapter 05

[1] ESPO, Annual Report (2006-2007)

[2] Drewry Shipping Consultants, http://www.thehindubusinessline.com/2008/01/07/stories/2008010750230600.htm (2008)

[3] International Bank for Reconstruction and Development, The Investment Climate in Brazil, India, and South Africa: a construction for the IBSA debate (September 2006)

Chapter 07

[1] UNCED Rio Declaration 1992, http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm (2008)

[2] Deutscher Naturschutzring – EU Koordination, http://www.eu-koordination.de/index.php?page=31 (2008)

[3] Deutscher Naturschutzring – EU Koordination, http://www.eu-koordination.de/index.php?page=31 (2008)

[4] Deutscher Naturschutzring – EU Koordination, http://www.eu-koordination.de/index.php?page=33#Verweis_14 (2008)

[5] Carbon Dioxide Information Analysis Center (CDIAC), http://cdiac.ornl.gov/trends/emis/tre_rus.htm (2008)

[6] Deutscher Naturschutzring – EU Koordination, http://www.eu-koordination.de/index.php?page=33#Verweis_14 (2008)

Chapter 8.1

[1] UNCTAD (2007)

[2] European Automobile Manufacturers Association (ACEA, 2008)

[3] Motor vehicles refer to passenger cars, light commercial vehicles, heavy trucks, coaches and buses; ACEA (2008)

[4] ACEA (2008)

[5] ACEA (2008)

[6] International Organization of Motor Vehicles Manufacturers (2008)

Chapter 8.2

[1] BASF was founded in 1865. Bayer was founded in 1863.

Chapter 8.3

[1] UNCTAD (2007)

[2] Confederation of the Food and Drink Industries of the European Union (2008)

[3] The World Bank, WITS database (intra-European trade excluded, 2007)

[4] Eurostat (2007)

[5] Eurostat (2007)

[6] Eurostat (2007)

Chapter 8.4

[1] European Commission, European Competitiveness Report 2006, http://ec.europa.eu/enterprise/ict/policy/ict/euro_comp_report_2006.pdf

[2] European Information Technology Observatory (EITO), www.eito.com (Summer Autumn Update 2007)

[3] Bitkom (2008)

[4] EITO, www.eito.com (July 2008)

[5] EITO, www.eito.com (2007)

[6] EITO, www.eito.com (July 2008)

[7] EITO, www.eito.com (July 2008)

[8] OECD, Science, Technology and Industry Scoreboard, http://puck.sourceoecd.org/vl=14857967/cl=14/nw=1/rpsv/sti2007/e-13-b.htm (2007)

[9] OECD, Science, Technology and Industry Scoreboard, http://puck.sourceoecd.org/vl=14857967/cl=14/nw=1/rpsv/sti2007/e-13-b.htm (2007)

[10] OECD, Science, Technology and Industry Scoreboard, http://masetto.sourceoecd.org/vl=840620/cl=12/nw=1/rpsv/sti2007/ge15-1.htm) (2007)

[11] Software as a service (SaaS) refers to the model of delivering and maintaining software to the end user via internet; Internet Protocol Television (IPTV) refers to the digital transfer of television programs using internet protocol over a network infrastructure, e.g. internet television.

[12] EITO, www.eito.com (2007)

Chapter 8.5

[1] IMS Health (2008)

[2] OECD, Health at a Glance (2007)

[3] Eucomed (2008)

Chapter 8.6

[1] Renewable Energy Policy Network for the 21st Century (REN 21, 2007)

[2] REN 21 (2007)

[3] European Commission, http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/08/33 (2008)

[4] REN 21 (2007)

[5] REN 21 (2007)

[6] European Photovoltaic Industry Association, http://www.epia.org/fileadmin/EPIA_docs/publications/epia/EPIA__MarketPublication_18feb.pdf (2008)

Methodology

General Notes

Country set of comparisons

The purpose of the European Attractiveness Scoreboard is to compare the performance of the EU-27 with its main competitors in terms of international investment attractivity. These competitors include the major advanced economies, but also the largest emerging countries. Therefore, in addition to the USA and Japan, the comparison sample includes the four so-called BRIC countries: Brazil, Russia, India and China. China refers to mainland China, excluding Taiwan and Hong Kong.

Borders of the EU

The EU-15 refers to the 15 countries in the European Union before the expansion on May 1st, 2004: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom. In May 2004, 10 new countries joined the union forming the so-called EU-25: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia. Most recently, Bulgaria and Romania joined the bloc on January 1st, 2007, forming the EU-27.

Calculation of averages

Where overall data at the EU-27 level were not available, averages were calculated on the basis of national data. It should be noted that average values sum up a wide range of national figures and situations above and below the average, thus revealing the diversity and heterogeneity of European countries. Some sources have provided the national data indicators in ratios. In this case, the nominal number for the indicator was calculated first. For example, personal computers (PCs) per 1,000 inhabitants: the total population of each country was first used to identify the total number of PCs per economy. The average for the EU was then calculated with the sum of PCs of the EU divided by the total population of the EU.

Calculation of historical comparisons

When historical comparisons were made, especially for the calculation of growth rates, a constant boundary was maintained for the EU over the period in question (i.e. the EU-27) in order to avoid distortions due to the incremental enlargement of the EU.

Calculation of international trade and investment

Extra-EU-27 inflows and outflows were taken into account for international comparisons and rankings in order to avoid distortions. Other internal flows are not taken into account for other economic regions (e.g. trade flows between states within the USA). Nevertheless, intra-EU-27 flows were also mentioned as an additional information, providing further evidence of the ongoing integration process of the EU-27 economies.

Data on FDI (greenfield) projects

Data were mainly retrieved from the fDi Markets database developed by OCO Consulting, (now managed by Financial Times Business). This database tracks FDI cross-border greenfield projects (including expansion), covering all sectors and countries worldwide. It provides real-time monitoring of investment projects, capital investment and job creation.

See individual indicators for detailed information.

Chapter 02

Total FDI data (stocks and flows) are calculated according to the United Nations Conference on Trade & Development (UNCTAD) sources. The share of extra-EU-27 data are calculated using figures from Eurostat.

High-technology exports (2006)

Eurostat measures high-tech exports on the basis of industry codes. They include electronics, telecommunication, aerospace, scientific instruments, computers and office machines, pharmacy and other (electrical machinery, chemistry, non-electrical machinery and armament).

Chapter 03

Foreign students in tertiary education (2005)

The proportion of students abroad is based only on the total of students enrolled in countries reporting data to the OECD and UNESCO Institute for Statistics. Students are classified as foreign students if they are not citizens of the country in which the data are collected. Data on foreign students are obtained from enrolments in their countries of destination. Tertiary education: the OECD computes the data following the definition from the International Standard Classification of Education (ISCED). Tertiary-type A programs (ISCED 5A) are largely theory-based and are designed to provide sufficient qualifications for entry to advanced research programs and professions with high skill requirements. Programs have a minimum cumulative theoretical duration (at tertiary level) of three years' full-time equivalent. Tertiary-type B programs (ISCED 5B) are typically shorter than those of tertiary-type A and focus on practical, technical or occupational skills for direct entry into the labour market. They have a minimum duration of two years full-time equivalent at the tertiary level. (For more information see http://www.unesco.org/education/information/nfsunesco/doc/isced_1997.htm)

Working hours (2006)

The average number of working hours per year includes paid holidays and legal public holidays. The average is weighted with 13 occupations (excluding teachers). The EU-27 (excluding Cyprus, Latvia and Malta) average was calculated from the average numbers of working hours per year from 2006.

Working days lost due to strikes (average 2004 – 2006)

The number of days not worked as a result of strikes and lockouts is measured in terms of the sum of the actual working days during which work would normally have been carried out by each worker involved had there been no stoppage. These data excludes the public sector. A strike is a temporary work stoppage effected by one or more groups of workers with a focus on enforcing or resisting demands or expressing grievances, or supporting other workers in their demands or grievances. A lockout is a total or partial temporary closure of one or more places of employment, or the hindering of the normal work activities of employees, by other employers with a view to enforcing or resisting demands or expressing grievances, or supporting other employers in their demands or grievances. Due to different definitions and regulations, individual country data differ: Brazil and Romania: strikes only; Belgium and France: excluding public sector; Germany: excluding public administration; Russia: average from 2003-2005; India: average from 2002-2004; Portugal and Austria: average 2003-2005; France: average from 2002-2004.

Tertiary graduates in science and technology

Data for the EU-27 are based on all EU-27 member countries for 2001-2005. The indicator is calculated by dividing the number of graduates (of all ages) in tertiary education in the fields of science, mathematics and computing and engineering, manufacturing and construction by the population aged 20-29 and then multiplying by 1,000. The OECD computes the data following the definition from the International Standard Classification of Education (ISCED). For a definition of tertiary education please see notes on the indicator "Foreign students in tertiary education (2005)". For China, the Ministry of Science and Technology of the People's Republic of China provides data of national students in regular institutions of higher education by field of study. Data of engineering and science graduates were used to calculate the Science & Technology graduates indicator. Data for the population aged 20-29 years were provided by the Statistical Yearbook of People's Republic of China.

Chapter 04

R&D expenditure (2005)

Research and development is a term covering three activities: basic research, applied research, and experimental development. In comparison, an innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations. (For further information see http://stats.oecd.org/glossary)

Business expenditure on R&D (BERD, 2005)

The main aggregate used for international comparisons on R&D expenditures is gross domestic expenditure on R&D (GERD). This consists of the total expenditure (current and capital) on R&D by all resident companies, research institutes, university and government laboratories, etc. It excludes R&D expenditures financed by domestic firms but performed abroad. The share of GERD that accounts for the private sector is called business expenditure on R&D (BERD). BERD can be differentiated in government-financed BERD or privately financed BERD.

Scientific production measured by papers and citations (2006)

The Observatoire des Sciences et des Techniques (OST) is primarily focused on the conception and production of indicators for use in describing and analyzing scientific, technological, and innovation activities. OST works with the Web of Science of ISI-Thomson Scientific bibliographic database. The Web of Science keeps track of more than 7,000 journals covering all disciplines.

Development in triadic patents (1985 – 2005)

In order to remedy the discrepancies attributable to differences between patent systems (and thus limit bias in international comparisons), the OECD has introduced the concept of "triadic patent families" (or "triadic patents"). Triadic patent families are a set of patents applied for at all three of these major patent offices – the European Patent Office (EPO), the Japan Patent Office (JPO) and the United States Patent and Trademark Office (USPTO). Triadic patents refer to patent families, which are defined as a set of patents taken in various countries (i.e. patent offices) to protect the same invention. Triadic patent family counts are attributed to the country of residence of the inventor and to the date when the patent was first registered.

Chapter 05

Air transportation measured by passengers carried (2005)

Main companies are members of the International Civil Aviation Organization only. Data refer to international and domestic flights.

Internet users (2007) and user growth (2000 – 2007)

For calculation of annual growth rate (2000-2007) CAGR was used.

Electricity transmission and distribution losses (2005)

Electric power transmission is the bulk transfer of electrical power. Typically, power transmission is between the power plant and a substation near populated and industrial areas. Electricity distribution refers to the delivery of electricity from the substation to the consumer.

Chapter 06

The EU-27 averages for indicators derived from the World Bank's Doing Business report have been GDP-weighted from International Monetary Fund (IMF) 2007 data. The World Bank data are indices on a specified scale and the indicators do not account for different economic backgrounds within the EU. The GDP weighting takes into account the significance in terms of market size. This method considers in particular the investment motive of the market-seeking investor.

Several indicators measure the "number of procedures". Procedures refer to all interactions between the business founder and a third party (such as obtaining permits and licenses). The time required to gather all of the information is not considered.

Labor flexibility (2007)

Dismissal costs are calculated on the basis of salary per week. A score of 0 corresponds to the cost of 0-8 weeks of salary. For each additional week of salary a score of 1 is added. For example, a score of 12 indicates dismissal costs of 8+12 weeks of salary (a total of 20 weeks of salary).

Corporate tax rates (2007)

Simple average tax rates are used according to the international economic approach. Since the European Union does not follow a common tax policy this comparison can give only a rough overall picture.

Chapter 07

Carbon dioxide emissions (2004) and changes (1990 – 2004)

All EU-27 countries were considered when calculating figures for the year 1990 and 2004. For „Change of CO_2 emissions", the nominal figures were used.

Chapter 8.4

The indicators "World market for ICT (2007)", "World market for telecommunications (2007)", and "World market for software and IT services (2007)" represent revenues generated from ICT expenditures in the respective region, regardless of where the ICT company is located. Data from the European Information Technology Observatory (EITO) are available from www.eito.com.

Exports of ICT goods (2006)

The OECD definition of the ICT manufacturing sector, based on ISIC Rev. 3, has been used as the basis for ICT trade indicators.

Chapter 8.5

Expenditures for medication per person (2006)

Total expenditure on health is the sum of both public and private spending on health goods and services. The public outlays themselves are categorized on the basis of the financing institutions: those financed through social security contributions, through various forms of taxation to various branches of government, and from external agencies, including both grants and loans. Private outlays, in turn, comprise private insurance premiums and prepaid schemes, mandated enterprise health expenditure, expenditure on health through non-profit health services, and direct payments or out-of-pocket expenditure in health goods, which include co-payments as well as direct disbursements by uninsured individuals.

Biotechnology patents (2005 or latest available year)

The Patent Cooperation Treaty (PCT) is an international patent law treaty concluded in 1970. It provides a unified procedure for filing patent applications to protect inventions in each of its signatory states. A patent application filed under the PCT is called an international application or PCT application.

Chapter 8.6

New installed energy capacities from solar energy

MegaWatt Peak (MWp) measures the nominal electrical capacity of photovoltaic installations under standard test conditions.

Acknowledgements

This study was carried out between January and August 2008 by a team of four parties:

ESCP-EAP Europäische Wirtschaftshochschule, Berlin, represented by Prof. Herwig E. Haase and research assistants Christoph Schmierer and Xiangyu Li.
ESCP-EAP European School of Management is a consortium of business schools owned by the Paris Chamber of Commerce and Industry with campuses in Germany, France, England, Spain, and Italy. It is the number one rated school of management in Germany according to the Financial Times annual ranking of business schools.

Ecole des Hautes Etudes Commerciales (HEC), Paris, represented by Prof. Michael Segalla
HEC School of Management is a founding member of ParisTech, a group of prestigious French engineering schools including the Ecole Polytechnique. It is the number one rated management school in Europe according to the Financial Times annual ranking of business schools. HEC is owned by the Paris Chamber of Commerce and Industry.

Invest in France Agency represented by Fabrice Hatem and Constance Arnaud
Invest in Germany represented by Ulrike Handtke and Anne Neumann

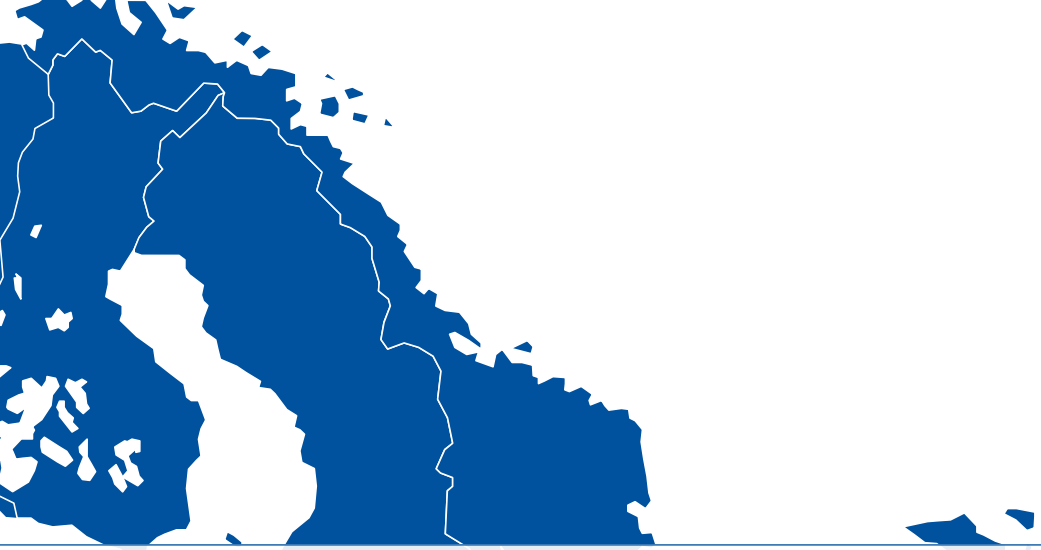
Contacts
Constance Arnaud (constance.arnaud@afii.fr)
Ulrike Handtke (handtke@invest-in-germany.com)
Fabrice Hatem (fabrice.hatem@afii.fr)
Anne Neumann (a.neumann@invest-in-germany.com)

Text and Translation
Invest in Germany, Invest in France Agency

Conception and Layout
Invest in Germany

Supported by
The German Federal Ministry of Economics and Technology

Note
All information provided by ***Invest in France Agency*** and ***Invest in Germany*** has been put together with the utmost care. However we assume no liability for the accuracy of the information provided.



Invest in France Agency is the national body responsible for promoting, prospecting and facilitating of international investment in France. It also coordinates initiatives promoting the appeal and image of France. The IFA network operates world-wide, with offices in France at both national and local level. It draws on the expertise of specialists in a range of disciplines based at its head office in Paris, as well as in offices in North America, Europe and Asia. In France, IFA works in partnership with regional development agencies to offer international investors outstanding business opportunities and customized services.

Invest in France Agency
77, boulevard Saint-Jacques
F-75014 Paris - France
T. +33 1 44 87 17 17
F. +33 1 40 74 73 27
www.investinfrance.org

Invest in Germany is the inward investment promotion agency of the Federal Republic of Germany. We assist and advise potential investors interested in Germany. Foreign enterprises planning to establish their business operations in Germany can obtain information on the business environment, such as the corporate investment framework, tax regulations, and subsidies. Our range of services includes strategic planning, market research and competitive analysis. Our experts provide comprehensive project management and support services from site selection to the final realization of the investment. All inquiries are kept confidential and our services are free of charge. We support investors from our headquarters in Berlin and from our offices in the US, China, and Japan.

Invest in Germany GmbH
Friedrichstraße 60
10117 Berlin
Germany
T. +49 30 200 099-0
F. +49 30 200 099-111
www.invest-in-germany.com