TIME TO CHOOSE

2003

KNOWLEDGE ECONOMY MONITOR

COLOPHON

Time to Choose

Knowledge Economy Monitor 2003

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Figure 5.6 and figure 8.3

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INTRODUCTION

1890, Herengracht 220, Amsterdam. Gerard Philips and the analytical chemist Jan Jacob Reesse fiddle with the biotechnology of their time: electrical lightning. Since his graduation from Delft Technical University seven years before Gerard Philips had worked with various German companies and at Lord Kelvin's research laboratory at the Glasgow College of Science and Arts. In 1891 he was able to buy several buildings at the Annasingel in Eindhoven with the financial help of his father Frederik, where he used his acquired knowledge to produce electric light bulbs. From 1895 onwards, when his brother Anton took charge of sales and marketing, the company expanded rapidly and became a world leader in electronics. Philips became one of Holland's major employers with a strong sense of social responsibility. However, during the 1970s, this social trend was reversed. Pressured by foreign competition, Philips chose to transfer its main production processes to other parts of the world. Nowadays most of the manual work takes place in countries where wages are significantly lower than those in the Netherlands. In addition, an increasingly large part of research and development (R&D) takes place abroad, although Philips remains the most important R&D investor in our country. The long-term presence of Philips in Eindhoven has allowed an extensive network of knowledge institutions to develop over the years, such as the Natlab, the Eindhoven Technical University, and a branch of TNO (Organisation for Applied Scientific Research). A host of small and large companies, some being supply industries of Philips, use this knowledge infrastructure. In addition, several companies have emerged as a result of Philips' own acquired knowledge, ASML (international leader in the field of production machines for microchips) being the most well known. All these networks together make Eindhoven one of the most important knowledge-based clusters in the EU. (EC, 2002b)

This one paragraph history of Philips includes many elements of the Knowledge Economy Monitor before you. The story provides a classical example of how knowledge advantage can be transformed into economic and social superiority. It all starts with a good idea, like Gerard and his friend's, that emerges from a fundamental understanding of a certain problem. Thanks to his father, the inventor Gerard could take action and turn himself into an entrepreneur. His brother Anton brought in the managerial and marketing skills that were necessary to make the company grow.

The story of Philips also illustrates why the knowledge economy is such a relevant theme today. Everybody knows that knowledge is the motor of economic progress. But difference is that since the 1970s, low-skilled work has left the Netherlands at a fast pace and has settled at places where labour costs are lower. We have become a country of knowledge-based industries and an ever increasing part of our employed population works as knowledge workers. This development accidentally came upon us, in the sense that we did not actively make efforts in that direction. However, just like with agriculture or industry it is possible to create optimal conditions that allow the knowledge economy to reach its full potential. This Knowledge Economy Monitor shows that countries that actively pursue the creation of conditions favourable to the knowledge economy score substantially better. These countries include the much appraised Finnish Model, but also regions of the United States, Sweden, Belgium, Ireland and South Korea.

The case of Philips is mentioned here for another reason as well. Philips goes back a long time and is, fortunately for the Netherlands, still going strong. However, when we look at the highly dynamic and innovative growth markets of the past thirty years, the absence of Dutch successes is disturbing. A few examples from abroad: in 1978, Microsoft was a small company that employed only fifteen people; in 1992, Nokia's mobile phone department counted for just ten percent of the company's total turnover; in 1964, Nike's founders were going around the American athletics tracks to have their shoes tested by local sportsmen. The list of successful young foreign enterprises is endless and the small number of Dutch examples in this field leads to the core of the problem: although the knowledge economy provides the breeding-place of future economic successes, the Netherlands still relies extensively on the achievements of the past. This represents an important risk for the country's welfare, because past profits do not provide any guarantees for the future.

Times are changing

Fortunately, times are changing. Also in the Netherlands, the knowledge economy has become a generally accepted concept over the past few years and the new government has placed the subject high on the political agenda. The coalition agreement of May 2003 states: 'Education and research form an essential base of society and the economy. (…) The Netherlands should belong to the European top regarding tertiary education, research and innovation.' The government's policy statement adds: 'The Netherlands stands at a crossroads. Will we resort to painful measures to accomplish economic recovery? Or will we let things go their way and sink into further depression? 'More work' also requires that the Dutch economy grows at a faster pace. In this process, capacity to innovate and industrial entrepreneurship are decisive factors. The government can contribute to this.' With the establishment of the Innovation Platform chaired by the Prime Minister an instrument has been created to realise this ambition. The government's policy statement for the Innovation Platform reads: 'It should be a catalyst that brings out the best in Holland. Not isolation, but innovation. Allow more space for creativity.'

These words come straight from our hearts. It is time to choose. The big question is: which choices do we have? How do we know if we are on the right track? And above all: what are we going to *DO*? The Knowledge Economy Monitor is intended as an assistant in this search. It provides a map of where we are today and a framework designed to measure future achievements. One could consider it a starting point. Moreover, this monitor offers building blocks for the political agenda of the coming years. The building blocks mentioned in this monitor are meant to stimulate the discussion about what will have to happen to boost the Dutch knowledge economy over the next years. The Innovation Platform will play an essential role in answering this question. Therefore, we present the first copy of this Monitor to the Prime Minister, who, as chairman of the Platform, plays a leading role in this process. We wish him the best of luck with this crucial task.

Set up

The monitor starts with a general overview of the development of the Netherlands over the past two decades. We will explain the phenomenon 'knowledge economy' and elements that relate to it. In the following chapters, these elements will be analysed more closely and Dutch achievements will be compared to other countries whenever possible. In the final chapter we summarize the most important conclusions and introduce material for further discussion.

Why we do this

The KnowledgeLand Foundation was founded in 1999 and aims to establish the Netherlands as one of the key regions of the international knowledge economy in an economically and socially responsible way. Simply because we think the Netherlands has got the potential, but it needs a common strategy and concrete actions to realise this. We dream of the Netherlands in 2010 (or sooner if possible!) as a country in which ideas and entrepreneurship flourish again. A country that allows everyone to acquire knowledge until they drop, an international hot spot for talented knowledge workers. A country where new technology is accessible to anyone, where young and old entrepreneurs fill the gap between academic laboratories and commercial business in no time. This requires excellent education, high-profile research, entrepreneurship at universities, industrial innovation, and broadband internet in every home. The KnowledgeLand Foundation helps companies, social organisations and local authorities to translate the knowledge economy into concrete action. Because at the end of the day, action speaks louder than words.

Our motto is: 'less policy, more action.' For once we will ignore this, just because a better picture is required of where the Netherlands stands now. This version of the Knowledge Economy Monitor 1.0 offers a fair amount of insight, but also still lacks information in certain areas. We hope to continue working on the Monitor over the next years and we warmly invite you to contribute to this process. We are looking forward to receiving your comments.

1 THE NETHERLANDS

September 2003. The Netherlands has just lived through a meagre year. A year of economic decline, political turbulence and social tensions. Just a bad year, or is something going on? We (the KnowledgeLand Foundation) believe the Netherlands is transforming from an industrial society into a knowledge society. This transformation requires adjustments in all sections of society. We are searching for a new structure, a new direction.

1.1 POLDER MODEL

In the early 1980s, the Netherlands experienced a severe economic crisis. Trade and industry were restructured ruthlessly. A lot of manual work, the closely controlled, labour-intensive production disappeared due to computerisation and bankruptcies. Also, large chunks of this type of work were relocated abroad, to countries with lower wages. Unemployment increased rapidly. A new Cabinet, led by Prime Minister Lubbers, was installed in 1982. In that same year, government, employers and the unions signed the Agreement of Wassenaar. This signified the start of a new strategy, later known as the 'polder model', designed to restore the country's economic achievements.
The core elements of this model were: wage-restraints, an increase in labour participation and reduction of labour charges. Boosting labour participation was intended to result in economic growth. Compared to other countries, labour participation was low in the Netherlands. The government offered a reduction of labour charges in order to support Dutch employers. Employers' organisations and labour unions contributed by signing several agreements on wage-restraints and labour participation. Moreover, the government aimed to reform the welfare state. This included the creation of a more flexible labour market and the reorganisation of government finances. The effects of this long-term strategy started to show in the 1990s, when labour participation started to rise. The strong economic growth in the second half of the 90s was a direct result of this.

1.2 DUTCH DECLINE

During the first years of the new century, however, things are looking down for the Netherlands. Just like in other countries, Dutch economic growth has slowed down considerably, but the Netherlands seemed to be more affected than others. Whereas growth rates of the Dutch Gross National Product (GNP) used to be above average during the 1990s, from 2000 onwards they decreased rapidly. (fig. 1.1) International benchmarks show a similar trend. In the Global Competitiveness Report of the World Economic Forum, the Netherlands dropped from the 8th to the 21st place in the innovation and technology category. It appears to be more than an economic dip. What stands out is that productivity growth already lagged behind during the 1990s. During the period 1995-2000, Dutch productivity growth

equalled 1.1%, while other countries experienced a growth of around 2% (CPB 2003). Innovation is the base of productivity growth, since smarter and more effective production leads to economic growth and a general increase of welfare. In this respect, the Netherlands seems to have lost the plot. The result of the polder model is that we have achieved the same as before, except with more people, and for less money. The European Innovation Scoreboard 2001 (EIS) uses various indicators to measure the development of the knowledge economy in the EU countries. The EIS characterizes the Netherlands as 'losing momentum': we score above the European average on the innovation index, but innovation growth is lower than in many other European countries. (fig. 1.2) 'Losing momentum' is probably the best way to describe the situation in which we find ourselves at this moment: Holland is going down.

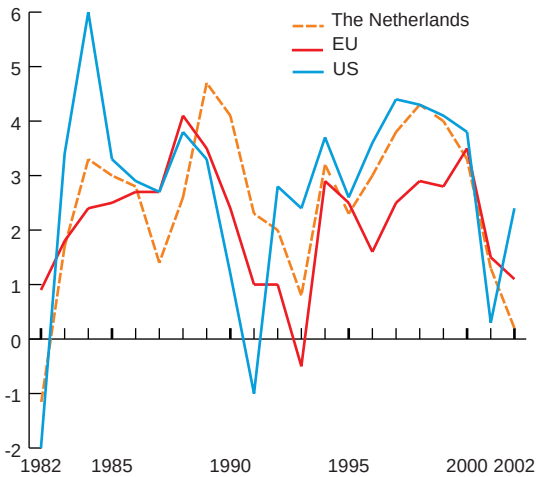
1.3 NEED FOR A DIFFERENT COURSE

It is not to be expected that the strategic triangle of wage-restraints, increase of labour participation and reduction of labour charges can be used to solve present-day problems. A closer look at wage-restraints reveals that permanent international competition of labour costs of lowly-skilled work and increasingly also of highly-skilled jobs means that companies can contract out work for lower costs. The Netherlands will eventually lose the international competition for the lowest wages, especially when the East European countries join the European Union on January 1st 2004. In a fully integrated European labour market Eastern European employees, often well educated, will always be willing to work for less. Ironically enough, even more knowledge-based work is becoming flexible: every multinational has transferred work to countries like India or China. The Netherlands can use the wage-restraint tool again to slow down the export of labour in the short term, but the long-term solution has to be based on new jobs that have a higher added value.

A second development is the ageing population. Growth as a result of higher labour participation will no longer be possible in the future simply because there is a shortage of labour. The past years have made this abundantly clear: companies struggled to find employees, particularly highly-educated people. This shortage of labour was most eminent in the ICT sector. New employees could expect to drive off in a new lease car directly after their job interview , and wage-increases of more than 10 percent were no exception. Consequently, wage levels increased with great speed: one weakness of the polder model was exposed. The third cornerstone of the polder model, reduction of labour charges, does remain relevant today. It is possible to cut expenses in the public sector significantly by introducing management concepts and organisational structures that have been developed in the private sector over the past ten year and rely to a great extent on ICT. Better and more effective public services is a challenge for many European countries. The report of the KL-initiated committee *'Belgium Does Better'* (www.belgendoenhetbeter.nl) has already shown examples how this can be done.
The bottom-line is that the Netherlands has fundamentally changed over the past thirty-five years. Our country has gradually experienced a process of de-industrialisation, while the economic share of the service sector has grown rapidly. Whereas the manufacturing sector provided most jobs in the late 60s, the service sector is now the Netherlands' most important employer. (see fig. 1.3) Another development is the rise of new industries, most notably the information and communication technology (ICT) industry. This development started in the 1960s but its effects became clear mostly during the 1980s and 90s. It resulted in slimmed down versions of companies, which operate smoothly within

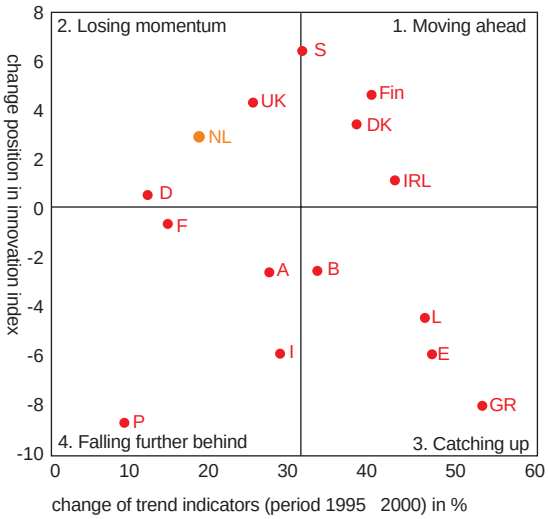
networks and are increasingly oriented towards the international market. The rise of ICT also stimulated the growth of new hardware and software markets that are highly dynamic. International competition has increased strongly. Consumers reap the benefits of this development: better products and services for lower prices. However, entrepreneurs and employees are faced with the flip side: an increase in the economy's volatility, without any guarantees. Change is the only constant. This makes innovation so important: no one can afford to ease off, the capacity to change and to renew are crucial factors for survival. Things will never be the same again. Manual work not geographically bound to the Netherlands will move away and never return. The secure job with that big company where a career starts and ends no longer exists . The welfare and well-being of present and future generations is put at risk if the Netherlands will not be able to provide an answer to these challenges. Our capacity to distinguish ourselves from others will have to depend on better ideas. We need to be able to create new products that are so original, cool, high quality, convenient, funny, durable, and/or unbelievably beautiful that people do not mind paying extra. This requires a dynamic knowledge economy.

Figure 1.1 GNP Increase in % (1982-2002)



source: CPB, 2003

Figure 1.2 Losing momentum



source: EC, 2001a

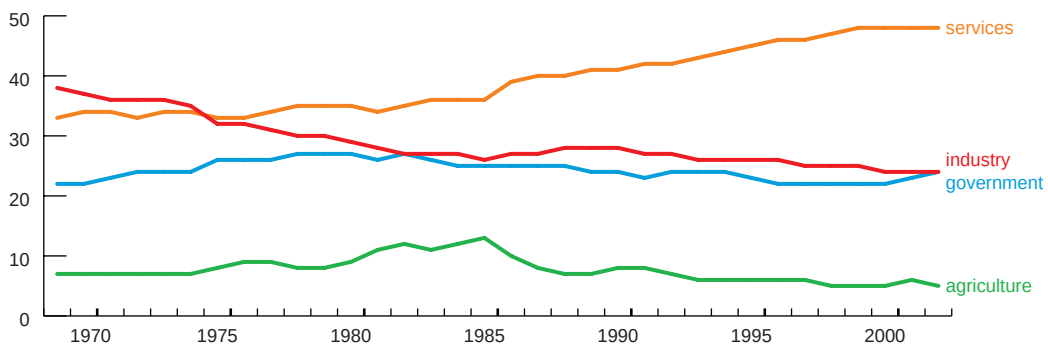
1.4 THE ROAD TO 2010

The Netherlands has not been the only country to notice that the economic environment has changed and that new paths are required to ensure economic growth and expansion of welfare in the future. At the 2000 Lisbon summit, Europe's political leaders announced the ambition to make Europe in 2010 the most competitive and dynamic knowledge economy of the world. This involves making adjustments and reorganizing institutions and policy on several levels. Following this European ambition, the Dutch government stated that, within the European knowledge economy, the Netherlands should belong to the top. Various policy notes have already announced different courses of action. However, many of the plans seem already to have been forgotten. In the Innovation Lecture of the Dutch Ministry of Economic Affairs (2001), Michael Porter mentioned to have seen much analysis but little action. In his eyes, this is where the Netherlands' biggest challenge lies:

> *Changes in a nation's strategy and innovation policies are hard to accomplish and take time. Other countries have shown that a fundamental change in attitude towards entrepreneurship, commercialisation and innovation can produce impressive results. Perhaps the greatest challenge facing the Netherlands is to realise that the currently healthy situation is not sustainable, and that the time to act is now. (Porter, 2001)*

Economic developments of the past two years have shown the truth of Porter's foresight. Now is the time to choose, time to act. In this Monitor, we will provide the information necessary to make that start.

Figure 1.3 Development economic sectors (1969-2002)



source: CBS, 2003c

2 KNOWLEDGE ECONOMY

In 1975 Daniel Bell published the book 'The Coming of Post-Industrial Society'. This book provides a surprisingly accurate picture of the developments that took place in the thirty years after it was published. The title makes clear that at the time no terminology existed to cover the meaning of that process, except for the word 'post-industrial'. During the course of the 1990s, the terminology framework gradually expanded, partly owing to contributions of Drucker, Castells, Porter, Reich and Florida. We will discuss them briefly.

Information society and knowledge society are terms used to explain the process of de-industrialisation. In the information society knowledge and information play important roles, while creation, reproduction and application of knowledge and information are the principal economic activities. Drucker wrote in 1993:

> *'The basic economic resource – 'the means of production', to use the economist's term – is no longer capital, nor land, nor labor. It is and will be knowledge. (..) Value is now created by productivity and innovation, both applications of knowledge to work.'*

Drucker was also the first to introduce the term 'knowledge worker'.

Castells (1996, 2002a, 2002b) contributed greatly to the thinking about the role of networks in this process of creating added value. Networks provide the basic structures of the information society. The acceleration of innovation in the United States in the 1970s is, according to Castells, a result of the network-based working culture that became popular in innovative clusters such as Boston Route 128 and, above all, Silicon Valley. In a relatively small area, several small companies work simultaneously on the development of innovative products and services, while heavily competing with each other. Castells contrasts this example with the 'bureaucratic' model that is hierarchically organised and is based on containment. This model allows for little dynamic. According to Castells, it offers the most plausible explanation of the American victory in the Cold War: the Soviet Union could not keep up with America's innovative capacity and fell economically and technically behind.

This analysis is the continuation of the cluster theory of Michael Porter, who has been mentioned earlier. Clusters are concentrations of enterprises in one region that stimulate each other to a great extent, because of vigorous competition. Thus a cluster becomes a critical mass on the world market. In the Netherlands, the region around Eindhoven is a good example of such a cluster. In the field of agriculture, Wageningen presents an interesting case. Working within networks is not limited to a region, it is an international process. We can look at it as an uninterrupted process of international labour sharing. This perspective has been introduced by Robert Reich, former Trade Secretary in Clinton's first government. Reich (1992, 1998) shows that most of the thinking takes place in the western countries of the world, while

manual work is conducted in countries where wages are low. Nokia phones are conceptualized in Finland and made in China, Nike shoes are developed in the United States and produced on the Philippines, 'French' cars consist of 80% 'foreign' parts. Reich's division between different kinds of work is very illustrative. (see below) It is an alternative way of looking at the classical division of the three economic sectors: agriculture, industry and services.

A new system of labour classification

Reich defines the economy by means of **three** categories of work:

1. Routine Production Services

This is the type of work that carried the industrial revolution. The assembly line of radios, computers, cars, etc. This kind of work can be carried out at anywhere, which keeps wages low.

2. Personal Services

Personal services are also based on highly repetitive work, for example catering services, health care, taxi drivers, the cleaning business. However, in contrast to routine production services, this work requires, by definition, human presence or contact. Therefore, they do not compete on the international market. Also, wage developments are positive compared to those in routine production services.

3. Symbolic Analytic Services

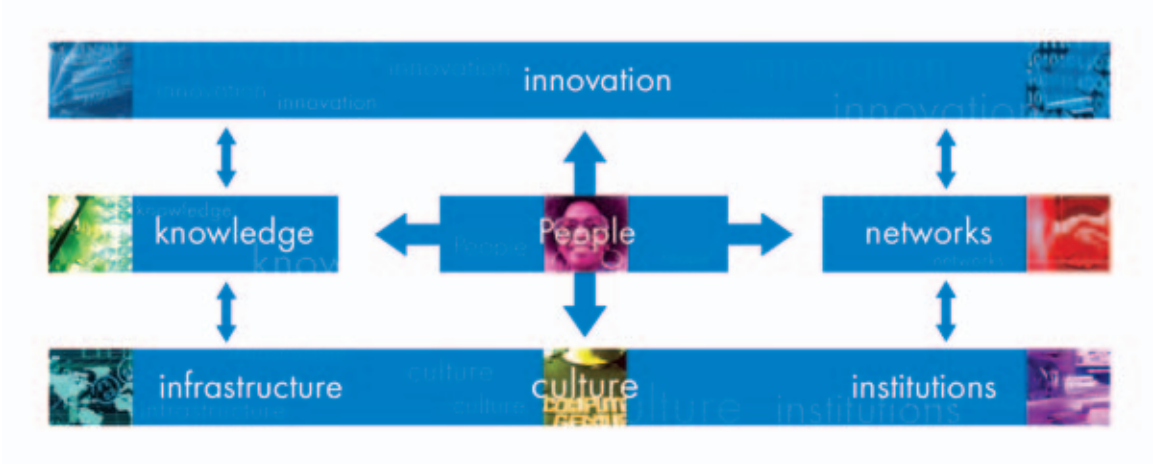
A complicated term to indicate the knowledge worker. Available in three different flavours: the problem solver, the problem identifier and the strategic broker who brings together all problem-solving combinations. With this we mean consultants, PR advisers, stockbrokers, scientific researchers, architects, bankers, lawyers, software architects, journalists, musicians, etc. These services can be traded internationally, just like routine production services. The difference is that a successful knowledge worker can earn a very high income, because his good ideas are for sale at home *and* abroad.

In these three categories of work, the income of the knowledge worker increases at the fastest pace, followed by the income of those employed in the personal services industry. The wages of those working in routine production services have stagnated since the 1980s. According to Reich, the growing wage gap in western countries is largely due to differences in income growth rates between these three groups. (Reich, 1992 Moet dit hier staan?)

Reich and economic geographer Richard Florida (2002) estimate the number of knowledge workers in the United States in 2000 at 30% of all available labour, compared to 8% in 1960. Therefore, Florida speaks about the 'rise of the creative class'. European Union figures indicate that in the Netherlands 39% of the labour force works in knowledge-intensive services. This puts the Netherlands fourth in the European ratings. (EC, 2002g) The problem is that figures can not yet be accurately compared. Walter Wriston, ex-CEO of Citicorp rightly points out: 'Federal economists can tell us exactly how many left-handed cowboys are employed each year, yet have no idea how many software programs are in use.' (Kelly, 1998) Statistics never catch up with new developments; early innovation is by definition insignificant from a statistical point of view.

2.2 A MODEL

All this thinking about the knowledge society has brought forward the vital ingredients of a strong knowledge economy. The most important condition for success is crystal-clear: creative, well-educated, innovative people. People create new knowledge and are the source of new ideas that eventually bring about innovation. Flexible networks make it possible to mobilise support in order to find finance, clients or additional knowledge. Eventually, this will result in a new product or service, an innovation. If we recount Gerard Philips' story this picture makes a lot of sense. He had this crazy idea that he brought into practice by making use of his knowledge. His network was initially small: he built his enterprise aided by his father Frederik, his brother Anton and a befriended analytical chemist whose contribution was additional knowledge. The outcome resulted in whirlwind of innovation. Philips' success created a network of knowledge institutions and enterprises, which has been essential to the lasting nature of the innovative capacity of the company.
This process of innovation depends on a number of conditions necessary to make the system work, like fertile soil makes crops grow. We distinguish three elements. First of all, the infrastructure of the knowledge economy. This means smooth transport of ideas, facilitated by the internet and flight connections. A second element is culture. This includes the attitude of a country towards innovation, as well as the arts as a source of creativity. And finally, institutions, the way in which a country has been organised and whether this organisational structure invites innovation. Schematically, that looks like the model below. Each part of the model will be discussed in the following chapters.

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3 PEOPLE

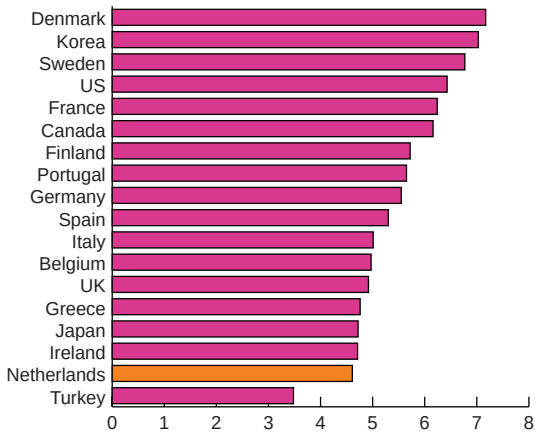
Just like fertile soil is vital to agrarian society and natural resources are essential to industrial society, people are key to a successful knowledge economy. The intellectual, creative and innovative power of the Dutch will be decisive for our economic welfare and social progress.
The achievements of the agrarian and industrial revolutions were mainly determined by containment of nature and means of production. Containment is only partly effective as a guiding principle for the knowledge economy. Human creativity and entrepreneurial spirit flourish best in a stimulating, open environment with room for inspiration. In such a setting, new ideas arise and new knowledge is created which is a base for new products and services.
The Dutch potential in the international knowledge economy consists of sixteen million people. This chapter explains to what extent we can use this potential and what kind of 'soil' we offer our citizens to grow and develop themselves. We will use six indicators: national education expenditure, education levels, number of science students, life-long learning possibilities, career prospects for women working in the academic field, and the Netherlands' appeal to international knowledge-economy talent.

3.1 EDUCATION EXPENDITURE

Investment in education contributes considerably to strengthening the knowledge economy. The Bureau for Central Planning (CPB) (2002a) marks off three effects: higher wages, a more favourable climate for knowledge-intensive companies to invest and more opportunities for children of well-educated parents. Education also affects productivity growth. In their report on economic profits of education, Groot and Maassen van den Brink (2003) cite various research projects, which show that one additional year of education leads to 5 to 15% productivity growth per employee. According to the authors, the structural increase of the total economic growth rate is 0.3%.

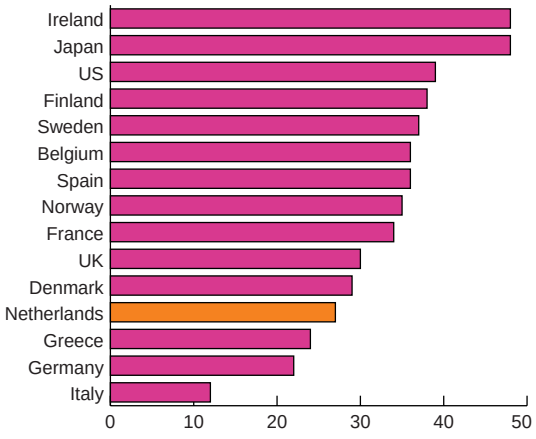
Despite a slight rise in real public education expenditure over the past years, Dutch educational spending per student and as a percentage of Gross National Product (GNP) stands at the lowest level in the Euro-zone. As a percentage of GNP, educational expenses have declined with 30% in ten years, and the Netherlands' score of 4.5% is one of the lowest in the European Union. (fig. 3.1) Nevertheless, Dutch educational participation measured in years lies just above OECD-average. But we are much behind countries such as Belgium, the United Kingdom, and the Scandinavian countries. (OECD, 2002c)

Figure 3.1 Education expenditure as % of GNP (2002)



source: OECD 2003

Figure 3.2 Participation tertiary education 25-34 year in % (2001)



source: OECD 2003

3.2 EDUCATION LEVELS

Too often it is assumed that the education level of the Dutch population is high. Statistics prove this assumption to be false. Compared to other western countries, the Netherlands has fewer highly-educated and more lower-educated people. Despite an absolute increase of the general educational level over the past twenty years, the Netherlands lags behind compared to other countries. They have simply grown faster.

The share of highly-educated people reaches 24% in the Netherlands. Countries such as Belgium, the United Kingdom, Ireland and the Scandinavian countries score significantly higher, while the United Stated stands at the top (37%). The Netherlands falls back even more when we look at the number of graduates in the age group of 25-34 years. In the Netherlands only 27% of these people have enjoyed higher education. The only countries in the European Union we surpass with this percentage are Italy, Germany and Greece. (fig. 3.2) Statistics of the Dutch Central Bureau for Statistics (CBS) show that the share of VWO-students (who prepare to go to university) has declined over the past five years due to demographical reasons, which means that the number of tertiary level graduates will probably decrease accordingly in the coming years. In the Netherlands, 35% of the working population only has a primary or secondary vocational

education degree. The United Kingdom, the United States, Germany and the Scandinavian countries score much lower in this respect (26% or less). In addition, the share of Dutch people between 18 and 24 who only have a lower secondary (vocational) education degree and do not continue, is very high if placed in an international context: more than 15%. In France, Germany and the Scandinavian countries, percentages are much lower (fig. 3.3)

3.3 S&T STUDENTS

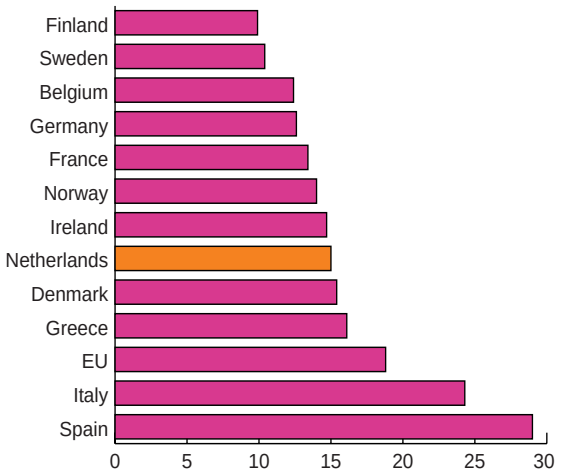
In addition to educational participation levels, chosen specialization is a decisive factor for the human potential of the knowledge economy. An economy that is increasingly dependent on innovation and technology also requires a sufficient number of people with a background in science or technology. The availability of an adequate number of highly qualified people is one condition for technological innovation. The European Innovation Scoreboard makes clear that, after Italy, the Netherlands has the lowest percentage of science and technology graduates per year. (fig. 3.4) Surprising to know is that our 13-14 year olds achieve high scores on maths and physics (UNICE 2002), but that only very few of these students will eventually choose a career in physics or technology. The Dutch process of choosing a major can be pictured as a hurdle-race in which only few manage to reach the finish. Three moments of choice can be identified: firstly, the choice for science or technical courses in secondary education, secondly, the choice for a science or technology degree at university or tertiary education level, and thirdly, the choice for a career in science or technology. Each of these moments has its own problems. Despite all efforts that are being made to motivate young people to choose science or technical courses, the trend is negative. Since the introduction of the 'Second Phase' in 1998, a new programme for higher secondary education in the Netherlands, the number of students who opt for a S&T 'profile' has gone down. Especially when we look at the profile 'Science and Technology', this development becomes painfully clear. The number of students choosing this particular profile declined from 19% to 17% over the period 1998-2000. The number of university students in S&T courses dropped from 19% to 16% during the same period. The intake of technical students at polytechnics did increase significantly in 2002, however the year before this number had been much lower than previous years. (Axis 2002) Women are, even more so than men, inclined to reject technical course choices. As a result, the number of female graduates in science and technology in the Netherlands is the lowest among the European countries.

3.4 LIFE-LONG LEARNING

The learning process does not end at graduation day. In an economy in which capacity to innovate is central to the wellbeing of the system, life-long learning is a primary requirement. For this reason, the Treaty of Lisbon has named life-long learning as one of its main points of action. Companies invest in their staff by offering them extra training, while at the same time more and more people take the initiative to acquire new skills.
In an OECD questionnaire which asked employees whether they had taken extra training courses, the Netherlands scored average. (fig. 3.5) Our country does better in the statistics of the CBS, which looks at training courses offered by Dutch companies to their employees compared to those abroad. Countries that pay most attention to professional

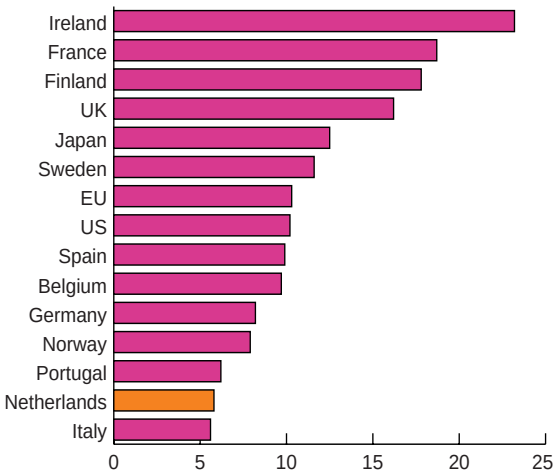
training include Denmark and Sweden. Roughly 85% of Dutch companies offer training courses to their staff, which makes us third in the European league. If we compare professional training expenditure as a percentage of labour costs, we are again number three in Europe with 2.8%. We score according to the norm when we look at who takes these courses: 44% of the employed men versus 35% of the employed women. Also with regards to the hours of training per employee (15), the Netherlands is no exception. But according to the CBS, the Dutch score is generally above average.

Figure 3.3 School drop-outs
(only PO + VMBO, 2002)



source: Eurostat 2003

Figure 3.4 Graduates in Science and Technology in % (2000)



source: EIS 2002b

3.5. WOMEN IN ACADEMICS

Do we make sufficient use of all knowledge-economy talent present in this country? An indication of what the answer to this question could be may be found in the position of women. The education level of Dutch women between 25 and 64 years old is lower than the education level of Dutch men, while in other North-European countries male and female education levels are similar or even show an advantage on the side of the women. (OECD 2002c) Another indicator is

women's participation in academics. Figure 3.6 shows there is still a lot to improve in this field. While student numbers at universities show a 50-50 ratio, statistics take a different turn after graduation. Male and female PhD students are in the proportion of 70-30, though this becomes 93-7 at the level of professors. The figure makes clear that the Netherlands scores far below average at this point, and lags behind completely when compared to frontrunner Finland. (Fig, 3.6) The good news is that the number of female professors (15%) and lecturers (25%) has increased over the past year. This is partly due to special programmes introduced by the universities to attract more women in academic professions. Almost 9% of Dutch professors are now female, compared to only 7% one year ago.

3.6. ATTRACTING INTERNATIONAL KNOWLEDGE-ECONOMY TALENT

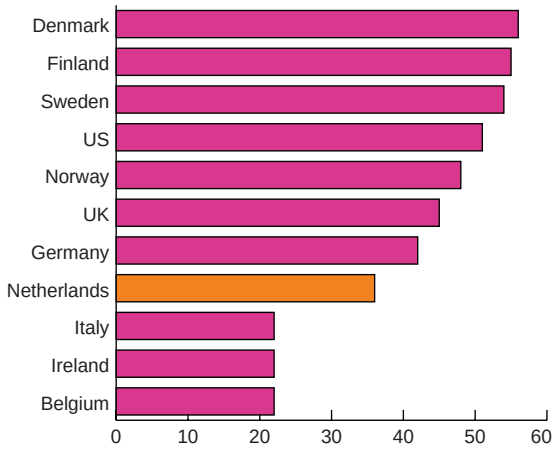
Just like professional football players, talent in the knowledge economy has an international outlook. For a knowledge economy that wants to belong to the top it is vital that talented people want to live, work and study there. One indicator to measure this involves the Netherlands' appeal to foreign students, which gives an indication of the quality of education and tells us something about the openness of our education system and to what extent institutions for further education manage to develop international networks. Roughly 3% of students in further education come from abroad. In comparison to other countries this percentage is low. Only Spain, Finland and Italy score lower than the Netherlands. (fig. 3.7) The greater part of foreign students in the Netherlands originates from countries within the European Union (1.27%), and a minority from Asia and Australia (0.75%) and Africa (0.54%). What is left comes from other European countries, the United States, Canada and Latin America. It would have been interesting to see how many Dutch students choose a study abroad. Unfortunately, no data was available for this.

The picture in 2003

The present base of human potential in the Netherlands is small, compared to other countries. We have relatively few highly-educated people. Demographic developments make things worse: the absolute and relative number of young people is gradually dropping. An ever-smaller number of young people will finish higher secondary education. In the field of science and technology, the picture is even worse and our country has fallen to the bottom of the rating lists. In addition we have many low-educated people who do not obtain any further education. A shocking example of potential that remains unused is provided by the limited participation of women in academics; compared to others the Netherlands scores far below average.

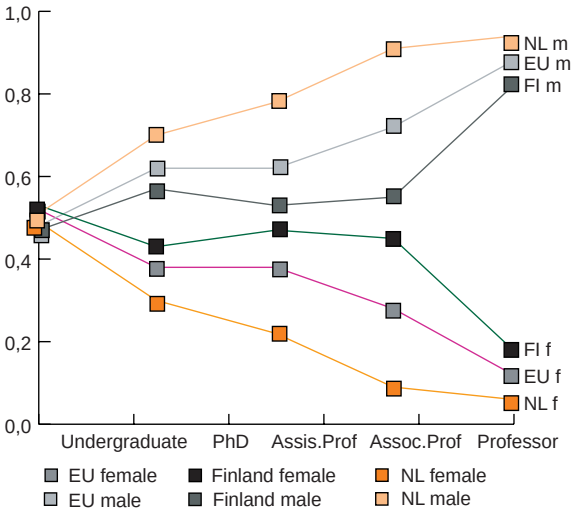
If the Netherlands wants to be a key region in the international knowledge economy, then we find in this chapter the biggest hurdle: the education of our citizens. First and foremost, we need to answer the following question: do we possess the strength of will to belong to the top of the knowledge economy? If the answer is yes, we will have to translate our ideas into concrete actions. Something has to happen to ensure that our most important source of wealth – sixteen million brains – is fit enough to compete internationally for the best ideas.

Figure 3.5 Participation life-long learning 25-64 year in % (2000)



source: OECD 2003

Figure 3.6 Male and female participation academia (1998)



Source: EC, 2003c

Material for a future agenda

• A broad base

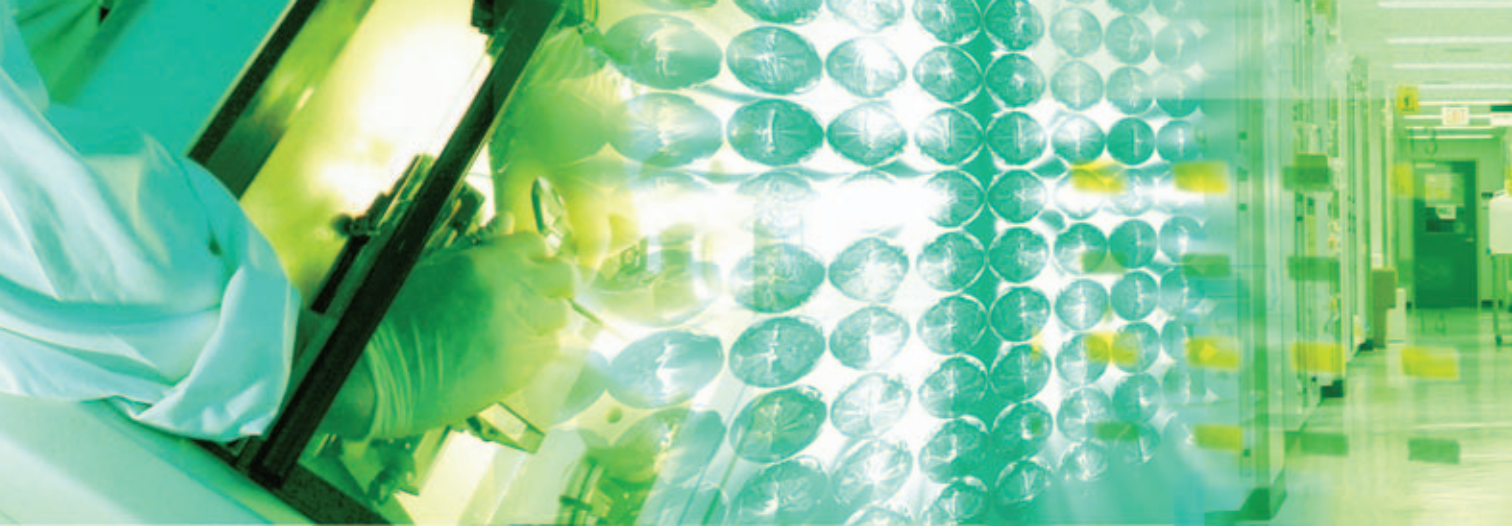
The Netherlands needs a broad base of human potential to compete in the knowledge economy. This base will not be created in one day, it is a long-term process. Increasing investment in education is required, on all fronts. Considering the latest government estimates, this will not be an easy process. But with determination, new sources of funding can always be found. The education budget, now 4.6% of BBP, needs to be gradually increased. A structural increase of 0.1% per year will raise the budget to 5.3% in 2010. That will at least bring us at level with the international average. Another suggestion, mentioned in the coalition agreement, may also help: give schools the chance to control their own budget and let them reinvest the money made available by effective management.

• Standing out

Who wants to belong to the top of the knowledge economy needs top educational institutions. This requires choices: we cannot stand out in all academic areas. The creation of several leading institutions focused on specialist areas may help to strengthen the international competition capacity of the Netherlands. Ideally, excellent courses offered by leading research centres are linked to economic clusters, which can make effective use of generated specialist knowledge. These institutions will eventually attract international talent and this can boost the knowledge economy.

Figure 3.7 Foreign students in tertiary education in % (1999)

source: EC, 2003c



KNOWLEDGE

4

Knowledge equals tested conviction. Knowledge arises out of curiosity, when someone wants to test a new idea to see if it works. This search leads to new understandings, intended or unintended. This process is not shocking in itself, however, humanity has developed very effective methods over the past five hundred years to define and exchange the obtained information, all in the name of 'science'. Also, in no prior period were so many people allowed to dedicate their lives to this process of learning. The result: unprecedented dynamics in the field of scientific knowledge development and the social application of the acquired knowledge. In this chapter the position of the Netherlands in this highly dynamic field will be mapped out.

Typology

The scheme below provides a characterisation of the several phases of knowledge development. These phases are more or less equal to the steps of the linear innovation model. The period indicated by each typology is the expected period of time required to bring newly-acquired knowledge into practice. Basic and explorative research is mainly conducted at universities and research institutes. In the case of applied research, commercial industries usually take over. The present innovation model is no longer that static as this model implies. It is much more dynamic. Yet the distinctions of this model still serve in pointing out the different types of knowledge creation.

Basic research	Explorative research	Applied Research	Product renewal
> 10 years	5 - 10 years	2 - 5 years	0 - 2 years

In this chapter, we will look at knowledge development through the use of five indicators. Firstly, we will consider researchers: how many do we have and what can they offer. After that, we will map the international position of Dutch universities and look at the actual research conducted by research institutes and companies. Finally, we will examine the degree to which knowledge in the Netherlands is patented.

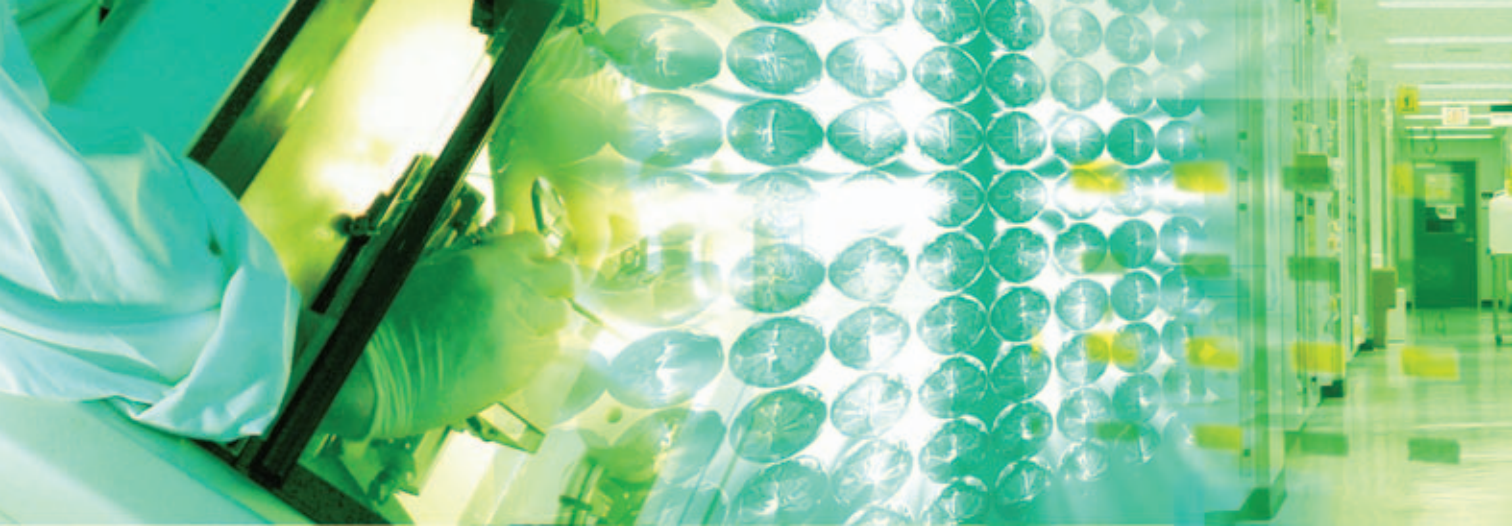
4.1 RESEARCHERS

Research is the work of people. At least half of the funds of universities, research institutes and commercial laboratories is spent on personnel. The CBS (2003b) concludes that in 2000, about 88.000 years of labour were dedicated to research, 2% more compared to 1999. Yet the number of researchers in the Netherlands is low compared to other countries. Of every 1000 employees, 5.05 work in research. We score below EU average and lag behind countries such as Finland, the United States, France and Germany. (fig. 4.1)

The age structure of Dutch university staff shows two peaks: one in the age category 25 to 29 and one in the category over 50. The first peak represents PhD students who are conducting research on a temporary labour contract. The second peak are long-term university staff, many of whom were employed in the 1970s and 80s. The gap between these two peaks shows that many universities cannot offer permanent jobs to students who finished their PhDs. Some get offered a short-term post-doc contract, but many leave academics or go abroad. Foreign countries are happy to welcome young Dutch researchers, who have an excellent reputation in international academic circles. (Cie. Van Vucht Tijssen, 2000)

In the past years, Dutch universities have attempted to improve this situation. The Dutch Organisation for Academic Research (NWO) and the Royal Dutch Academy for the Arts and Sciences (KNAW) have also developed programmes to keep in or to bring academic talent back to the Netherlands. Recent statistics indeed show that age structure within the academic world has improved (VSNU, 2003), but front-line stories are still pessimistic. The larger number of academics between 30 and 50 years old seems to be primarily a result of an increase in short-term post-doc contracts. Apparently, young researchers tend to collect an ever-larger number of post-docs without obtaining permanent contracts. (Sofokles, 2003) Insecurity about their careers grows, while it becomes increasingly difficult to find employment outside of university life. The risk of academic talent leaving the country is thus still present. These are also the conclusions of the CPB (2002a). Despite the absence of reliable data on the volume of this brain drain, it is clear that the international mobility of researchers is large and that Dutch researchers are popular abroad.

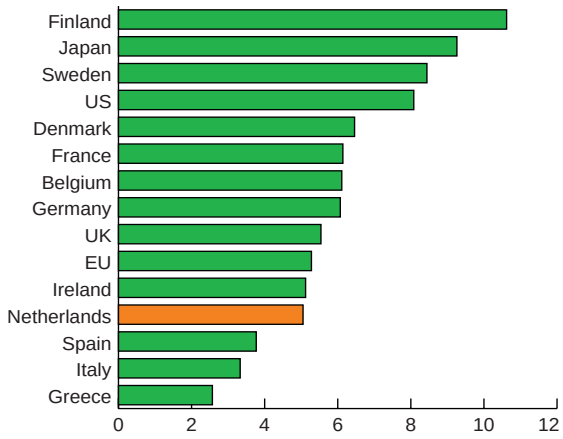
With regards to the recruitment of PhD students a new development has become apparent. In certain areas it has become increasingly difficult to find students willing to do a PhD, most of all in the field of natural science and technology. Influx of new PhD students declines as undergraduate numbers are gradually diminishing. As a result, these academic fields attract a lot of foreign students, mostly from Eastern Europe and China. In certain specialist areas foreign students make up more than 50% of the total. Although the Netherlands takes advantage of a large amount of foreign research talent, foreign students often use the Netherlands as a stepping stone to an academic career in other countries, such as the United States, after they have finished their PhD. It proves to be difficult to continue their career path in the Netherlands for them as well. Thus we educate foreign talent to continue their career abroad. In order to increase the appeal of the PhD, doctorate grants have recently been increased. But the bottlenecks of the system, mainly in the areas of coaching and labour conditions still exist.



4.2 UNIVERSITIES

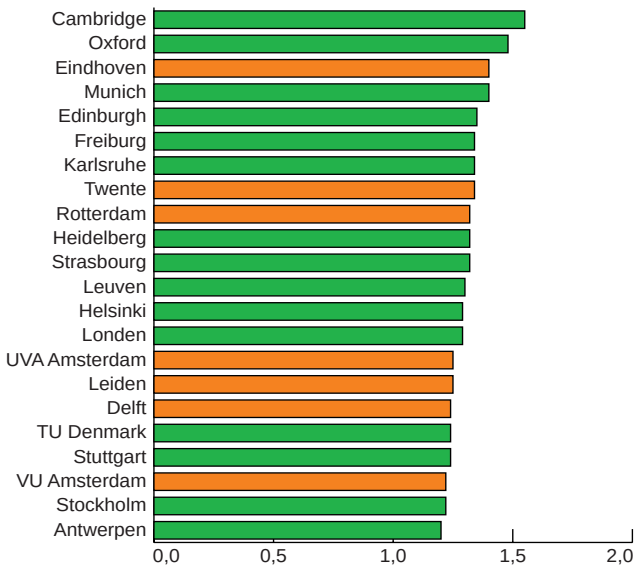
Dutch universities belong to the international top. The top-20 rating of European universities that contribute most to scientific publications includes seven Dutch universities. The Eindhoven Technical University scores best, ranked directly after the universities of Oxford and Cambridge. (fig. 4.2) This picture is confirmed by the number of scientific publications and their reference score (publications in well-established journals). The Netherlands scores a third place after the United States and the Scandinavian countries with 1120 publications per one million inhabitants. The Dutch reference score is second best after the United States. We may conclude that the quality of basic research in the Netherlands is high. In comparison to other western countries, Dutch universities invest large amounts in research. In 2000, this was 0.57% of BBP, while the average of the EU countries and the OECD was 0.4%. (VSNU, 2003)

Figure 4.1 Number of researchers per 1000 employed (2000)



source: EC, 2001b

Figure 4.2 Reference scores European universities



source: EC, 2003c

4.3 RESEARCH INSTITUTIONS

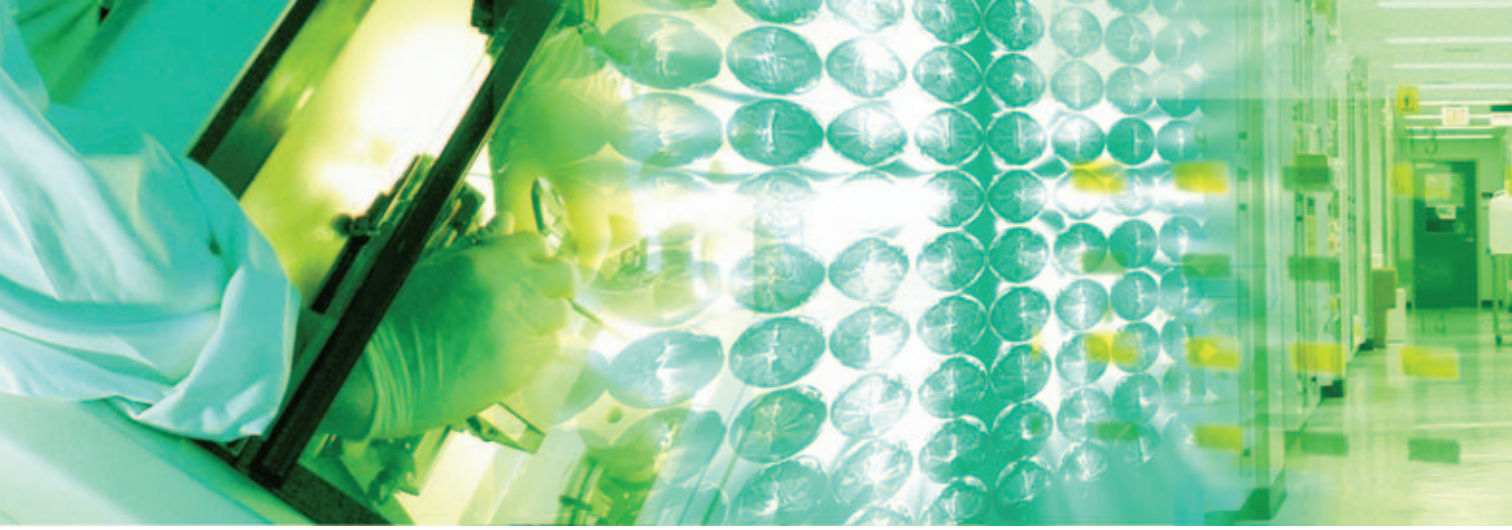
In research institutions research is the core of all activity. The most famous research institute in the Netherlands is the institute of Applied Scientific Research (TNO), but others are the Dutch Energy Centre in Petten, the National Laboratory for Aviation and the Agricultural Research Service in Wageningen. Less well-known are the Technological Top Institutes (TTIs) and the research institutes of the Dutch Organisation for Applied Research in the Natural Sciences (NOW) and the KNAW.
The major part of research conducted in research institutes consists of explorative and applied research. In the early 1990s, these two research types counted for 23% of the total Dutch research budget. Today this is only 14%. As a percentage of BBP we now hit the European average. (CBS, 2003b) Where our position in basic research remains strong, we are losing ground with respect to applied research.

4.4 COMPANIES

Companies also generate knowledge. This is the base of innovation and is summarised by the term *Research and Development*. In the past decade, the focus of commercial research has been directed towards applied research and product renewal. Basic and explorative research is generally slowed down and seen as a job for academics. Companies tend to buy this kind of knowledge whenever it is needed. This trend becomes apparent when we look at increased commercial spending on contracted academic research, which has doubled between 1995 and 1999. About two thirds of these funds goes to Dutch universities and research institutes. (CBS, 2003b) In a report (29, 2002) of the Advisory Commission for Science and Technology Policy (AWT), former CEO of AKZO-Nobel Van Lede explains the trend towards applied research in business: 'Pressured by internationalisation competition has sharpened with the consequence that research as a 'hobby' is now out of question. Although certain kinds of basic research can be incredibly interesting, they do not deliver any benefits to real life.' Thus the renewed focus on research that can be applied immediately was born out of sheer necessity.
The commercial knowledge development in the Netherlands has been dominated by six large industrial concerns since the 1960s: Philips, AKZO-Nobel, Unilever, Shell, Océ and DSM. Together they spend about 44% of the aggregate Dutch R&D expenditure. Incidentally, this percentage is lower than before, it was 65% in 1984. (NOWT, 2000) Although industry is still the biggest spender on R&D, R&D spending in the service sector is on the rise. Furthermore, medium-sized companies become more significant if we look at industrial knowledge development. These companies together increased their R&D spending to 13%, while smaller business R&D spending went down to 6%. (CBS, 2003b) The latter figure is particularly problematic since SMEs are seen as crucial to innovation.

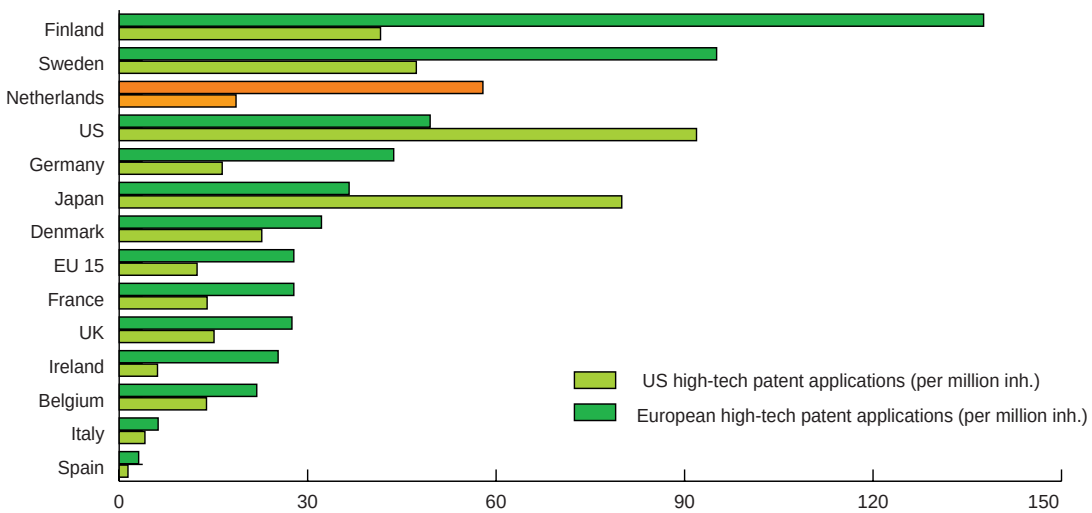
4.5 PATENTS AND LICENCES

Patents allow knowledge developers the right to exploit their knowledge. The right to use knowledge is being sold by means of a licence; it is the reward for all those hours spent in the lab. The number of patents therefore



indicates the commercial potential of knowledge in the Netherlands, while licences tell us something about the actual commercial use of knowledge.
When we consider the number of patents, conclusions are positive as well as negative. The number of patents per 10.000 inhabitants in the Netherlands lies far below European average. (CPB 2002a) However, the Netherlands scores high when we look at the number of high-tech patents: a third ranking with 58 patents per one million inhabitants after Finland (138) and Sweden (95). Also when American high-tech patents are taken into account, we score well above average. (fig. 4.3) Nonetheless, this favourable position is at risk. The annual increase in American high-tech patents originating in the Netherlands was 3% over the period 1990-2000, while countries such as Belgium, Denmark, Finland and Sweden scored above 7%. (Porter 2002) References to Dutch scientific publications in patents are on a par with American as well as with European patents.
An indication for the actual use of patents is given by the number of licences provided. A study of the CBS (2003b) shows that 19% of all academic patents are licensed. We may thus conclude that approximately 80% of academic patents are not being used. We have not been able to find international figures to compare, so we cannot conclude whether these numbers are positive or negative in an international context.

Figure 4.3: Dutch high-tech patents in US and EU



source: EC, 2002b

The picture in 2003

The Netherlands scores high on knowledge development, especially when it comes down to basic research. Dutch academics belong to the world top, which becomes clear when we look at the number and impact of scientific publications. In this respect, we are doing well, nationally as well as internationally. However, we should wonder whether this is enough from our knowledge economy perspective. The research sector can be quite an in-crowd, and what is missing here are the incentives to apply knowledge, to use the research. This starts with more frequent contact between universities and society.
With reference to applied research the situation is less favourable. Compared to other countries, Dutch companies invest less in R&D and the share of public research institutions is going down. Especially the limited participation of small companies in the R&D sector is surprising, taking into account that they play such an important role in Dutch industrial life. The challenge is to tempt universities to use their knowledge for the benefit of society and to stimulate small companies to make better use of the information offered by the universities.

Material for a future agenda

• The natural resources of the knowledge economy
The fact that seven Dutch universities appear in the European top twenty is impressive. Basic research is like a rough diamond: it provides the material for innovation but needs to go through several stages of polishing. We have access to the natural resources of the knowledge economy, but we have not yet found out how to fully exploit these.

• Science generation X
Striking is how badly we treat our young researchers, although they are the professional football players of the knowledge economy. Dutch PhD students have a great reputation abroad, but have mostly been unable to find a job after completing their doctorate. As a result we lose our academic talent to the non-academic world or to foreign countries. We may compare it to the Ajax football team: the youth division would have never existed if there were no free spaces in the first team. Ajax would know exactly what to do in the kind of situation we find ourselves in: send all young talent abroad and retrieve it a few years later when it is experienced and ready to join the leading team.

• Bridges between basic research and product renewal
In a knowledge economy that runs smoothly, the distance between laboratory and shop is as small as possible. Each country that manages to turn the results of basic research directly into new products and services has an advantage on the international market. At this moment, most companies have lowered their spending on basic research, while small businesses seem to be unable to make use of academic discoveries. New instruments are needed to bridge the gap between basic research and product development. Traditionally, this was the task of the research institutes. The lower share of the total Dutch research budget allocated to research institutions is therefore reason to worry.

5 NETWORKS

New ideas often arise when different types of knowledge and skills meet. The innovative capacity of an organisation is directly linked to the ability to use and to combine knowledge of external and internal sources. For a knowledge economy, networks are indispensable. So indispensable, in fact, that some scholars call it the 'network economy'. The sociologist Manuel Castells (1996) even uses the term 'network society', because he believes networks are central to the way in which production and processes are being conducted in the present.

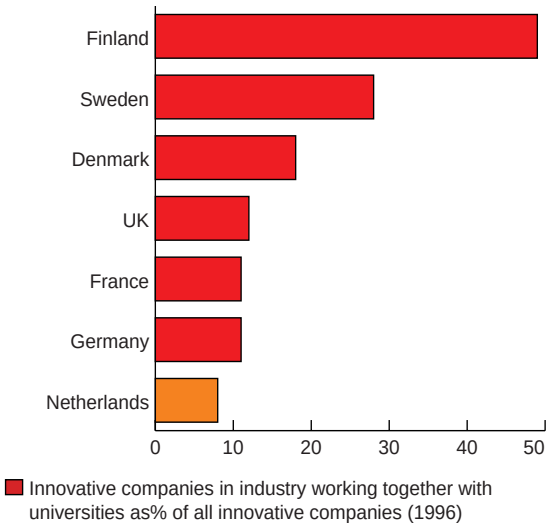
The rise of the information society supports this trend. Individuals and organisations can work together in a new fashion, at a very low expense. This generates new challenges and forces which require adaptation on the side of our institutions. (Castells, 1996) For example, KaZaa is a loosely-connected network of music lovers who collectively link the entire music collection of the planet together. It took some time for record companies to come up with an answer to this new phenomenon. Another example is the development of open-source software. Linux, the most well-known of this type of software, is now used by about one-third of all Dutch companies. But the use of the Internet by terrorist organisations such as Al-Qaida also raises new questions. Secret services all over the world are struggling to provide an answer to this new development.

Networks are also key to Michael Porter's cluster approach. His theory states that innovation and competition power are primarily stimulated by cluster development. Clusters are thematic networks based in one specific location, most often at the regional level. Important conditions for the success of a cluster: access to a pool of highly-qualified staff, new theme-based knowledge, sufficient suppliers, nearby competitors who stimulate higher achievements and intermediate organisations that lower the threshold for cooperation. According to Porter, clusters are essential to innovation and productivity growth, and thus to economic growth. National competition power depends on the extent to which a country facilitates clusters that can book international successes in their specific fields. (Porter 1990)

For a country that wants to be competitive in the world knowledge economy, this leads to two conclusions: Firstly, individuals and organisations in the relevant country will need to be extremely good at building networks amongst each other, using these in the most effective manner. Secondly a country needs to secure good connections with the rest of the world in order to obtain the best position on the international market. After all, a strong country is not only connected to lots of networks, but is also one of the nodes in the international knowledge economy.

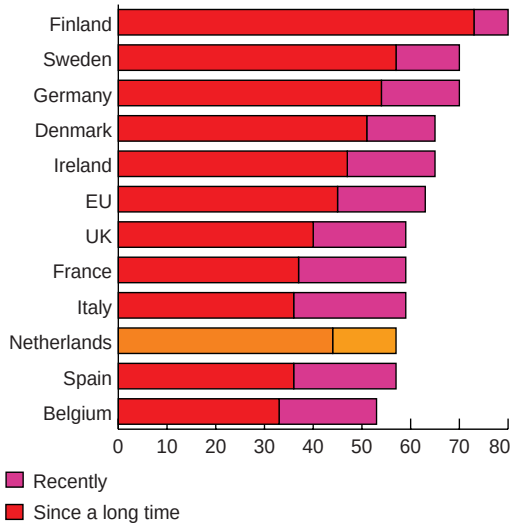
In this chapter we will examine to what extent the Netherlands uses these networks and how well this country is connected to the rest of the world. Indicator for the first point is the extent to which companies cooperate with knowledge institutions and other organisations in order to innovate. The second point may be observed from the number of foreigners in highly-qualified jobs, but also the number of international conferences that take place in the Netherlands. As a final point we will attempt to discover some regional clusters in the Netherlands.

Figure 5.1 Cooperation with universities



source: EC, 2002b

Figure 5.2 Cooperation between companies



source: EC, 2002c

5.1 COOPERATION WITH KNOWLEDGE INSTITUTIONS

Lack of cooperation between companies on the one hand and knowledge institutions on the other is central to the debate about the Dutch knowledge economy. Porter (2002) concluded that the need for improved relations between industry and the academic world is too often ignored and that academics have a rather negative attitude towards the application and commercialisation of knowledge. Various statistics show indeed that the Netherlands' score is not up to the mark. The rankings of the European Innovation Scoreboard 2002 show what percentage of innovative companies in a country works together with universities. Finland scores best with 49%. The Netherlands scores worst with 8%. (fig. 5.1) Analysis of public-private cooperation in the realisation of scientific publications shows a similar picture. The Netherlands is falling behind compared to the United Kingdom, the United States and Finland. (CWTS, 2000)
Knowledge institutions do cooperate more often compared to the early 1990s. The CWTS concludes in 2000 that

especially international collaboration between knowledge institutions has increased. Although the United States is the Netherlands' most important partner in this field, cooperation with European academics is becoming more frequent. This is one of the consequences of European integration and is stimulated by the EU Framework programmes. (CWTS, 2000)

5.2 COOPERATION BETWEEN COMPANIES

Innovation is increasingly a result of partnership. Partnership guarantees reduced development costs and extra knowledge. Cooperation can take place between knowledge institutions, but also between different kinds of organisations or even competitors. Also in this field, Dutch achievements are minimal. (fig. 5.2) Striking is the low number of recent joint efforts. Although the diagram on the previous page does not show it, the figures of the European Innovation Barometer reveal that the Netherlands holds the largest number of companies that do not collaborate with others and have no intention of doing so in the future.

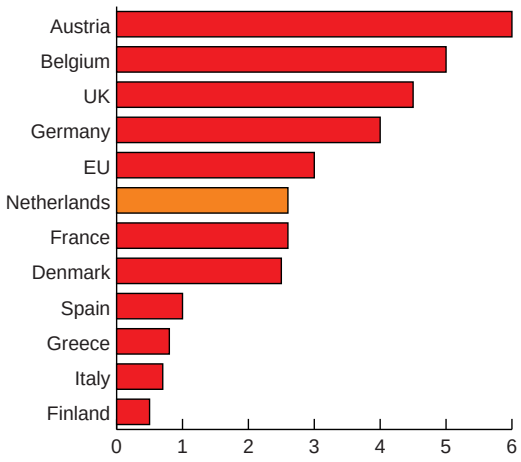
5.3 FOREIGN EMPLOYEES

The Netherlands is an open economy. Foreign companies open offices here, and at the same time many Dutch companies operate internationally. None of these companies can survive without external knowledge. Foreign companies bring in knowledge workers, while Dutch companies attract knowledge workers from abroad. Therefore, the number of foreign, highly-educated workers in the Netherlands gives a good indication of the Dutch position in the international field. This number expresses to what extent the Netherlands is connected to the rest of the world, as well as our appeal to foreign knowledge-economy talent. Another indicator of Holland's appeal to foreigners was already mentioned in chapter three: the number of foreign students. On this point our country also scores below the international norm. However, as foreign employment figures make clear, the Netherlands is no exception. OECD statistics over 1998 demonstrate that 2.6% of all highly-qualified jobs are in the hands of foreigners. In this respect we score average in the EU, but below countries as the United Kingdom, Germany and Belgium. Finland's low score is surprising. (fig. 5.3)

5.4. INTERNATIONAL CONFERENCES

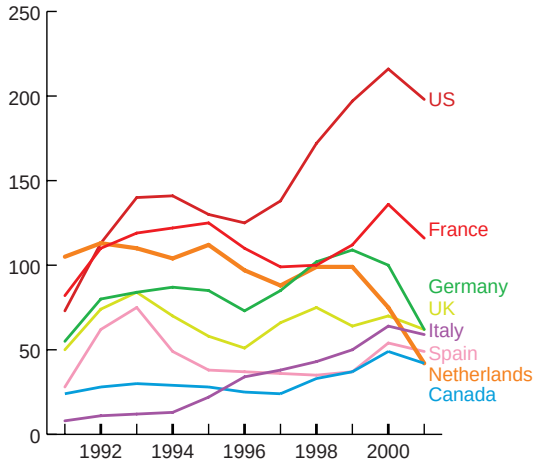
Knowledge sharing takes also place at international conferences. The number of international conferences that are hosted in a country gives a good indication of a country's networks. It also tells us something about a country's facilities to share this information and its international orientation. Of course, these facts say nothing about the actual quality of these meetings or the results they produce. At the start of the 1990s, the Netherlands was still market leader in the area of international conferencing. Since 1999, the number of conferences has gone down rapidly, while in other countries a similar downward trend only started in 2000 and has never been as intense. In this process, we have lost our leading position and have fallen to a level far below average. (fig. 5.4)

Figure 5.3 Foreigners in highly-qualified jobs in% (1998)



source: OECD, 2002b

Figure 5.4 International conferences (2001)



source: UIA 2003

5.5 REGIONAL CLUSTERS

Although Porter states that cluster thinking has been adopted rather early in the Netherlands, he concludes that it is still seldom applied in practice. With the exception of the food cluster of Wageningen, he cannot distinguish other cluster examples in the Netherlands. (Porter, 2001) But is this true? Not many analyses of clusters in the Netherlands are available. One exception is the Economic Barometer of the Netherlands. (Bureau Louter, 2003) This study has looked at regional development of the Dutch economy. For instance, where do industry, distribution and services settle down? And where do we find specific clusters as ICT, agro and chemicals? The report concludes that several geographic clusters have developed in line with certain activities. Primary focus was those regional industries that serviced more regions than just their own geographical location. According to the Economic Barometer, labour-intensive industries have left the Randstad, not seldom to go abroad. A limited number of these industries can now only be found in the North of the country. The capital-intensive industry is concentrated around seaports such as Rotterdam and IJmuiden. The highest scores regarding knowledge-intensive industries can be found in the South East and in Twente. The Economic Barometer points to the South East (around Eindhoven), and not to the Randstad, as the motor of the

national high-tech industry. Distribution concentrates around Rotterdam (port) and Amsterdam (Schiphol Airport). What stands out is that employment created by distribution industries is mainly concentrated around Amsterdam, while Rotterdam benefits less. According to the report, this is caused by the kinds of products that are distributed. In the service sector the northern branch of the Randstad is leading (Amsterdam, Utrecht, Amersfoort). Taking these facts into account, this region has the fastest growth in employment and labour productivity over the period 1996-2000. During this period, economic growth was 3% higher than in Rotterdam. (fig. 5.5) This is confirmed by the growth in employment opportunities per 1000 inhabitants in those industries that are not limited to one region. In this respect, the combination of Amsterdam/Schiphol is very strong, while the Amsterdam-Eindhoven axis is clearly the growth line of the Netherlands. (fig. 5.6) The report has also looked at several thematic clusters and showed that the ICT cluster can be found on the Amsterdam-Eindhoven axis and until a lesser extent in Groningen. The chemicals sector can be found primarily in sea port areas, notably in Rotterdam and Limburg. Metal and electrical engineering is concentrated in Eindhoven and surroundings. Agro-industry is located mainly outside of the Randstad, with a clear core in Wageningen. In the Randstad, the so-called Westland stands out in this sector. Amsterdam profiles itself through leisure activities, such as tourism and culture. (Bureau Louter, 2003) The triangle Amsterdam, Utrecht and Hilversum can be seen as the heart of the Dutch creative economy.

The picture in 2003

We still have a lot of work ahead of us to improve the networks in the Netherlands. Compared to other countries, cooperation between companies and knowledge institutions is minimal and inter-company cooperation is only moderately successful. We talk a lot, but doing things together seems difficult. However, we can distinguish several regional clusters that could be the base for the development of further networks for applied knowledge, which could lead to innovation. It is interesting to discover that the most important clusters can be found in the Amsterdam-Amersfoort-Eindhoven triangle. The international appeal of the Netherlands to short-term and long-term foreign visitors seems to be diminishing. This point deserves attention, as international encounters are essential to a knowledge economy.

Material for a future agenda

- **Investing in specific clusters**

  The Netherlands could choose to develop a number of specific regional clusters. Firstly, this would require an analysis of those areas that have a high knowledge potential in one specific field, as well as a high number of specialist companies and a right climate for international growth. We have to make choices, a small country cannot excel in all fields. The Economic Barometer demonstrates regional clusters, which are dominated by particular economic activities. These would have to be analysed more closely in order to come to a decision. Important to know is which clusters are focused on international growth markets. Or in which clusters knowledge and economic infrastructures are effectively inter-linked. The answers to these questions may well be rather surprising.

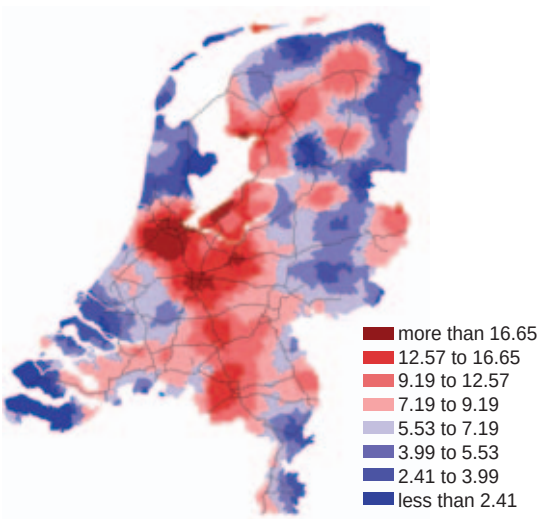
• Attracting foreign knowledge workers

Much is possible to increase the Netherlands' appeal to foreign knowledge workers. Firstly, lowering the threshold to come and work here, particularly for the highly-educated. The process of obtaining residency or a work permit could be a lot smoother, and the annual renewal process is unnecessarily expensive. Furthermore, we need to look at cultural facilities (see also chapter 8), an accessible housing market and high-quality transport facilities. Perhaps we should establish an organisation to manage this process more effectively: an office for international knowledge workers in addition to the existing infrastructures for international trade and industry. Furthermore, the Netherlands is also well equipped for international knowledge exchange through conferences. Why we have lost our position as a market leader is unclear. However, a thorough understanding of this problem may help to re-conquer lost territory.

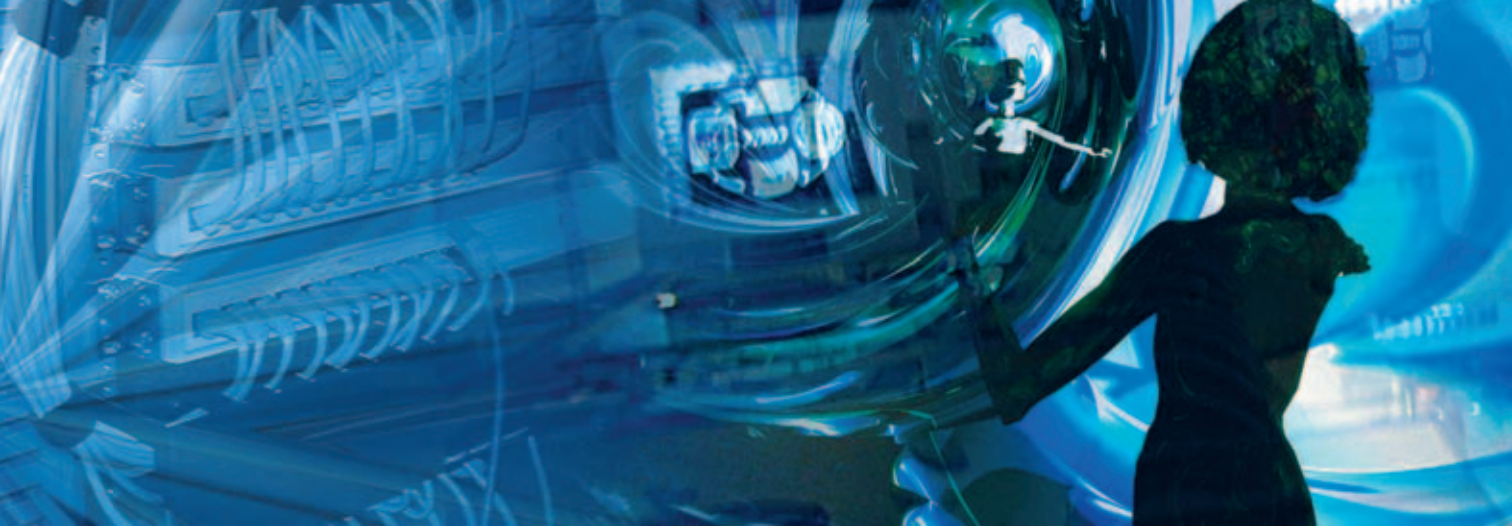
Figure 5.5 Annual growth urban regions in % (1996-2001)

source: Bureau Louter, 2003

Figure 5.6 Growth employment concentration measured in employment per 1000 inhabitants (1996-2001)



source: Bureau Louter, 2003



INNOVATION

6

In this chapter, we will map out how the Netherlands performs when innovation is involved. Innovation is ‘knowledge in action’, it is the ability to transform people’s creative and entrepreneurial qualities, as well as the knowledge they create and the networks they have, into concrete results.

About the term

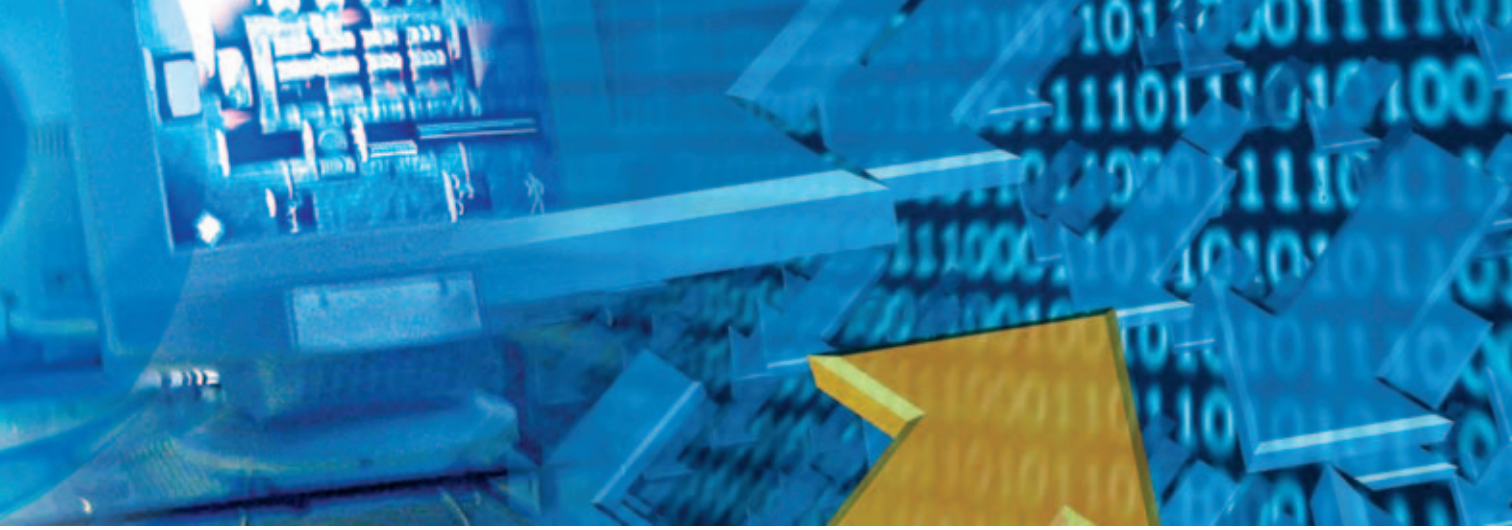
The term ‘innovation’ has an almost magical sound to it. However its meaning is, according to the Oxford English Dictionary, quite down to earth: the introduction of something new. In other words, innovation is equal to the power to *renew*. Innovation can take place in the technical sector, for example the development of the CD, a new medicine or a new laser device that cleans paintings of old masters. But innovation does not only concern technology. It may also involve issues that belong, according to economists, in the ‘service sector’ category. Consultancy firms like McKinsey and the Boston Consultancy Group flourished thanks to the export of knowledge of American management methods and organisational concepts to Europe. Other examples of innovative services are new insurances developed by Dutch insurance companies or Endemol’s TV programmes like Big Brother, which are popular all over the world. Also, Dutch architects such as Rem Koolhaas and Sjoerd Soeters have made our country a trend-setting breeding-ground for the service ‘building and city design’. And the Dutch DJ Tiësto is the young generation’s Bach, being chosen the world’s best DJ two years in a row.

About the indicators

Just like with every other subject in this monitor, plenty of statistics are available. In this jungle of data we chose seven indicators which are, according to us, significant in relation to this topic. These are: expenditure on R&D measured as a percentage of BNP, productivity growth, company earnings based on products that are no more than two years old, measured as a percentage of total turnover, availability of venture capital, the sum of the number of enterprises that start and stop, non-technological innovations and start-up companies in biotechnology.

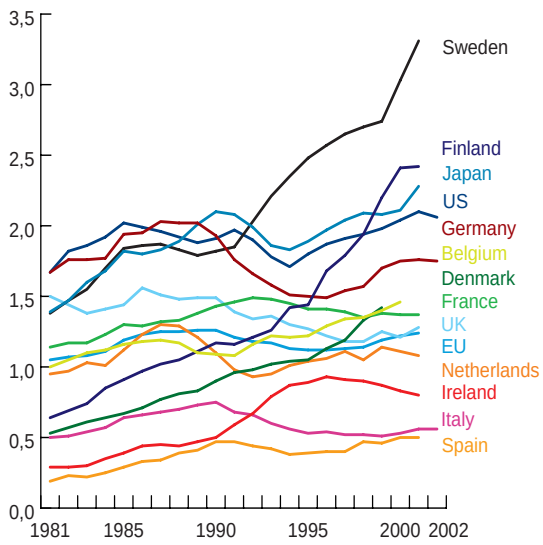
6.1 R&D EXPENDITURE

National expenditure on R&D is a good indicator of a country’s innovation power. However, we should note that innovation is more than R&D alone. In all statistics, R&D is defined as research as well as the application of scientific and technological knowledge. Non-technological innovation in strategic planning, management and marketing are not taken into consideration in R&D statistics.



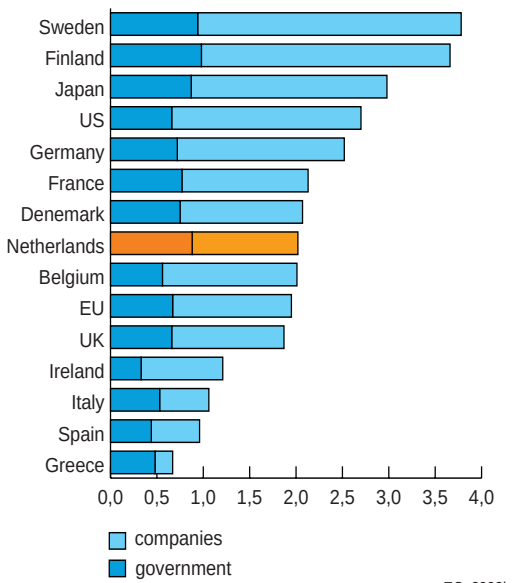
In the late 1960s, total R&D expenditure of Dutch companies measured as a percentage of BNP was the highest in the world. In roughly thirty years the situation has changed dramatically. In the year 2002, the Netherlands is average in R&D spending, in the industrial as well as in the service sector. Countries that managed to realise an increase of more than 50% include Sweden, Finland, Denmark, Belgium, Ireland and Spain. (fig. 6.1) Total R&D expenditure in the Netherlands is 2.02% of BNP. (see fig. 6.2) With this percentage we score 1% below the European target of 3% in 2010. At the moment, only Finland and Sweden hit this target. The graph also shows the large share of public funding of total R&D expenditure of countries such as Spain, Italy, Greece and the Netherlands. The returns of each euro spent by the government are relatively low in these countries.

Figure 6.1 R&D expenditure in % of GNP (1982-2002)



source: Soete, 2003

Figure 6.2 R&D expenditure (government + companies) in % GNP (2000)

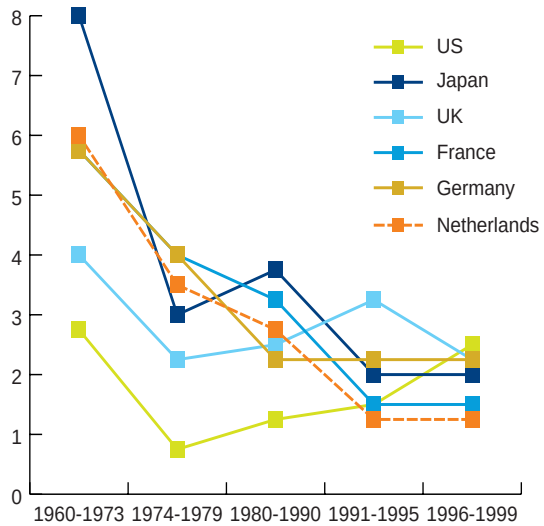


source: EC, 2002b

6.2 PRODUCTIVITY

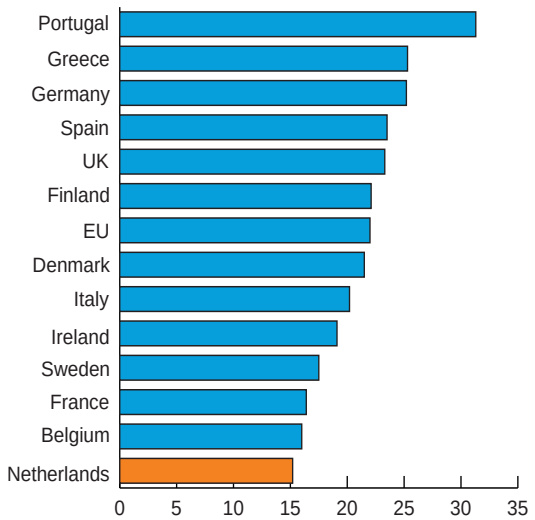
Successful innovation will partly result from more efficient work processes. This translates into productivity growth, expressed as the amount of work required per product. Productivity of Dutch trade and industry is traditionally high. But the bad news is that productivity growth over the past ten years has been low compared to our most important trade partners and competitors. (fig. 6.3) This suggests insufficient innovation power.

Figure 6.3 Increase labour productivity market sector (1960-1999)

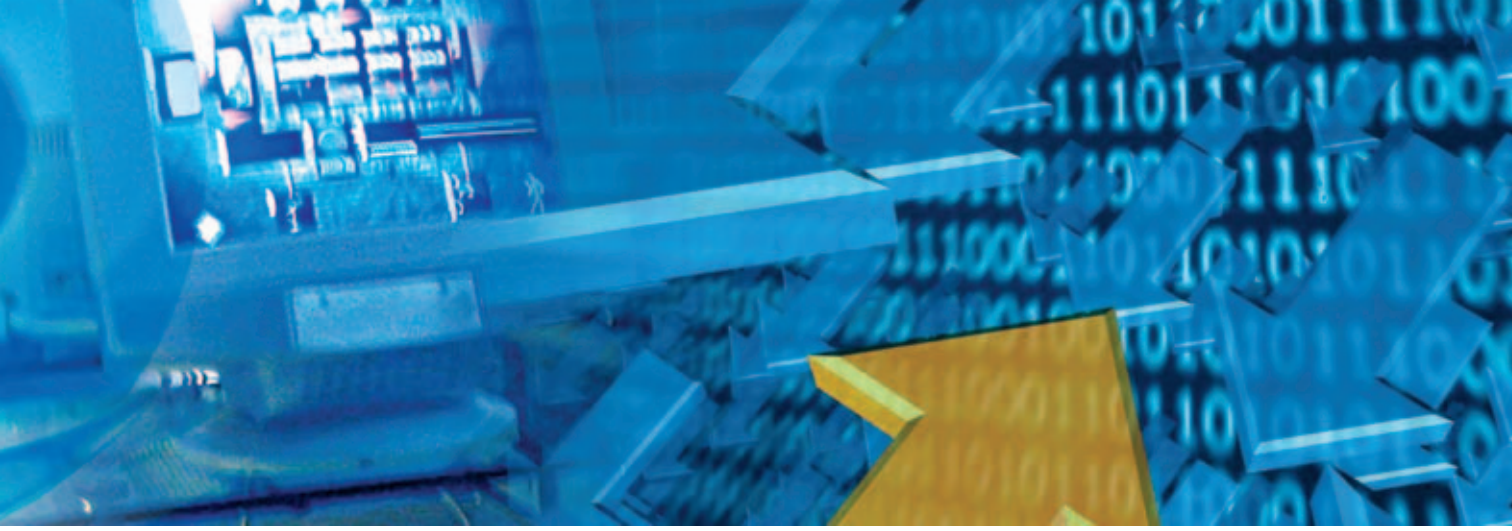


source: CPB 2001

Figure 6.4 Turnover from new products in % (2002)



source: EC, 2002c



6.3 SALES OF NEW PRODUCTS

Another important indicator of successful innovation is a company's sales of new products and services as a percentage of total turnover. Innovation surveys of the CBS and the European Union contain questions on this subject. Figures are based on estimates given by those interviewed in trade and industry and can therefore be rather subjective. But the fact that the Netherlands scores lower than any of the other countries is still significant. (fig. 6.4) An important source of new products and services are small-and medium-sized enterprises. Research of the Economic Institute for Small- and Medium-Sized Enterprises (EIM) has shown that SMEs are increasingly unwilling to invest in renewal of products or services. In 1999, 57% of small- and medium-sized companies indicated that they had launched new products or services in the previous three years. In 2000, this percentage had fallen to 34%.(EIM, 2002)

6.4 AVAILABILITY OF VENTURE CAPITAL

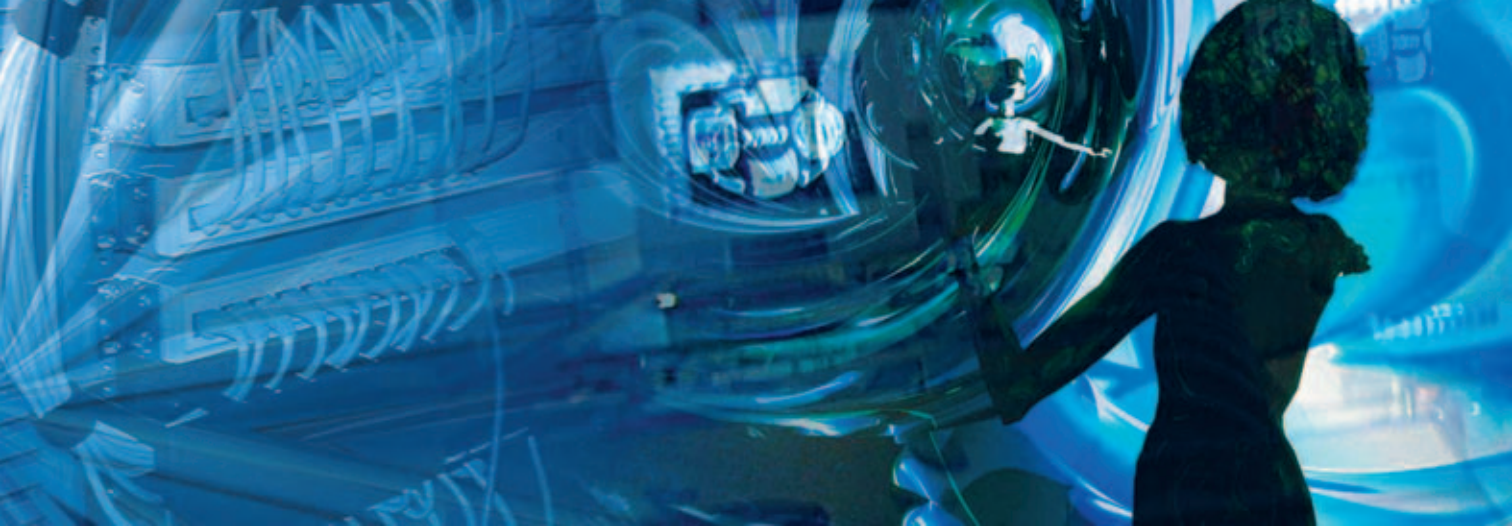
Venture capital is money that is available to starting enterprises with high-risk profiles. It is funding for the nursery of the economy and can be compared to the money father Philips lend to his son Gerard. International comparisons show that the Netherlands held a favourable position at the peak of the internet-hype. Also in the post-hype, the Netherlands does very well. After the United States, Scandinavian countries score very high. (fig. 6.5) OECD figures, however, make clear that Dutch venture capital is primarily accessible to those enterprises that successfully survived the start-up period. (fig. 6.6) Little money is available for starting enterprises during the most risky stage.

6.5 INNOVATION DYNAMICS

An indication of innovation dynamics in an economy is the number of companies that start up and close down. It tells us something about an economy's pace of renewal, but also to what extent starters are prepared to take risks. Fig. 6.7 gives the sum of companies that go in and out of business. The Netherlands has a low number of starters, but the number of companies that go bankrupt is even lower. On balance, our country has an increase of enterprises, though economic renewal is modest. (fig. 6.7)

6.6 NON-TECHNOLOGICAL INNOVATION

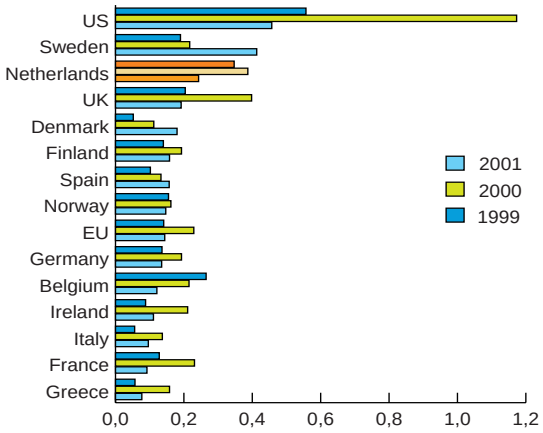
Innovation does not only concern technology. What is more, non-technological aspects, such as product design or renewal of organisational services, become increasingly important in the present-day economy. These products and services can be compared to the role brother Anton played in the development of Philips. We already presented several examples at the beginning of this chapter. The definition of R&D is technologically orientated and this may distort the discussion on innovation power in the Netherlands. That is research has been done to look at the performance of the Netherlands in the field of non-technological innovation. 45% of Dutch companies have introduced this type of innovation in the period 1996-1998. (CBS, 2003) Unfortunately no international statistics are available on this topic.



6.7 BIOTECHNOLOGY START-UPS

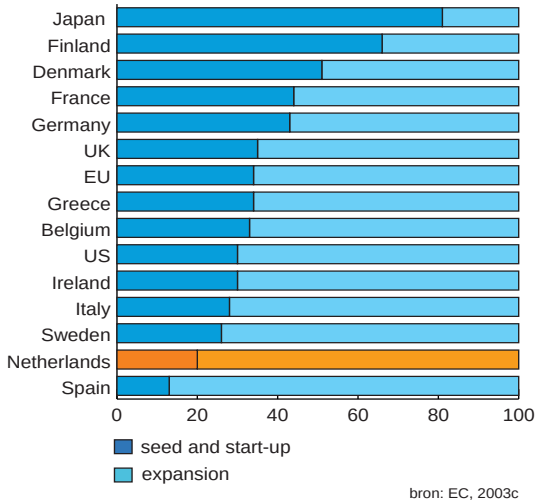
One of the growth sectors of the future is biotechnology. It is a highly dynamic field, in which various young, small companies are searching for new products such as new foodstuffs and medicines which could improve the quality of life. Socially and economically, these are interesting facts for a country. Compare it to the rise of Microsoft: in 1978, the company employed only fifteen people. Those starting off in the biotech industry now could be world leaders in a market of milliards in twenty years. The United States takes a lead in the economic utilisation of biotechnology. Figure 6.8 shows that in Europe Scandinavian countries are most prominent in this respect. Although the Netherlands has improved its position over the past few years, it still scores below average. (fig. 6.8)

Figure 6.5 Venture capital as % of GNP(1999-2001)

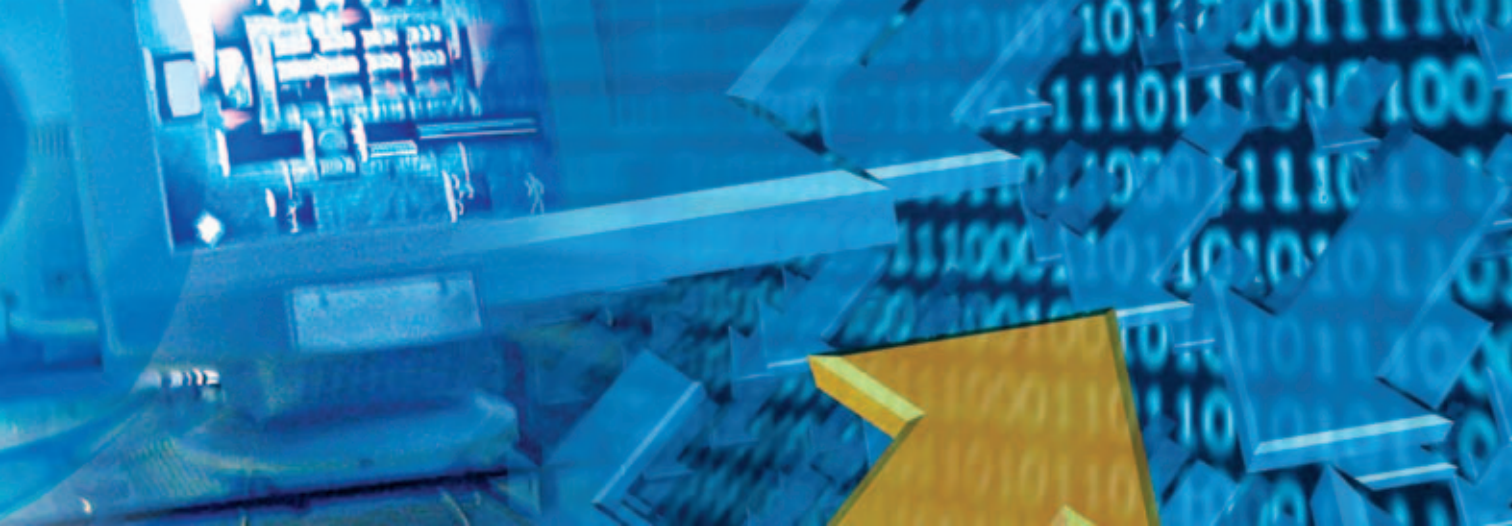


source: Eurostat, 2003

Figure 6.6 Proportion seed + start-up capital versus expansion capital (2001)



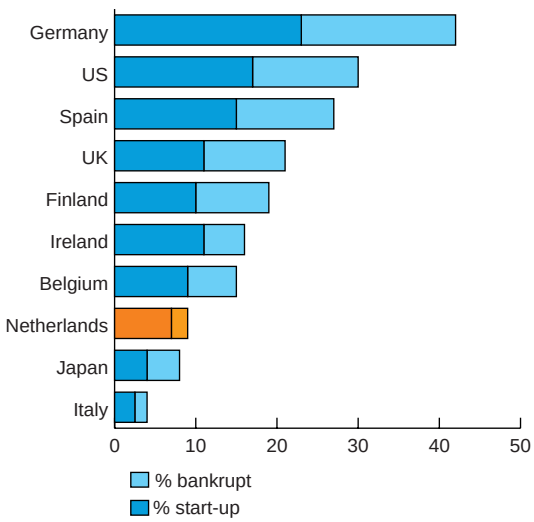
bron: EC, 2003c



The picture in 2003

In this chapter on innovation we have looked at the first results of investments in people, knowledge and networks. The statistics produce a picture of a former champion who is loosing his strength. Since the late 1960s, the position of the Netherlands in R&D has been in decline. Top achievements have become low averages. More and more research is conducted abroad. (fig. 6.9) In a recent survey held among industrial companies, 68% of the respondents expressed the expectation that a large share of R&D would be moved to low-wage countries. (Van Dorp en Wijgerse, 2003) The transfer of R&D activities of big companies to foreign countries is compensated insufficiently by innovation of new companies or existing SMEs. For SMEs, the trend to invest in R&D and to innovate is in decline. The results are accordingly: productivity growth stays behind, as well as the introduction of new products and services. To cut a long story short: if nothing changes in the Netherlands, the most likely prognosis is a fall towards demotion.

Figure 6.7 Dynamics enterprises (1998)



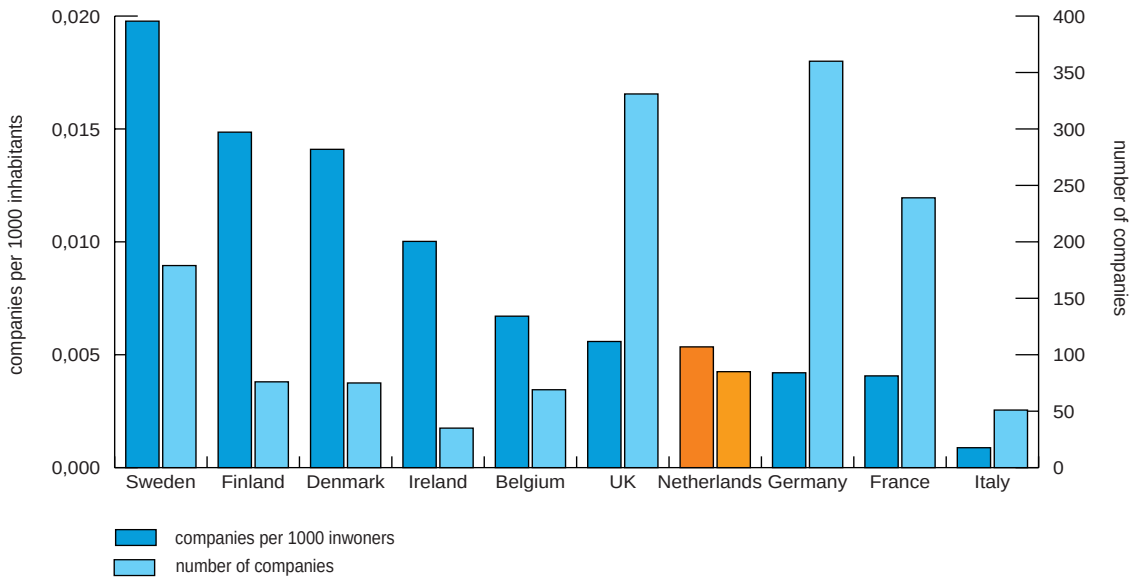
source: OECD, 2001b

Material for a future agenda

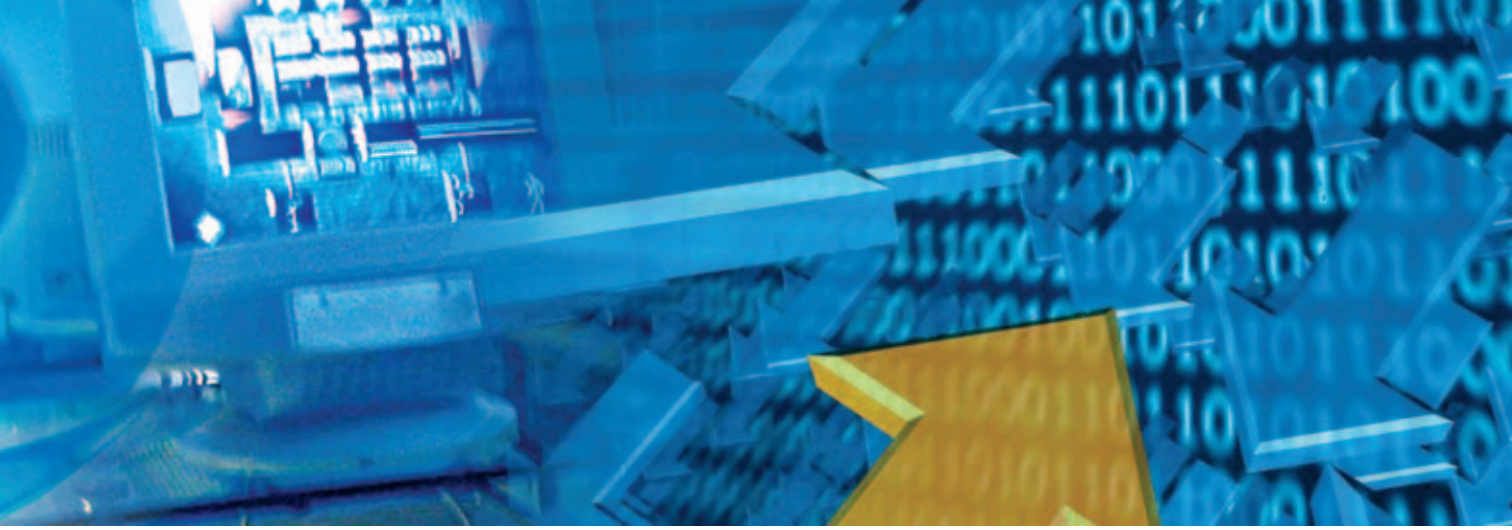
• How to grow innovation capacity

Growth of Dutch innovative capacity can come from several sources. This requires choice. New companies constitute a first source of innovative power, especially new enterprises that grow in or around universities. A second possible source is stimulation of R&D in existing Dutch SMEs. A third potential source is conservation of R&D activities of large Dutch and foreign enterprises, as well as attracting R&D activities from abroad. The big question is which source has the most potential. Betting on all three may lead to failure.

Figure 6.8 Bio-tech companies



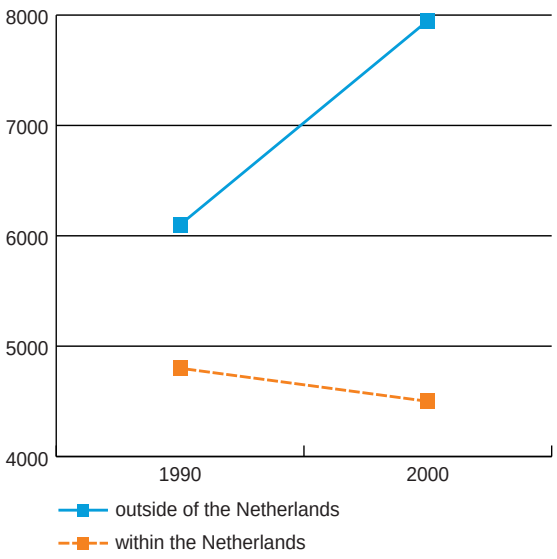
source: EC, 2002f. Ernst & Young, 2003



• Managing innovation: general or specific

Dutch innovation policy mainly consists of financial incentives: companies that innovate pay less taxes. The results of this model are meagre: compared to other countries, each euro paid by the Dutch government generates only a few euros in the market. There is an alternative: specific guidance of programmes and clusters. This only works when priorities are formulated. The Netherlands is too small to excel in everything. Therefore we must choose. This method has been used by countries that have been successful in improving their innovation capacity, such as Sweden, Finland and Belgium. The model is also applicable to the Netherlands.

Figuur 6.9 R&D of the great 6
(Millions of Dutch Guilders,1999 prices)



source: AWT, 2003

7 INFRASTRUCTURE

A good infrastructure strongly determines a country's economic success. But the infrastructure of the knowledge economy is different from the industrial economy's infrastructure. It is not so much about transport of goods and natural resources, as it is about the transport of information and services. Of course, road, railway and water networks will still be needed in the future; however, the competitive ability of knowledge-intensive industries will be increasingly determined by newer infrastructures such as broadband internet and flight connections.

In this chapter we will investigate the infrastructure of the Netherlands. We will consider a number of indicators: ICT-expenditure, number of internet connections and mobile phones and the Netherlands' position as an intersection of the economic highway. Lastly we will look at air traffic and flight connections from and to the Netherlands.

7.1 ICT EXPENDITURE

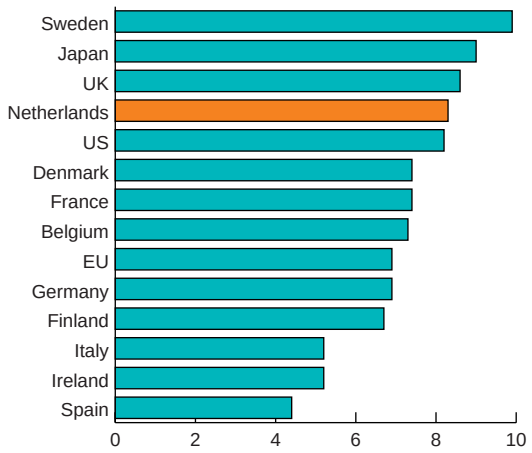
The level of ICT expenditure indicates the importance of ICT for an economy and its willingness to invest in it. In comparison to others, the Netherlands spends a lot on ICT. If we judge this against the percentage of GNP, the Netherlands reaches 8.3% per year. This makes us third in Europe. (fig. 7.1) Included in this number are investments in infrastructure, hardware and software.

7.2 INTERNET AND MOBILE PHONES

An indicator for the quality of ICT infrastructure is the number of internet connections and mobile phones, as this indicates to which extent ICT infrastructures are used and what possibilities there are to further develop these.

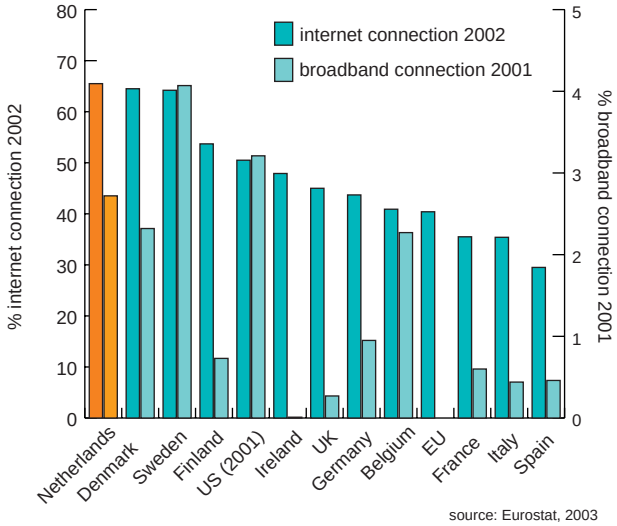
In the area of internet connections, the Netherlands is an international front runner. In 2002, 63% of all households was connected to the internet, more than anywhere else in Europe. (fig. 7.2) Almost 80% of Dutch people had access to the world wide web, at home, at school or at work. According to the CBS, the number of broadband internet connections is increasing rapidly. Internationally we score above average and we even experience fast growth. (CBS, 2003a) At this moment 1,24 million people have a DSL or cable-modem internet connection, which is 19% of total households and 29% of those households with internet at home (figures August 2003). With regards to the number of mobile phones the Netherlands belongs to the top as well. Almost 80% of the population now has a mobile phone. This makes us fourth in the international ratings, after Finland, Sweden and the United Kingdom. (fig. 7.3) Compared to other countries, the Netherlands has a high number of providers. This makes mobile phone use relatively cheap compared to other countries. (EZ, 2002b)

Figure 7.1 ICT expenditure as % GNP (2001)



source: EC, 2002b

Figure 7.2 Households connected to the Internet in %



source: Eurostat, 2003

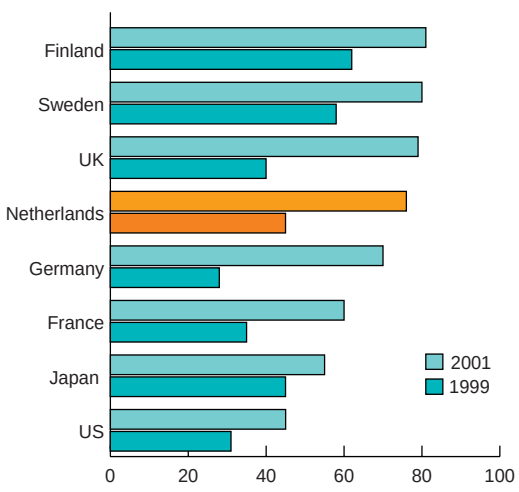
7.3 DATA NETWORKS

One important condition for a knowledge economy is the availability of good data networks. Companies that are professionally dependent on the internet (ICT companies or banks, for instance) want to be in a location where internet is broadband and stable. The Netherlands does well in this regard. The Amsterdam Internet Exchange was one of the first internet hubs in the world. Founded by a group of mathematicians of the University of Amsterdam, the AMS-IX has become the largest internet hub on mainland Europe. (fig. 7.4) A large part of European data traffic goes via Amsterdam, including all traffic to and from the United States. This has positively affected the number of new companies coming to Amsterdam over the past few years.

The position of the Netherlands' in the area of data networking is extraordinary for other reasons as well. Thanks to SURFnet (www.surfnet.nl) and the Gigaport project (www.gigaport.nl), the Netherlands has the fastest research network in the world. (fig. 7.5) Universities, polytechnics, research institutions and R&D companies all make use of it. Over the next few years, the Netherlands will still be in the lead, but other international players are catching up. At the European

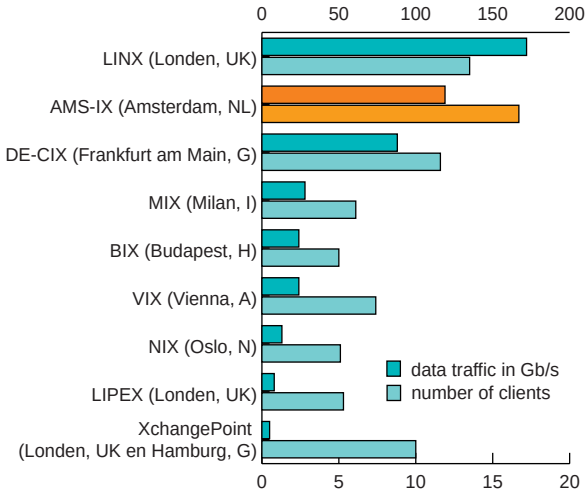
level, in the framework of eEurope, a broadband data network is being established, which connects all European institutes of tertiary education. The European Commission also plans to link schools to a similar network. (EC, 2002a). In the Netherlands we now see numerous initiatives on the local level for fibre to the institution, connecting schools, libraries, etcetera to high speed internet.

Figure 7.3 Number of mobile phones per 100 inhabitants



source: EZ, 2002b

Figure 7.4 Data traffic via internet



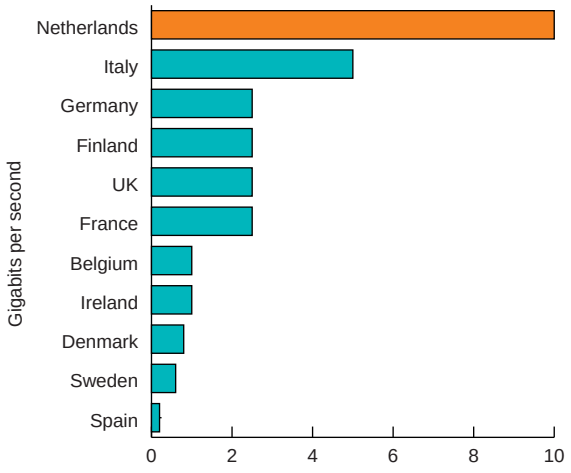
source: EIEA, 2003

7.4 FLIGHT CONNECTIONS

Naturally, knowledge and information are also transferred through people, not only through data networks. Along with increasing international contacts, international movements of people are growing more frequent and intense. The quality of an airport has come to determine the choice of knowledge-intensive industries to settle down in a certain area. Particularly for organisations with high international mobility such as head-quarters of large multinationals, an airport can be a decisive factor. The appeal of the Amsterdam South Axis can thus be partly explained. The quality of an airport

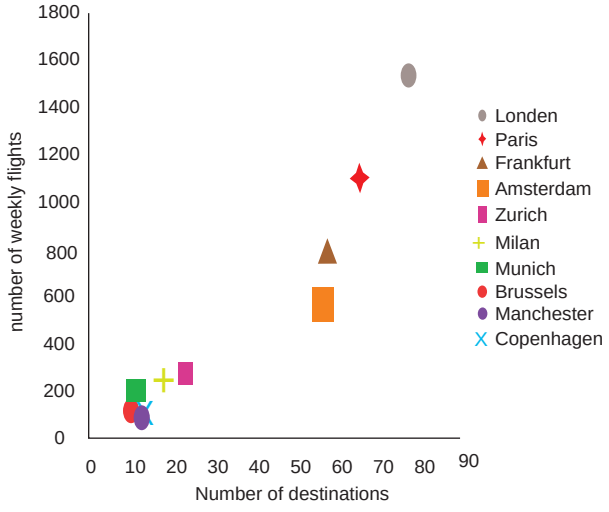
is firstly determined by its connexions. The more direct connexions to other economic centres in the knowledge economy the better. The frequency of flights adds to this. Figure 7.6 compares the airports of a number of European cities on the topic of intercontinental connections. For European connections numbers are similar. Measures have been taken at all airports in one city. Amsterdam only has Schiphol, but London and Paris have several airports.

Figure 7.5 Speed research networks (2001)



source: EC, 2002a

Figure 7.6 Intercontinental flight connections (2002)



source: schipholgroup 2003

London clearly is the most accessible city. Paris and Frankfurt are next and Amsterdam follows. Amsterdam has 57 destinations and 560 flights per week. Other airports in Europe, such as Zurich, Milan and Munich fall far behind. (fig. 7.6)

Material for a future agenda

• New broadband networks

The broadband internet market in the Netherlands is growing rapidly. Providers can barely satisfy the demand for broadband. Throughout the country various initiatives are being explored to develop glass fibre networks. Investment may partly come from private investors, however a smart strategy and involvement of all parties is a primary requirement. The lessons learned from Gigaport could contribute to this process.

•International data and flight connections

Our international competitive position is strongly supported by good international data facilities and flight connections. The Netherlands performs well at this point. We are talking about highly dynamic fields and continuous attention is required to maintain our strong position.

8 CULTURE

According to the sociologists Lenski & Lenski, culture has an immaterial and a material side. The immaterial side concerns values, norms, perceptions, symbols and customs. The material side is about cultural products. (SCP, 2002) Both aspects are important to a knowledge economy. Culture in terms of values is an important condition for economic success. UNICE, the employers' organisation in Europe states: *'In the long run, economic values and people's attitude towards risk-taking, entrepreneurship and new technologies determine the innovative capacity of companies'*. (UNICE, 2000) The material side of culture is about expressions of culture: paintings, films and photos, but also about products that are produced in advertisement, design and marketing. These products become increasingly important in an economy that revolves around the trade of ideas and experiences. Enterprises specialised in this trade are together known as the 'creative industry'.

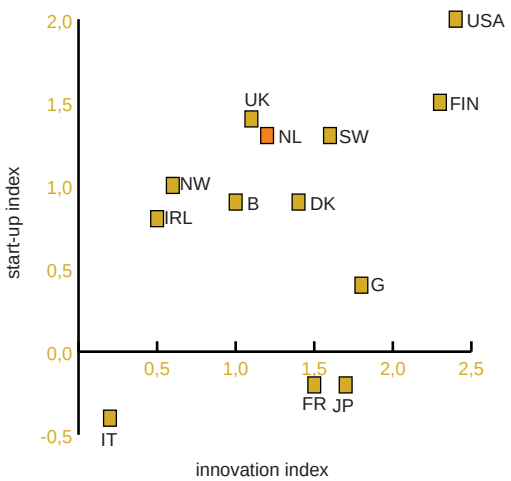
There is another reason that makes culture so important. Attracting talent is one of the most important requirements for success. Companies thus tend to settle down in places where talented people live. *'Keep your tax incentives and highway interchange, we will go where the highly skilled people are'* , Carly Fiorina, CEO of Hewlett Packard, stated (cited in Florida, 2002). Economic geographer Florida researched knowledge workers' reasons to take up residence in a certain place. He calls them '*the creative class'*, those people who earn their money with creative applications of knowledge. They are academics and designers, as well as lawyers and consultants. Florida states they are mobile on the national and international level, and they settle down in regions where can develop themselves and where the quality of life is high. The creative class now covers more than 30% of the working population in the United States. Florida's research makes clear that culture is the decisive factor in the process of choosing a place to live. Both the immaterial side (covering values as diversity and openness) and the material side (cultural facilities) of culture are significant. Cities that score high in this respect are the cities that experienced the strongest economic growth over the past ten years.

Taking this into account, culture is a crucial element of the knowledge economy: as a climate which supports innovation, as a sector generating people who contribute to innovation and as an environment which attracts talent. In this chapter we will use these dimensions to map out culture in the Netherlands. We will consider four indicators: economic creativity in the Netherlands, our attitude towards entrepreneurship, our attitude towards new technologies and the presence of creative industries in our country.

8.1 ECONOMIC CREATIVITY

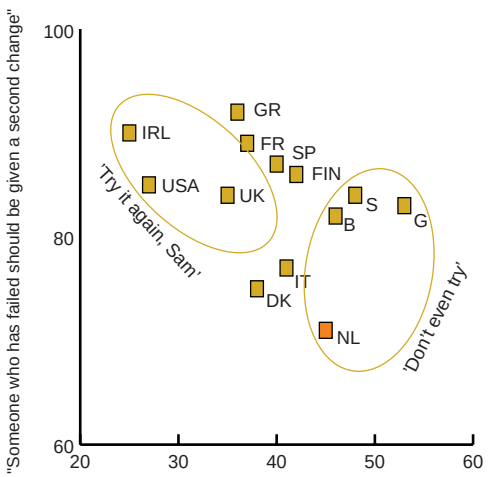
Innovation is a creative process. It means daring to think the unthinkable, combining this with existing ideas and trying out what seems unlikely. Creativity is a spark that triggers innovation. Creativity is somehow elusive. Many organisations have searched for suitable models to measure and stimulate creativity. Larger companies experience more problems than smaller and newer ones. Especially smaller companies are seen as the sources of innovation. As a result, many larger companies have developed innovation models that are based on the incorporation of smaller companies to produce new products and services. One example is the purchase of the small company Powerpoint by Microsoft. A Dutch example was the acquisition of wifi-supplyer Hubhop by KPN. Is the Netherlands creative? A suitable indicator for that is not (yet) available.. Most relevant is a research project of Warner (EZ, 2002a), who invented an economic creativity index based on the *Global Competitiveness Report*. He combined an index for starting enterprises with an innovation index. Both indices were based on various indicators. The index provides a picture of countries' economic creativity. The Netherlands scores average in this respect, while the United Stated and Finland are clearly in the lead. (fig. 8.1)

Figure 8.1 Economic creativity



source: EZ, 2002a

Figure 8.2 Enterpreneurship



source: EZ, 2002a

8.2 ENTREPRENEURSHIP

We just concluded that starting enterprises are a source of innovation. But what is the state of entrepreneurship in the Netherlands? Various aspects are relevant to this topic: willingness to take risks, the degree to which competition is valued and the level of individualism. (UNICE, 2002)

Attitudes towards entrepreneurship in the Netherlands do not encourage anyone to start up a company. This becomes clear when we look at the reactions to the statements: 'One should not start a business if there is a risk it might fail' and 'someone who has failed should be given a second chance'. The survey shows that Dutch men and women are, compared to other countries, particularly keen to avoid risks. Our country even gets the label 'don't even try'. (fig. 8.2)

8.3 TECHNOLOGY

Technology plays an important part in the process of innovation. Attitudes towards new technologies say something about the chance that technological innovations will be applied and adopted. We did not find any international figures with regards to this topic. Research of the Bureau for Social and Cultural Planning (SCP) shows that since 1985 opinions about technological innovations are becoming increasingly favourable. This applies primarily to ICT, and to a lesser extent to biotechnology, nuclear energy and military technology. (SCP, 2002)

8.4 CREATIVE INDUSTRY

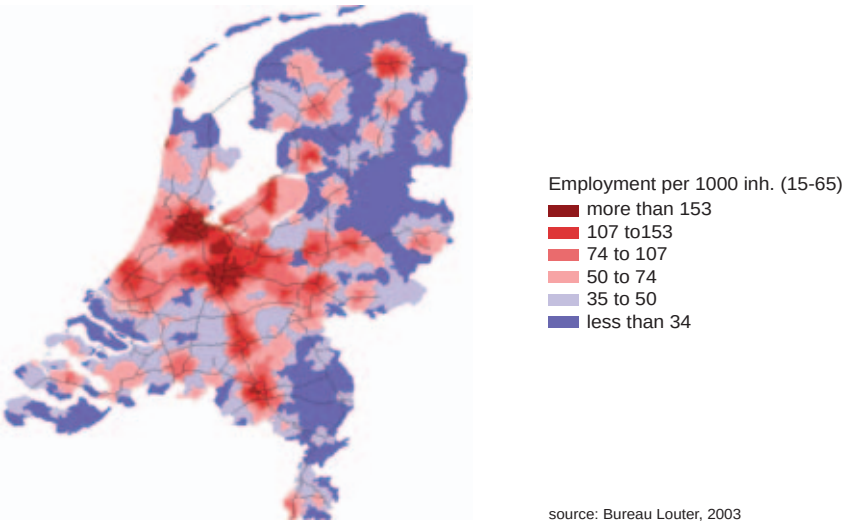
Where can we find creative industry in the Netherlands? Creativity is an important aspect of creating added value. In the knowledge economy not only a product's quality and price are important. It is also the power of a brand, product experience and product identification which make a difference. All these issues depend on cultural products such as branding, design and marketing. At the same time, a growing part of the economy hangs on the trade of ideas and non-tangible products, such as computer games, films, music, furniture design, mobile phones and websites.

The Netherlands is known for its powerful creative industry: our country has a strong reputation when DJs, fashion, architecture, design or advertisement are concerned. Also in the entertainment industry the Netherlands is an important player. A well-known example is the TV programme Big Brother, produced by the Dutch company Endemol and successful all over the world. Endemol is also strongly represented in the international musical scene. According to Florida's theory, creative industries are concentrated in specific cities or regions. In these places economic growth should be faster. Is this true for the Netherlands?

An analysis such as Florida made of residential areas of the creative class in the United States does not yet exist for the Netherlands. Nonetheless, the Economic Barometer gives a good impression. (Bureau Louter, 2003) The Economic

Barometer looks at creative services, for example consultancy, ICT and the media. Its definition comes close to Florida's *Creative Class*. In the field of creative services, Amsterdam, and to a lesser extent Utrecht and Hilversum are the frontrunners. In these places employment opportunity in the creative service industry per 1000 inhabitants is greater than in any other part of the country. (fig. 8.3) CBS statistics on places of settlement of so-called content businesses confirm this picture. (CBS, 2003a) Compare this with economic figures and you will see Florida's findings in the United States confirmed. In the period 1996-2001, economic growth was strongest in Utrecht and Amsterdam, with respect to employment opportunity as well as labour productivity (see chapter 5).

Figure 8.3 Creative services: employment per 1000 inhabitants (2001)



source: Bureau Louter, 2003

The picture in 2003

If we look at culture understood as a climate in which innovation is stimulated, the image is far from encouraging. There is little economic creativity and our attitude towards entrepreneurship is entirely negative. Opinions about technology are more positive. When you look at culture as a sector in which cultural products are produced, the so-called creative industry, you will find that is well represented in the Netherlands. This is especially true for the regions Amsterdam, Hilversum and Utrecht. The opportunity to distinguish ourselves lies here. Unfortunately no figures are available that make clear to what extent Dutch culture plays a role in attracting talent, for example because of its cultural facilities. We expect the Netherlands scores high at this point, but evidence is not available.

Material for a future agenda

- Stimulating entrepreneurship

Over the past few years several initiatives have been introduced to stimulate entrepreneurship, for example competitions such as New Venture and the Broos van Erp award. But our cultural desire to avoid risks still affects our attitude towards starting a company. Students in higher education could be stimulated more to start their own companies. For example, universities and polytechnics could allow student businesses to make use of their facilities. Also, a university teacher who owns a company will encourage students to do the same. Stimulating university teachers to start a company or appointing entrepreneurs as part-time university teachers may contribute to this process.

- The Netherlands as a creative breeding-place

Architects, DJs, designers, and advertisers: the Netherlands provides part of the international top. In these professional fields the Dutch can distinguish themselves from others in the international knowledge economy. However the meaning of culture as an economic force is seldom fully understood. Government can stimulate this in two ways. Firstly by creating top courses in tertiary education that enjoy international prestige and improve creative industry in the Netherlands on the supply side. We already have several of these high-profile schools that select principally on quality. Secondly, culture should be stimulated economically. Not through subsidisation, but by offering prior conditions, creating markets and making these markets more accessible. Just like the fiscal measures that have been taken to stimulate the film industry and have strongly encouraged private investors to invest in this cultural sector.

9 INSTITUTIONS

A smart country cannot exist without smart public institutions. It all starts with a smart government, because the government strongly influences institutional arrangements in a society. The government settles laws and regulations and allocates tasks to different institutions. In most western countries the government makes sure that, through education, the intellectual, creative and entrepreneurial potential of a population is fully developed. Finally, the government plays an important role in creating prior economic conditions concerning spatial planning, quality of infrastructure, cultural climate and service level. But not only the government is responsible for smart institutions. Employers' organisations and labour unions also play a central role in designing our institutions.

In this chapter we will look at the extent to which our institutions promote the development of the knowledge economy. We will consider five indicators: threshold for starting up an enterprise, administrative costs for companies, number of incubators per 100 SMEs, level of e-government and the functioning of the national innovation system.

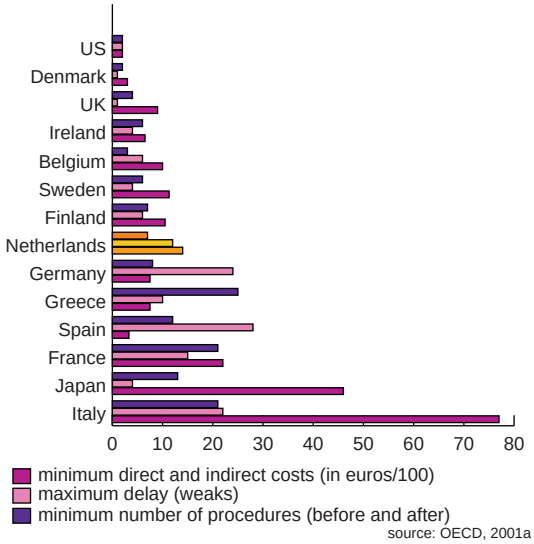
9.1 STARTING ENTERPRISES

Innovation means creating a venture based on a new idea, within an existing company structure or by starting up a new enterprise. Inevitably, anyone who starts up a company needs to fulfil a number of obligations, such as signing up with the Chamber of Commerce and applying for tax registration. The lower the threshold for starting an enterprise is, the more people will actually take this (courageous) step. Figure 9.1 makes clear that the Netherlands holds an average position in the international ratings. (OECD, 2001b) It should be noted that these figures date back to 1988. Certain conditions may have changed since then. But as the report from the Ministry of Economic Affairs *Benchmarking the Netherlands 2002* indicates, the situation in other countries is likely to have changed as well.

9.2 ADMINISTRATIVE COSTS

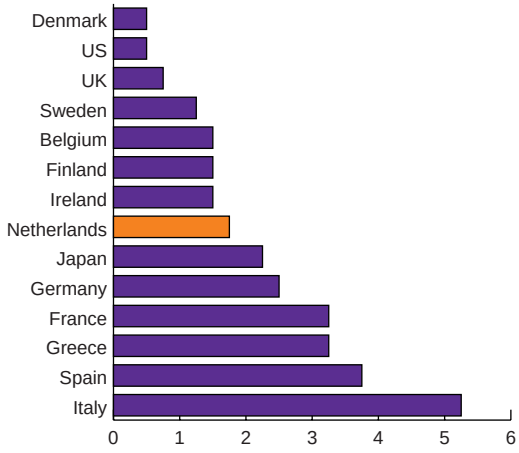
Administrative costs are an inevitable burden: certain procedures and the provision of information always require administrative support. In the Netherlands, aggregate administrative costs add up to 7 billion Euro per year. (EZ, 2002c) OECD figures (2001b) show that this number is average in an international context. Only the United States, the United Kingdom, Ireland and the Scandinavian countries perform better. (fig. 9.2)

Figure 9.1 Thresholds for starting an enterprise



source: OECD, 2001a

Figure 9.2 Administrative costs for companies (1998)



source: OECD, 2001b

9.3 INCUBATORS

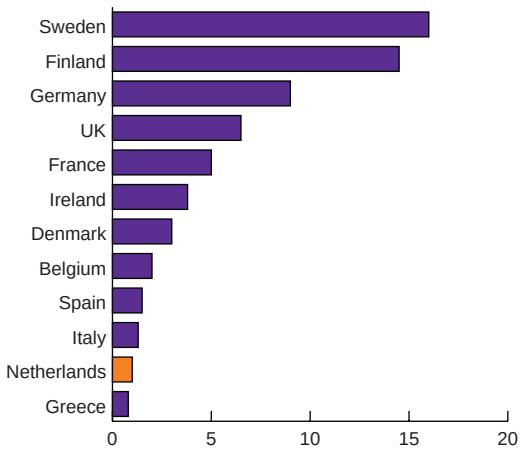
Incubators are the nurseries of new knowledge-intensive enterprises. They are organisations that assist start-up companies with structuring their businesses, the search for clients and funding issues. Often they also provide office space in a building where various young companies can exchange knowledge and experiences. Eventually, successful incubators grow to become important players in regional networks. These networks have been known to gradually develop into clusters.

It is difficult to find sufficient market funds to finance the work of incubators in difficult economic times. The investment is simply too risky. Therefore, European governments are the most important investors of incubators. In Finland and Germany, government has set up incubators around universities in order to support the creation of more knowledge-intensive companies. Figure 9.3 makes clear that the Netherlands lags behind at this point; only Greece has fewer incubators than we do. (fig. 9.3)

9.4 E-GOVERNMENT

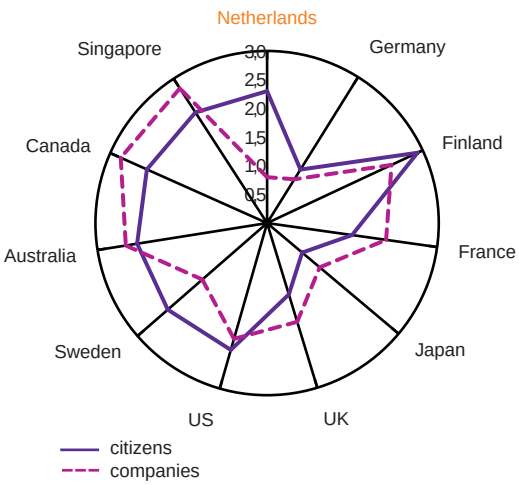
ICT provides an extremely useful means to improve the quality of government services against lower structural costs. Application of ICT in government services is an indication of a government's willingness and capacity to innovate: it says something about how eager a government is to apply new solutions. Figure 9.4 demonstrates that the Netherlands performs well in providing services to its citizens. We even hold a number of international best practices, such as online tax returns. However with regards to developing new services for businesses, the Netherlands does not do so well. (fig. 9.4)

Figure 9.3 Number of incubators per 100 SMEs (2001)



source: EC, 2002d

Figure 9.4 Electrical services to citizens and companies



source: EZ, 2002b

9.5 INNOVATION SYSTEM

The innovation system is the sum of organisations and regulations which together aim to improve a country's capacity to innovate. Figures 9.5 and 9.6 outline the systems of Finland and the Netherlands. The schemes make clear that in Finland tasks are more clearly separated than in the Netherlands. Also responsibilities are better defined. The Finish system requires less communication between different institutions, which makes it more efficient and ready for immediate action. The advantages of the Finish model are clear: in almost every chapter of this monitor Finland scores well or even very well on most of the indicators.

The picture in 2003

Public institutions in the Netherlands could be a lot smarter. Especially concerning start-up enterprises: thresholds can be lowered and starting entrepreneurs can be assisted by incubators. More efficient execution of processes will lead to lower administrative costs. After several years of decreasing administrative costs, numbers again went up last year. The challenge is to recapture the decreasing trend. Government can work smarter, aided by the solutions of ICT. Although electronic services for citizens are numerous in the Netherlands, electronic services for businesses should be further looked into. Main point of concern is the state of institutions that aim to promote innovation: a jungle of different agencies and responsibilities. It is difficult to understand how such a fragmented system can effectively carry out innovation policy.

Material for a future agenda

- Reorganise the innovation system

  Reorganisation of the Dutch innovation system is needed to create a better division of tasks. In a new kind of organisation actors of the system will use their time more efficiently and will be less bothered by in-house competition.

- Stimulate knowledge-intensive industries

  Even Philips was once a one-man company, one of the first techno-starters. Without doubt, there are numerous talented students (m/f) at Dutch polytechnics and universities nowadays that have it in them to create a new Philips. A climate that stimulates knowledge-intensive companies will increase the chance that talent will eventually be turned into business. Therefore, it is necessary to lower thresholds for starting a business. In addition to this, figures have shown that supporting activities by means of incubators could be strengthened.

• Improve execution processes

For Dutch people it is very upsetting to hear that Belgians do better. The report ‘A Matter of Execution’, published by the KL-initiated advisory committee ‘Belgium Does Better’ makes apparent that the employment of e-government could contribute significantly to the improvement of government services against considerably lower costs. The use of e-government would provide an impulse to the organisation of government to modernise, while at the same time it would be the key to reducing administrative costs. A programme to lower administrative costs for businesses could be carried out in even less time. A larger number of countries already works with electronic VAT declaration and return procedures and so-called one-stop-shop internet systems that help companies to share information with public authorities and vice versa.

Figure 9.5 Finnish Innovation System (Tekes, 2002)

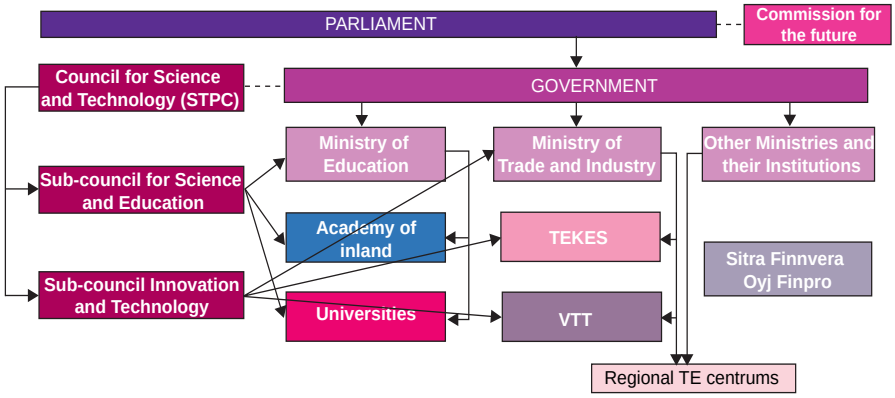
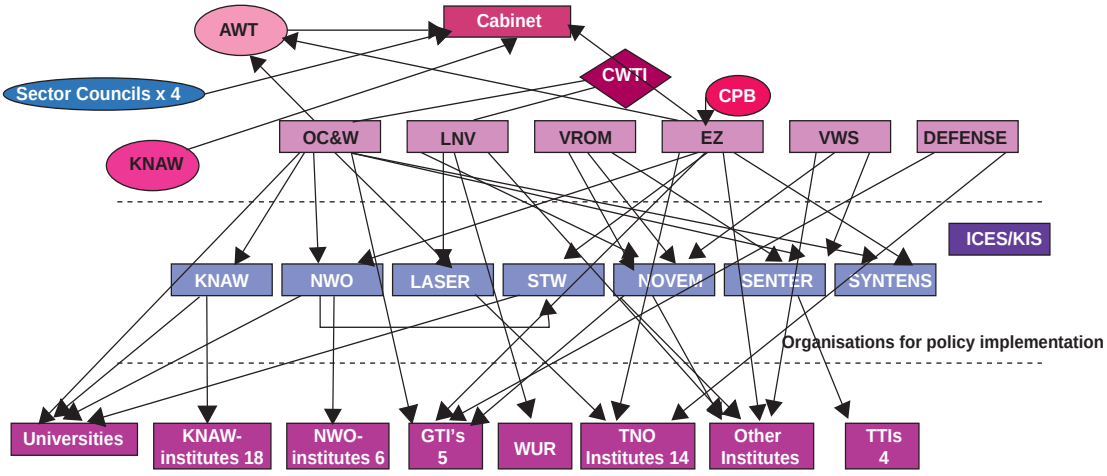


Figure 9.6 Dutch Innovation System (Soete, 2003)



10 TIME TO CHOOSE

The management summary of this monitor: in comparison to other European countries, our country has a low-educated population, very few researchers, low levels of productivity, hardly any profit from new products, few start-up companies in and around universities and polytechnics, a culture which strongly discourages entrepreneurship, institutions that function poorly, and an inadequate number of networks for knowledge exchange. This sombre conclusion is the result of insufficient investment in the education of the population, low private investments in innovation and a poor innovation system that is obstructed by a culture of too much talking and little action.

Former champion

The difference with thirty years ago is great. At that time, Dutch education expenditure belonged to the international top and our education was known for its excellent quality. In the late 1960s Dutch trade and industry held the world record for innovation. In the year 2003 the achievements of the Netherlands pale into insignificance next to the top of the European countries. In many cases we even choose to be no more than average. In certain areas the distance to others is immense, especially when we compare ourselves to Scandinavian countries. Also Belgium, Ireland and the United Kingdom often score better than the Netherlands. Most painful is perhaps that there are no signs of recovery, on the contrary, the situation is gradually deteriorating.

The power of non-decision-making

The question arises: “What on earth has happened?” Our parliament obviously did not make a conscious decision twenty years ago that average education levels were too high. Secret government memos from 1985 will not reveal governmental intentions to suppress entrepreneurship in the Netherlands. No education minister ever decided the Netherlands should have the lowest percentage of S&T students of all OECD-countries. But this is what the last thirty years have left us with. We’re left with the feeling that this just happened to us, surely this was not the intention?
It is all the result of non-decision-making, of failing to choose. Just to make things clear: writing a policy paper about something does not constitute a choice, it’s just a record of good intentions. Government papers of the past decades show nothing but good intentions, but there is a huge lack of willpower to transform these intentions into concrete action. Throughout this period one policy note after another has been written, full of good intentions, as if they were charms to ward of further deterioration. But real choices have hardly been made.

Is it really that bad?

Luckily there is some good news as well. According to the Economic Intelligence Unit (EIU, 2003) the Netherlands is, after Canada, the best country to do business. Whatever the state of our knowledge economy, the Netherlands apparently remains a good environment to do business. Besides, this monitor shows that the Netherlands performs well on quality of universities and researchers, that the state of our creative industry is surely promising and that there is no country in which use of the internet is so widely-spread. Certain regions in the Netherlands can compete well with the world's best in certain specialist areas.
Statistics do not always speak the truth. Numbers alone cannot make anything happen, they cannot choose what is best for a country. We have politicians for that. Only policy choices, vision and willpower can make the Netherlands a key region of the international knowledge economy. International examples have demonstrated it is possible. We know the polder model will never get us there. International labour competition and our ageing population render wage reduction and extending labour participation a useless long-term strategy. In addition to reduction of labour charges we need a new strategy. In the remainder of this chapter we will suggest how the path to recovery can be found again. This path requires clear political choices that are not necessarily self-evident. The course of the past thirty years has taught us that not to choose is also to choose. Good intentions alone will not suffice.

Time to choose

In its coalition agreement the new government expressed the ambition that the Netherlands should belong to the top of the European knowledge economy. The facts presented in this monitor make clear that the gap between this ambition and the present situation is considerable. Does the Netherlands really want its former rank at the European top back? Fine, that is certainly possible. Once we were the best and there is no reason to think we cannot come back. Provided we can show some persistence and patience, because building the knowledge economy resembles forestry: sow now and you will harvest in ten years. Three things are needed to achieve this: a clear vision, a number of new rules and a strategic agenda.

10.1 CLEAR VISION

Firstly a clear vision is needed of what the Netherlands' role in the international knowledge economy should be. This vision should be translated into concrete goals to encourage everyone involved to work together and give their. As the Americans say: *a goal is a dream with a target.* A good example is President Kennedy, who in the early 1960s voiced the goal of putting a man on the moon, and immediately mobilised large-scale popular support. The goals need to be translated to into points of measure that match international benchmarks and the 2010 goals decided upon in Lisbon, so that progress can be measured.

10.2 NEW RULES

We argue that the Netherlands needs new rules in order to establish a thriving knowledge economy. We have four suggestions:

Rule 1: Room for excellence
Minister of Economic Affairs Brinkhorst stated recently in a parliamentary meeting: “The Netherlands is a flat country, but we must not desire flat culture”. This comment hits the core of the problem. The praiseworthy Dutch tradition to achieve equal chances for everybody and at all fronts has unintentionally resulted in a society in which mediocrity is the norm. This tendency shows in many places. For instance, in the mid-1990s, the government wanted to concentrate research capability in a number of research schools. The result: a myriad of new research institutions in which no one intervened. These research schools now compete with each other for scarce research funds, while the project intended to build specialist knowledge essential to participate internationally. Another example is the Dutch education system, in which, except for the so-called CITO test, results in primary and secondary schools do not influence access to tertiary education. This has led to a mentality among students of ‘a pass is enough’. The same point is made by the figures on culture in this monitor: our opinion about people who are trying to create something new (entrepreneurs) is largely negative. Choosing excellence means that inspired people will have to be given more space. Those who tries their best should have priority. People who want to make a difference should be given a chance to demonstrate how things can be done better, or differently.

The new rule: People who want to make a difference get the space to do so.

Rule 2: Simplicity in the innovation system
In chapter nine the Dutch innovation system has been contrasted with the Finnish one. It becomes clear from that information that in the Netherlands too many organisations have too many overlapping responsibilities. The result is an excess amount of meetings and lack of action. This is not the fault of the organisations concerned, but is a result of decision-makers’ unwillingness to make choices.
The Dutch system resembles a busy intersection where complex hierarchical regulations decide who may cross and when. The Finnish model is more like a roundabout. On a roundabout different parties decide together who may go, based on one simple rule: traffic on the roundabout always has priority. Roundabouts have a higher capacity than intersections and fewer accidents.
The innovation system is the economic flywheel, the motor that secures long-term success. A cabinet which aims to make real choices should focus on restructuring its organisations first. The aim should be simplicity. All interests should have their own place in a system where overlapping responsibilities do not exist. This change will be painful and will cause resistance, however in the long run a clearer division of tasks is the most important condition for all players to be able to work more effectively.

The new rule: Provide a well-organised innovation system in which responsibilities and interests are clearly separated.

Rule 3: Raise national expenditure to the European level
Participation in Europe requires a level of expenditure that matches the European average, in the public as well as in the private sector. Unless we can demonstrate that government and business currently work more effectively and efficiently in the Netherlands than in other countries. But the actual facts in this monitor show that the opposite is the case. Dutch education expenditure as a percentage of GNP is 1% below the EU average; company spending on R&D is 0.16% lower. Translated into euros, these percentages represent four billion Euro and 650 billion Euro respectively. This is a lot of money, the kind of amounts that cannot be compensated for in one year. However, increasing expenses with 0.1% per year should not be too complicated.

The new rule: Dutch expenses on every aspect important to the national knowledge economy should at least equal EU averages.

Rule 4: Learning by doing
One of the most painful moments in Michael Porter's 2001 Innovation Lecture was his statement: *'A major problem in the Dutch case is that there has been a lot of analysis, but not enough action.'* Just like policy papers, research is often perceived as a charm that will guarantee economic success. There is an alternative to the traditional way of conducting research: practical experimentation. Not in a ministerial department in The Hague, but in a school in the south-east of Amsterdam, the Rotterdam harbour, a university in Enschede, or an office space for biotechnology start-ups in Ede. The role of ministries is to support this search in a practical manner and to highlight the best practises, to ensure that the rest of the country can emulate success. Because innovation can only be successful if the successful experiments of today will be daily practice tomorrow.

The new rule: learn through experimentation.

10.3 SUGGESTIONS FOR A STRATEGIC INNOVATION AGENDA

Based on the data and analysis in this monitor we provide six suggestions for a strategic innovation agenda:

1 Create a strong base
A powerful knowledge economy needs a strong base of human capital. The first condition for a strong knowledge economy is a high education level of its citizens. We need more highly-educated people in the Netherlands, especially in the science and technology sector. The challenge is to tempt more 18-year olds to take the step to tertiary education. Furthermore we need more differentiation and concentration in tertiary education, there is too much disintegration. This ideal can be realised through the creation of top schools that seek specialisation in a number of fields in which the Netherlands wishes to excel. Next point of attention concerns de influx of lower-educated students into polytechnics and universities. This requires strengthening of the so-called 'vocational column'.

2 Foster what is strong
The Netherlands achieves high scores on quality of basic research, infrastructure and creative industry. Foster these points, and expand them. Strengthen the quality of research and the education of researchers even further, reach maximum levels of excellence. Make sure that Dutch households will be the first in the world to enjoy internet connection through glass fibre (or a different technology of comparable quality) and foster the quality of the network of Schiphol as a stepping stone for the Netherlands to the most important knowledge economies in the world. And finally: make the Netherlands an international home base for the creative industry.

3 Exploit the natural resources of the knowledge economy
Traditionally, higher education has two dimensions: teaching and research. The knowledge economy adds a third dimension: exploitation of knowledge as a breeding-place for companies. Due to historical circumstances this third dimension is poorly developed. Foreign countries provide enough examples of how it can be different, but the question is: are we prepared to follow their lead? The result of it all should be a higher degree of business activity in and around universities and polytechnics. A further neglected source are young academic researchers. They enjoy a high international reputation but need to move abroad to find better career prospects. Low participation rates of women in science is a last source that has not been fully exploited. This is something we should feel rather ashamed about.

4 Choose for a regional approach
We cannot say it often enough: the knowledge economy is a regional phenomenon. On a national level the Innovation Platform can create favourable structural conditions, however in reality it all comes down to the regions. This entails strengthening regional clusters, and stimulating a bottom up movement. This is one of the Innovation Platform's most important tasks. Another challenge involves attracting (European) head offices. The 'Holland Distribution Land' campaign was very successful in attracting head quarters of international distribution firms. The Randstad has enough high-profile facilities to realise the same for knowledge-intensive enterprises, with reference to Schiphol and the so-called Amsterdam South Axis as international top business environments. In order to use the potential of the Randstad to the greatest extent national direction is necessary.

5 Encourage knowledge-intensive start-ups
The Netherlands ranks low when entrepreneurship is concerned. We have few start-up companies, particularly in and around universities and polytechnics. This can be encouraged in several ways. A first method involves the use of incubators. Secondly, scouting agencies connected to universities could challenge and assist students and teachers to venture into entrepreneurship. Thirdly, legal procedures for starting companies should be made more straightforward. Finally, much could be improved in the field of administrative costs.

6 Innovative public sector
You cannot have a smart country without smart public institutions. As long as its own organisation is not in order, government cannot advise industry, universities and polytechnics on innovation without loosing credibility. The government needs to reorganise. Again we point to the report of the commission 'Belgium Does Better'. Money can be found literally anywhere, while at the same time quality of public services needs to be improved drastically. It is simply all about execution, about taking action.

Primary conditions: Inspiration, ambition and leadership

Inspiration is the most important condition for the well-being of the Dutch knowledge economy. The success stories of countries as Finland, Korea and Ireland are no coincidence, but the result of inspired long-term visions. Vision generates enthusiasm, as well as perseverance not to give up until concrete results have been achieved. Just like in the 1950s, when the Netherlands invested whole-heartedly in reconstruction, driven by a collective ambition to rebuild the country's economy. It all starts with a politically pronounced ambition to turn the Netherlands into a key players in the knowledge economy. The question is whether the Prime Minister and his ministers will demonstrate leadership skills, and whether they will be satisfied with concrete results only.

Success

The definition of success is, according to us, the following passage in the Queen's annual speech at the opening of the Parliamentary Year in 2011:

> 'With hindsight, the year 2004 marked the radical reversal of a worrisome trend. Since then, general education levels have improved, quality of Dutch research has grown even better, numbers of knowledge-intensive start-ups have been on the increase, employment opportunities in knowledge-intensive industries have only been expanding, the number of European head offices and R&D departments has grown significantly and the Netherlands has become a very attractive place of residence for top talent in academics and the creative industry. Thanks to the efforts of preceding governments the Netherlands has become the most important knowledge economy of Europe.'

Life is great in a country that sizzles with creativity, where people's knowledge and entrepreneurship can flourish without limitations. Other countries have set the right examples. We have to choose, or lose. It is time to choose.

APPENDIX: METHODS AND THE THINGS WE DON'T KNOW YET

This monitor aims to provide a realistic image of the Dutch knowledge economy in the year 2003. Knowledge economy means many things to many people. Some focus on education, others on innovation or the role of ICT: we collected several approaches and created an overview of those different elements because we feel they are strongly interlinked. For the research of this monitor we worked our way through a great number of reports, analyses and statistics. In order to create order in the humongous number of facts we where forced to make choices. These choices are disputable; they depend, of course, on the perspective of the authors. There are many statistics that we would have liked to use, but this would have resulted in a totally incomprehensible report.
In the process of selecting the main sources we have used in this report, we chose international comparative material from recognised sources such as the OECD and the EU whenever that was possible. These kinds of statistics are often accompanied by discussion about the usefulness of definitions used (for example, what does 'tertiary education' include exactly?) But overall these sources provide the best material available at this moment. International comparisons unfortunately cannot always include the most recent material. Whereas Dutch figures for 2002 were sometimes already available, international comparisons were not. However, comparing the Netherlands to other countries indicates exactly where we stand.

THINGS WE DO NOT KNOW YET

Knowledge economy is a relatively new concept that is not yet widely used. Certain statistics could have added valuable information to this document, but unfortunately these are not yet available. This requires new research, and/or a different approach to existing figures. Hopefully this will be realised in years to come. Below we have indicated what we are curious about and which data we were unable to find.

a. Knowledge workers in the Netherlands

A whole range of figures is available on people working in research and technology, as the focus of discussion in the Netherlands is strongly biased towards technology. However creativity, high-level intellectualism and high-profile added-value are not limited to the high-tech sector. Knowledge work is also high touch in interior design, creativity in advertisement, product development in insurance companies, concept development in the entertainment industry, fashion design, consultancy in political campaigns, and more general services such as management consultancy and project management. Based on the work of authors such as Reich (1992), and Florida (2002), estimates are that 30% of the working population of the United States today works in knowledge-intensive sectors. In the early 1960s this was only 8%. By using the databases of the CBS, the CPB and the Foundation for Statistic Research (University of Amsterdam) it should not be too difficult to make a similar estimate for the Netherlands. It's just that no one has tried yet.

b. Making use of education

We have not been able to find statistics on utilisation of human potential of the population in the Netherlands. There are plenty of data relating to education levels of the Dutch population, but it is unclear whether the Netherlands uses the full potential of its people during their labour. With reference to the above, also here applies that databases are available, but no one has ever taken the effort to look at them.

c. Results of education

The OECD report PISA (Program for International Student Assessment) was published recently. This research programme compares the reading and mathematical skills of students in primary and secondary education. The report contains a treasure of information. Unfortunately however, there were not sufficient Dutch responses to render data about the Dutch statistically valid. Reliable comparisons to other countries cannot be drawn. We denied ourselves valuable information about school achievements of Dutch young people.

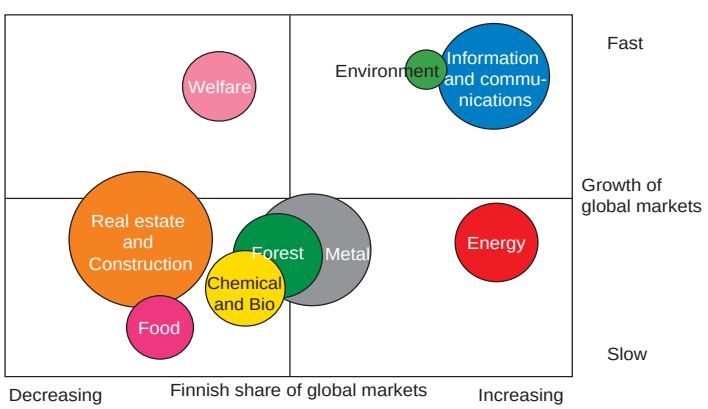
d. The answer to the key question

The most important question for success in the knowledge economy is: in which growth markets could the Netherlands become part of the world top? The greatest economic value can be realised in growth markets where success is decided by the ability to be different and excellent. At the moment we lack sufficient statistical data to answer this question. The graphic below shows how Finland has mapped its market shares in different sectors. We would like to have access to this kind of data with regards to the Netherlands. (Tekes, 2000)

e. Regional statistics

The knowledge economy is an international network of regional clusters. Hotspots in the knowledge economy such as Silicon Valley, Boston, Cambridge, Helsinki and Wageningen show a number of corresponding characteristics. In all places there is at least one high-profile university that provides a source of knowledge and talent, as well as a cloud of small and medium-sized enterprises that allow students and teachers alike to apply their knowledge to business. Furthermore, financial networks exist to support start-up companies, and a number of large companies function as points of crystalization. Networks in these regions are closely-knit; people know each other and even competitors cooperate in order to strengthen the region's potential. The scale of these regional clusters seldom covers more than one-hour travel time. Statistics in the monitor give a general impression of the Dutch situation. In order to get a good idea about the state of the Dutch knowledge economy it is necessary to gain insight into the regional clusters. The report 'The Economic Barometer of the Netherlands' (Bureau Louter, 2003) provides a number of clues, but these are not sufficient. Firstly it is necessary to identify regional clusters in the Netherlands, such as Wageningen (food), Eindhoven (technology), Amsterdam-Hilversum (creative industry), Rotterdam (logistics), and Delft (water and aircraft). A next step would be to map strong and weak points for every region in order to create a base for future regional policy.

Figure 10.1 Technology and competence are sources of renewal



source: Tekes, 2002

f. Transaction costs of innovation

The government possesses various ways to stimulate innovation through subsidisation. In our view, transaction costs of these regulations in the Netherlands are high. Whether you talk to researchers, entrepreneurs or start-up companies, stories about the length of application forms and the time spent in meetings are all too common. The final allocation of the grants can also be a rather lengthy and time-consuming process, just as procedures for giving accountability during the project and the final settlement. The high amount spent on transaction costs might well be an explanation for the low returns of every Dutch governmental euro spent on innovation. Unfortunately we do not have exact numbers and also lack international statistics.

g. The relative power of creative industry

We lack statistics about the composition, regional hotspots, size and quality of creative industry in the Netherlands compared to creative industries abroad. We think that the Netherlands has a lot of potential here, but we would like to see this confirmed.

We hope these voids will be filled by the time we publish the next Knowledge Economy Monitor. Until then we are open for all suggestions to improve this report.

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All public publications used for this monitor are available as a pdf-file at www.kennisland.nl/km2003

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Despite all these contributions, the authors are the ones to be held accountable for the final contents of this report. We are responsible for possible omissions or inaccuracies. We gladly receive your comments (info@kennisland.nl), so that the next version of this Knowledge Economy Monitor will provide an (even) better impression of the state of the knowledge economy of the Netherlands.

Amsterdam, September 2003

Frans Nauta
Joeri van den Steenhoven

THE KNOWLEDGELAND FOUNDATION

The KnowledgeLand Foundation (KL) is an independent Dutch think tank based in Amsterdam. Founded in 1999, its mission is to help establish the Netherlands as one of the key regions in the international knowledge economy. And preferably in a way that creates both economic as social value. The activities of KL are threefold: 1. Together with government, private sector, knowledge institutions an civil society we develop innovation strategies. Strategies that help the Netherlands to realise its potential in the knowledge economy by changing its structures and actions. 2. We initiate projects that help people and organisations to take action. These projects are aimed at enlarging the opportunities for people to participate in the knowledge economy, creating the best climate for knowledge workers and their companies and stimulating the innovation of public institutions to help them work effectively in the knowledge economy and society. 3. We organise learning networks around these strategies and projects. These networks help organisations to understand the need and impact of the knowledge economy and share experiences while taking action.

Thus, KL brings together a network of government, private sector, knowledge institutions and civil society to think about the consequences of the knowledge economy and how to respond to it as a society. But that is not its final destination. KL also translates this response in concrete action and supports learning in this transformation process. In short, we learn by doing.

About the authors
Frans Nauta and Joeri van den Steenhoven are both founders of the KnowledgeLand Foundation. They are considered opinion leaders in the public debate on the knowledge economy in the Netherlands. They regularly publish and lecture on numerous aspects of the knowledge economy. Since September 2003 Frans Nauta is also secretary and member of the Innovation Platform. This platform, under presidency of Prime Minister Balkenende, has to lead the development of the Dutch knowledge economy in the coming years. Joeri van den Steenhoven is also managing numerous KL-projects and acts as strategic advisor.

KL endeavours to establish partnerships with people and organisations around the world that are intrigued by the fundamental transformations of the knowledge economy and society. These partnerships will enable us to exchange experiences and build learning relationships to understand and to create successful regions in the knowledge economy. We are keen to share experiences with you. For more information on KL and our activities, please visit our website at www.kennisland.nl/english. You can contact us through info@kennisland.nl. Do feel free to bring others in contact with us as well.

Frans Nauta
Joeri van den Steenhoven

TIME TO CHOOSE

KNOWLEDGE ECONOMY MONITOR 2003

Knowledge and innovation are the new forces of our economy. Therefore it is called the knowledge economy. What is the state of the knowledge economy of the Netherlands? This monitor considers various aspects of the knowledge economy in order to map out the position of the Netherlands in an international context. Are we taking the right path and what should our future strategy be? It is time to choose.

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