

# THE OECD OBSERVER

2000

## *The Knowledge-based Economy*

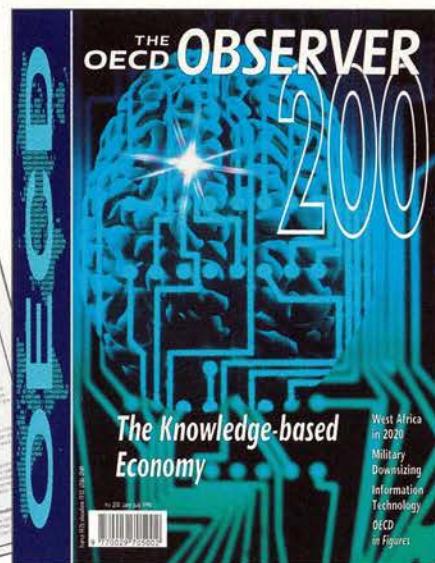
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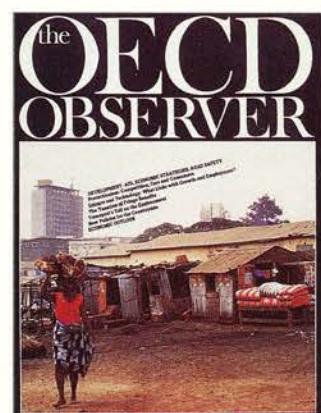
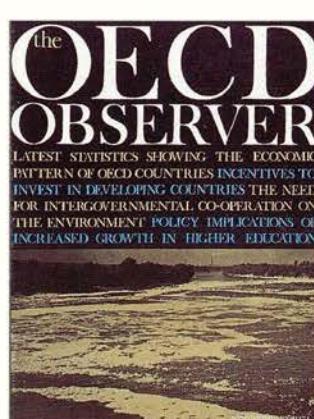
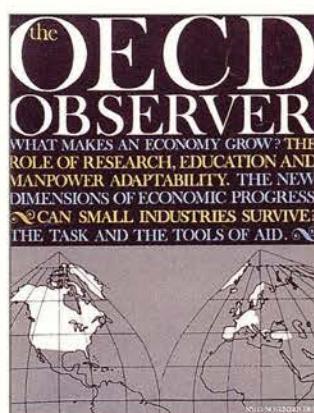
*As for content, although some topics have obviously appeared continually in the two hundred numbers of the Observer, the current issue contains a range of subjects that are radically new, even compared with those of five years ago: knowledge and information as the basis of the economy; the service sector which is beginning to resemble industry, and vice versa; the decline in defence-spending, which is creating difficulties in many regions, not least for employment; a new – and more optimistic – view of the future of West Africa; an analysis of Korea, a candidate for OECD membership. And in a magazine that was completely redesigned a year-and-a-half ago.*

In featuring the more prominent activities of the OECD in the 200 issues produced over the past 34 years or so, the Observer has moved with the times. An article in the very first number, published in November 1962, would seem anachronistic today in asking whether, 'among the business giants', there was room for small industries. The same would be true of the 50th issue which, in 1971, went into the problem of food surpluses. But there is continuity, too: articles in that first issue analysed 'manpower adaptability and economic growth' and discussed the 'role of research and education' in growth and the 'social consequences of office automation'. Nine years later it was being stated that countries should co-operate in environmental matters.

In the 100th issue the OECD looked ahead, bringing out a special number of the Observer entitled 'Facing the Future', in which global interdependence – not yet globalisation – was a central theme. In 1988 – No. 150 – criticism was levelled at 'The High Cost of Protection' and at 'Transport's Toll on the Environment'. And in view of the OECD's responsibility as a statistical organisation with peer-group reviews as one of its basic principles, the same issue asked 'Who Spends What on R&D?' and examined 'The Pros and Cons of Alternative Development Strategies'.

The transformation of our statistical supplement, 'The OECD Member Countries', which in 1988 became 'OECD in Figures', is indicative of four things: the gradual shift from measuring the OECD economies in 'accounting' terms (the number of telephones per thousand inhabitants...) towards structural analysis of their development, thereby increasing the range of subjects covered and providing long series of data; the growing sophistication of the OECD's statistics and the increasing wealth of its data-bases; the progress of information technology; and last, our concern to give you a practical, pocket-sized publication containing as many figures as possible.

*The next stage? The Observer on Internet? More and better all the time, of course. But that does not mean giving up paper, forgoing the pleasure of browsing or the smell of ink...*



*Ulla Ranball-Reyners*  
*Editor*

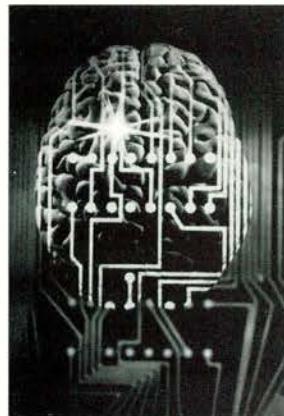
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*The advance of technology has made knowledge a central element of economic growth. The result has been a dramatic expansion of the service sector, requiring in turn the revision of both industrial policies and the indicators used to measure economic activity.*

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# Policies for a Knowledge-based Economy

Jean-Claude Paye, Secretary-General of the OECD

A major asset of OECD is its interdisciplinary approach to issues, not least its ability to combine macro and micro-economic analysis in areas such as education and training, labour and product markets. The emergence of the knowledge-based economy has brought this analytical capacity to the fore: knowledge is now a crucial factor underpinning economic growth.

Producing goods and services with high value-added is at the core of improving economic performance and international competitiveness. The fastest rates of growth in output are being recorded by high-technology manufacturing sectors, such as computers and aerospace, and knowledge-based services, finance and communications for example. OECD exports consist to a growing degree of high-technology products, patents and trademarks and technical services. Investments in R&D, computer software and the like have substantially grown in importance. Increasing intangible investment – which is difficult to measure – in the upgrading of the skills and competences of workers has become a major issue for enterprises and governments. Employment prospects are good for highly skilled workers, less promising for the unskilled.

The development and diffusion of information technologies are central to the evolution of the knowledge-based economy. Increasingly, knowledge can be transformed into information, codified and transmitted through computer and communications networks. The costs of acquiring knowledge are lower, barriers to entry are being demolished, 'natural' monopolies are evaporating, and new products and services are being created rapidly. Shorter product life-cycles, quick obsolescence of skills and intensified globalisation are

among the results. In this context, policies should aim for two broad goals – first, to increase the capacity of workers and societies to adapt and, second, to minimise the social costs of this process, especially for affected workers and communities.

In the knowledge-based economy, the service sector is taking on a new role, emphasising the value of technology and the quality of human capital. Service industries, particularly finance, business and telecommunications, are the primary purchasers of information and communications technologies. R&D spending by the service sector is growing faster than that of manufacturing and now accounts for a quarter or more of the total in the major OECD countries. Most net job gains in the past decade have come from service industries, with particularly rapid growth in business and professional services.

As all sectors of the economy rely increasingly on knowledge, enhancing the skills of the labour force becomes a prerequisite to better economic performance. Life-long learning is now a vital part of people's lives. In January OECD education ministers recognised the importance of encouraging more efficient and equitable strategies for skills development, including enterprise-based training and formulating more flexible transitions between education, training and work over the working lifetime. Transforming these initiatives into reality requires policies which promote a better balance between investments in physical and in human capital.

In parallel, industry, science and technology policies are changing. They are moving away from targeted supports and single-minded research projects to broader initiatives, including reforming regulations, increasing competitiveness,

fostering innovation and creating information infrastructures across the economy. Thus governments in OECD countries are moving away from direct intervention in industries towards providing the framework conditions conducive to the development of knowledge-based economies.

Disillusion with past industrial policies and budgetary restraints account, in part, for the winding-down of direct government involvement in industry. Although OECD countries do continue to support some basic industries, such as shipbuilding and textiles, assistance of this kind is more focused on restructuring them within the framework of international agreements and helping them prosper in the new knowledge-based economy. Attention is increasingly directed to new growth sectors, not least environment protection and biotechnology. More often than not, the public/private relationship takes the form of a partnership rather than one of donor and beneficiary. Governments and industries are working together to develop 'roadmaps' to success in a more competitive world. And these roadmaps depend on knowledge and technology.

This broader emphasis is also evident in evolving science and technology policies. Decreases in defence-related research have reduced the public contribution to national R&D in many countries. The private sector is funding and conducting a larger share of research than ever before – it now accounts for almost two-thirds of investment in research in OECD countries. Government policies are therefore increasingly geared to fostering linkages between public and private research activities so that basic research, not least in universities, can be better commercialised. In this respect it is important to build networks to promote the use of new technologies by the largest possible number of sectors and firms. Performance in the knowledge-based economy depends to a large extent on the functioning of such national innovation systems, particularly the ability to distribute knowledge and technology to a wide range of economic actors.

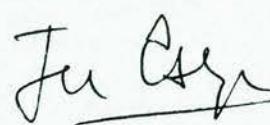
Policies to diffuse technology are becoming more demand-driven, with a heavier emphasis on enhancing the absorption capacity of firms. Policies aim to increase the access of enterprises, particularly smaller ones, to venture capital, technological advice and to improving workforce skills. Technology networks with private sectors bring together

clusters of firms with similar requirements, usually through computer and communications links.

Many non-OECD countries, too, are seeking to move away from an emphasis on manufacturing towards expanding the knowledge base of their economies. And some are well on their way. For instance, industrial policies in the transition economies of central and eastern Europe have encouraged the privatisation of large state-owned companies and the restructuring of heavy industries. Development strategies are now being broadened to include enhancing the role of smaller firms, improving the environment, retraining the labour force and giving a more central role to science and technology. The development of industrial technology and innovation will be vital to longer-term economic restructuring in these countries.

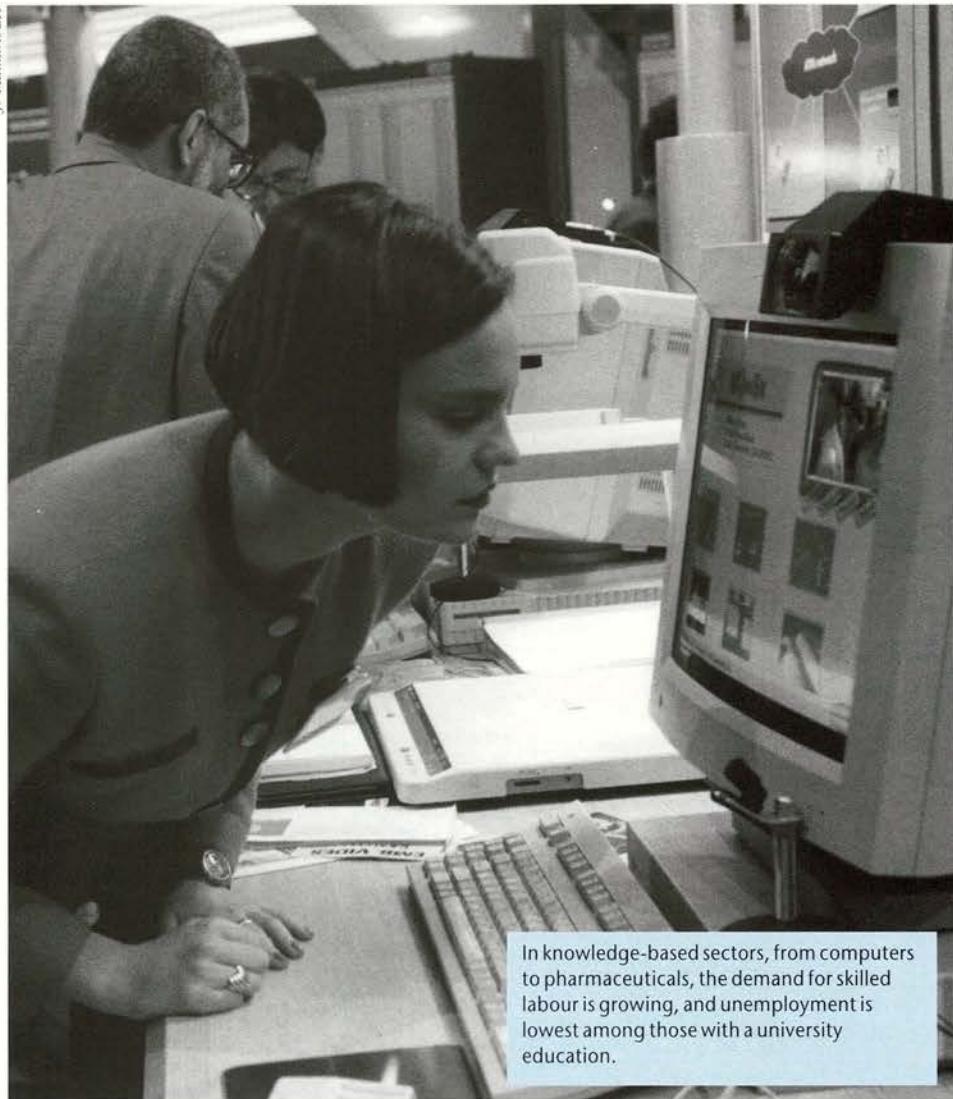
One problem in understanding these changes is that developments in the knowledge-based economy are difficult to assess by traditional economic statistics. The OECD is therefore devoting considerable effort to developing better indicators for knowledge inputs such as R&D and training expenditures, skills and competences, flows of knowledge in the form of exchanges of ideas and diffusion of technology and, most of all, returns to knowledge investments. New conceptual tools will help firms and governments to maximise the quality and productivity of knowledge, in both human capital and technology.

The knowledge-based economy will require considerable adjustments on the part of firms, workers and OECD governments, as well as the OECD itself. It is characterised by rapid change and a requirement of flexibility. Growth in productivity, output and jobs must be built on a foundation of technological progress and the development of human resources. Coherent policies for the knowledge-based economy must therefore create incentives for expanded investment in human resources, technology, innovation and information networks. Effective government will rest increasingly on nurturing this knowledge base and promoting the adaptability of economies to swiftly changing conditions.



# The Knowledge-driven

J. Maillet/AFPT



In knowledge-based sectors, from computers to pharmaceuticals, the demand for skilled labour is growing, and unemployment is lowest among those with a university education.

Candice Stevens

*The OECD economies are increasingly based on knowledge and information. Knowledge is now recognised as the driver of productivity and economic growth, leading to a new focus on the role of information, technology and learning in economic performance. It has also brought about calls for more emphasis on research and innovation, training and flexible structures of work.<sup>1</sup>*

Knowledge, as embodied in human beings (as 'human capital') and in technology, has always been central to economic development. But only over the last few years has its relative importance been recognised, just as that importance is growing. The OECD economies are more strongly dependent on the production, distribution and use of knowledge than ever before. Output and employment are expanding fastest in high-technology industries, such as computers, electronics and aerospace. In the past decade, the high-technology share of OECD manufacturing production (Table 1) and exports (Figure, p. 8) has more than doubled, to reach 20–25%. Knowledge-intensive service sectors, such as education, communications and information, are growing even faster. Indeed, it is estimated that more than 50% of GDP in the major OECD economies is now knowledge-based.

Investment is thus being directed to high-technology goods and services, particularly information and communications technologies. Computers and related equipment are the fastest-growing component of tangible investment.<sup>2</sup> Equally important are more intangible investments in research and development (R&D), the training of the labour force, computer software and technical expertise. Spending on research has reached about 2.3% of GDP in the OECD area. Education accounts for an average 12% of OECD government expenditures, and investments in job-related training are estimated to be as high as 2.5% of GDP in countries such as Germany and Austria which have apprenticeship or dual training (combining school and work) systems. Purchases of computer software, growing at a rate of 12% per year since the mid-1980s, are outpacing sales of hardware.<sup>3</sup> Spending on product enhancement is driving growth in knowledge-based services such as engineering studies and advertising. And balance-of-payments figures in technology show a 20% increase between 1985 and 1993 in trade in patents and technology services.

Candice Stevens is Head of the Science and Technology Policy Division in the OECD Directorate for Science, Technology and Industry.

# Economy

It is skilled labour that is in highest demand in the OECD countries (Table 2, p. 8). The average unemployment rate for people with a lower-secondary education is 10.5%, falling to 3.8% for those with university educations. Although the manufacturing sector is losing jobs across the OECD, employment is growing in high-technology, science-based sectors ranging from computers to pharmaceuticals. These jobs are more highly skilled and pay higher wages than those in lower-technology sectors (textiles and food-processing, say). Knowledge-based jobs in service sectors are also growing strongly. Indeed, non-production or 'knowledge' workers – those who do not engage in the output of physical products – are the employees in most demand in a wide range of activities, from computer technicians, through physical therapists to marketing specialists. The use of new technologies, which are the engine of longer-term gains in productivity and employment, generally improves the 'skills base' of the labour force in both manufacturing and services. And it is largely because of technology that employers now pay more for knowledge than for manual work.

These trends are leading to revisions in economic theories and models, as analysis follows reality. Economists continue to search for the foundations of economic growth. Traditional 'production functions' focus on labour, capital, materials and energy; knowledge and technology are external influences on production. Now analytical approaches are being developed so that knowledge can be included more directly in production functions. Investments in knowledge can increase the productive capacity of the other factors of production as well as transform them into new products and processes. And since these knowledge investments are characterised by increasing (rather than decreasing)

returns, they are the key to long-term economic growth.

The most visible sign of the knowledge-based economy is the emergence of the 'information society'.<sup>4</sup> Information technology has speeded up the codification of knowledge, transforming it into a market commodity: large chunks of knowledge can be codified and transmitted over computer and communications networks. The use of personal computers has more than doubled in the last decade; almost 40% of households in the United States now have computers, and their use is expanding in other OECD countries (Table 3, p. 9). These computers can be linked nationally and internationally; the worldwide Internet signs on around 160,000 new users every month. Through computer networks, knowledge is more accessible to a wider group of people and cheaper to acquire.

Knowledge itself is becoming a more marketable product, and its spread is transforming other goods and services and creating new markets. The spiralling number of information services available on the Internet, ranging from job searches to medical advice, is one example. The transformation of several disciplines – measurement, navigation, chemistry, music, surgery, telecommunications – by laser technology is another. And as the stock of knowledge accessible to the world economy swells, it is driving economic growth. The increase in knowledge accessibility and lower barriers to entry are also enhancing the role of the entrepreneur.

But there are some types of knowledge that are more difficult to codify and exchange in a market. There is 'tacit' knowledge – skills which often cannot be reduced to mere information. Some human capabilities, such as intuition, insight, creativity and judgement, resist codification. And it is these tacit skills which are essential to selecting, using and manipulating the knowledge which can be codified. The ability to select relevant (and disregard irrelevant) information, to recognise patterns in information and to interpret and decode information is not easily bought and sold.

While codified knowledge is the material to be transformed (the 'know-what'), tacit knowledge is the tool for handling it (the 'know-how').

The most important tacit skill may be the ability to learn continuously and to acquire new skills.<sup>5</sup> The process of continuous learning is more than merely obtaining a formal education. In the knowledge-based economy, learning-by-doing is paramount. Individuals must upgrade their skills in both codified and tacit knowledge continuously so as to keep up with fast-moving technologies. On-the-job training is an ongoing process. In the major OECD countries, around 35% of the employed population is now engaged in job-related training, but this ratio should be increased.

Firms, too, have to become learning organisations, adapting their management and structures to accommodate new technologies. There is a trend in business towards downsizing, decentralisation, to forming multiple alliances with other firms, flexible working arrangements and to diffused rather than hierarchical manage-

Table 1  
Shares of High-technology Industries  
in Total Manufacturing, 1970–94  
%

	Exports		Value added	
	1970	1993	1970	1994 <sup>1</sup>
<b>North America</b>				
Canada	9.0	13.4	10.2	12.6
United States	25.9	37.3	18.2	24.2
<b>Pacific Area</b>				
Australia	2.8	10.3	8.9	12.2
Japan	20.2	36.7	16.4	22.2
New Zealand	0.7	4.6	..	5.4
<b>Europe</b>				
Austria	11.4	18.4	..	..
Belgium	7.2	10.9	..	..
Denmark	11.9	18.1	9.3	13.4
Finland	3.2	16.4	5.9	14.3
France	14.0	24.2	12.8	18.7
Germany	15.8	21.4	15.3	20.1
Greece	2.4	5.6	..	..
Ireland	11.7	43.6	..	..
Italy	12.7	15.3	13.3	12.9
Netherlands	16.0	22.9	15.1	16.8
Norway	4.7	10.7	6.6	9.4
Spain	6.1	14.3	..	13.7
Sweden	12.0	21.9	12.8	17.7
United Kingdom	17.1	32.6	16.4	22.2

.. not available

<sup>1</sup> Or nearest available year.

Source: OECD

1. *Science, Technology and Industry Outlook*, OECD Publications, Paris, forthcoming 1996.

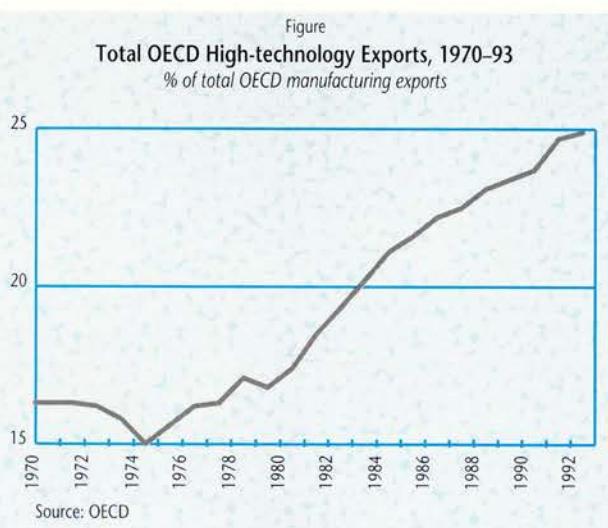
2. Jeremy Beale, 'The Information Explosion', *The OECD Observer*, No. 196, October/November 1995.

3. Vivian Bayar and Pierre Montagnier, 'The Information Technology Industry', *The OECD Observer*, No. 198, February/March, 1995.

4. *Information Technology Outlook*, OECD Publications, Paris, 1995.

5. Jean-Claude Payne, 'Making Life-long Learning a Reality for All', *The OECD Observer*, No. 193, April/May 1995.

# The Knowledge-driven Economy



ment. As a consequence, smaller firms are becoming more important in job creation; the share of large firms (over 500 employees) in OECD employment is declining by about 1% every year. Analyses indicate that such organisational adaptations are essential to realising the productivity gains to be generated by technology. The new flexible enterprise stresses such qualities in its workers as initiative, creativity, problem-solving and openness to change, and it is willing to pay a premium for these skills. Learning, creativity and flexibility matter more in the knowledge-based economy, experience and tradition less.

## Building Knowledge Networks

The diffusion of knowledge is as important for economic performance as the creation of new knowledge. Basic research in universities or public laboratories, for example, may be irrelevant to industry or fail to be commercialised if undertaken in total isolation from the private sector. Firms, particularly small or remote ones, may then remain ignorant of new process technologies. The success of enterprises, as of national economies, is determined by their effectiveness in gathering and using knowledge and technology. That may in turn reside in the

tacit abilities of individuals and firms to link up with the right networks and use all relevant items of information. Increasingly, the ability to innovate and enhance technological performance depends on obtaining access to learning-intensive relations. The result is a society composed of networks of individuals and firms, usually linked electronically.

The rise of the knowledge networks has changed economists' ideas about the process of innovation. Traditionally, it was seen as a discovery procedure that proceeded along a fixed and linear sequence of phases. It began, so it was argued, with new scientific research, progressed through stages of product development, production and marketing, and ended with the sale of new products, processes and services. This linear model of innovation has been replaced with an interactive one. Technical advances can assume many forms, including incremental improvements of existing products and new combinations of products and services. Innovation stems largely from the feedback 'loops' or the continuing interactions which exist between science, engineering, product development, manufacturing and marketing. It is fed by the interplay among the different institutions and individuals involved – firms, laboratories, universities and consumers.

The patterns of technology-related interactions in a national economy combine to form national innovation systems which are composed of the contacts and flows between industry, government and academia in the

development of science and technology. The links within this system, and its ability to diffuse knowledge and technology, influence the innovative performance both of firms and of economies as a whole. And increasingly, innovation systems extend beyond national boundaries.

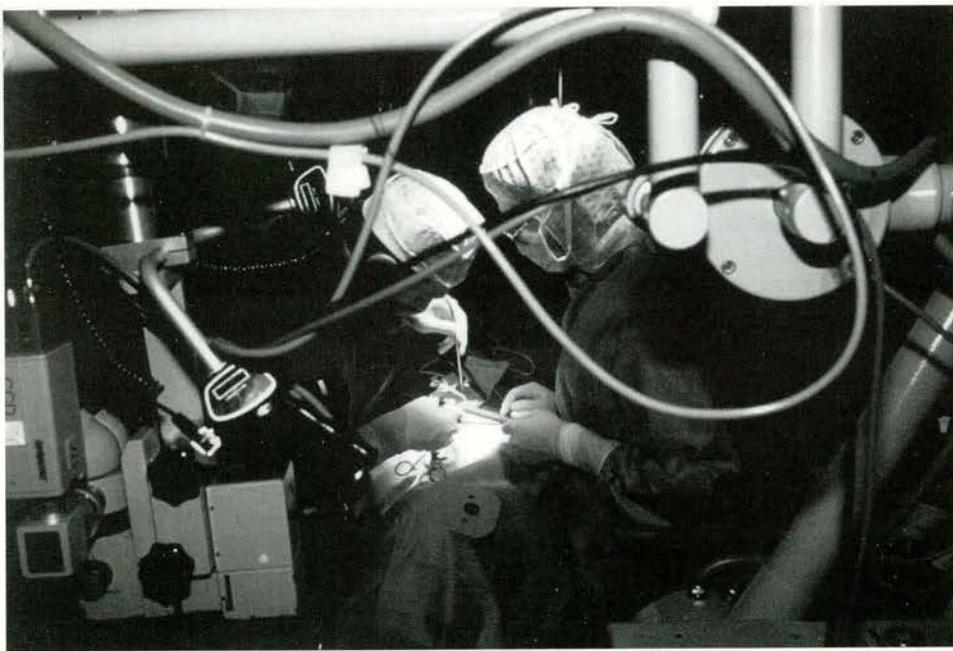
Only now are systematic efforts beginning to quantify and map the paths by which knowledge and technology are diffused throughout an economy. Indicators of information technology track the use of computers, software and related networks by businesses and households. Surveys of firms are used to gauge their use of different types of technologies. Comparative data show that Japan and Sweden have the most widespread use of advanced manufacturing technologies and robotics in industry, while the United States has a wider diffusion of computer-based engineering applications. In Canada, 48% of manufacturing firms use the latest technologies, mostly for inspection and communications.

It is more difficult to trace the diffusion of ideas and know-how in an economy. Analysis of how often patents and scholarly articles are

Table 2  
Employment Trends in Manufacturing, 1970–94  
%

	Total	Skilled	Unskilled	High-wage	Medium-wage	Low-wage
Australia	-0.7	-0.1	-1.3	-0.6	-0.4	-1.1
Canada	0.3	0.3	0.3	1.4	0.3	0.0
Denmark	-0.8	-0.3	-1.3	0.8	-0.5	-1.5
Finland	-1.3	-0.3	-2.1	1.3	-0.6	-2.7
France	-1.2	-0.4	-1.8	-0.6	-1.1	-1.5
Germany	-0.8	-0.5	-1.1	0.4	-0.7	-1.5
Italy	-0.7	-0.4	-0.9	-1.1	-0.4	-0.8
Japan	0.2	0.9	-0.2	1.2	0.4	-0.3
Netherlands	-1.5	-1.1	-2.1	-0.8	-1.1	-2.4
Norway	-1.5	-0.8	-2.1	0.2	-1.3	-2.1
Sweden	-1.5	-0.8	-2.4	0.5	-1.5	-2.2
United Kingdom	-2.3	-1.7	-2.9	-2.0	-2.4	-2.4
United States	-0.1	0.0	-0.3	-0.1	0.1	-0.5
OECD (19)	-0.3	0.1	-0.7	0.2	-0.2	-0.7

Source: OECD



Knowledge transforms what it touches: surgery is one of many disciplines that has been radically altered by technology.

cited is one tool for mapping the flow of ideas. Analysis of patent data in the United States, for instance, shows that 75% of some industrial innovations flow to users outside the originating industry – for example, medical genetics by the food industry and aerospace materials by the automobile sector. Similar techniques are used to measure the cross-fertilisation of ideas from universities to industry, from public laboratories to academia and also through international transactions. Another approach counts the movements of highly skilled personnel, who carry with them their codified and tacit knowledge, from one sector to another.

Innovation surveys of firms, which ask questions about the sources of information and equipment and the extent of technology co-operation with outside bodies, are now yielding the most complete portraits of national innovation systems. They show, for example, that most industry research is directed to product rather

than process innovation, that technical analysis of competitors' products is an important source of information, that researcher mobility is considered an asset, that joint ventures are crucial to high-technology firms and that domestic public research is used more than foreign sources.

## Knowledge Indicators

Knowledge is not a traditional economic input, like steel or labour, and presents enormous difficulties of measurement. As a result, the understanding of what is happening in OECD economies is circumscribed by the indicators available. Intangibles such as knowledge stocks and flows, knowledge distribution and the relationship between

the creation of knowledge (in the form of research and development, for example), and economic growth is still virtually unmapped.<sup>6</sup> In many respects, the knowledge-based economy remains more of a concept than a measurable entity.

The first task is to improve indicators of inputs, such as R&D, training and other intangible investments, by enhancing coverage of both small and large firms and services. Development of indicators of the flows of knowledge and of the acquisition and use of technology will yield more accurate measurement of the knowledge-intensity of industries and economies. And in view of the importance of tacit as well as codified knowledge, indicators are required to track the flow of ideas. Surveys of innovation in individual firms and similar techniques can help characterise strategic alliances and inter-active innovation processes. With these objectives in mind, the OECD is continually updating its manuals on collection and interpretation of science and technology statistics.

Although current data indicate that investments in knowledge are the key to growth, as shown by the outstanding performance of high-technology sectors, the extent and soundness of this conclusion must be tested on a broader basis. Further indicators are thus required to show the private and social rates of return to

Table 3  
Diffusion of Information Technologies, 1994  
% of households

	United States	Japan	United Kingdom	Germany	France
<b>User Terminals</b>					
Personal Computer	37	12	24	28	15
Video Cassette Recorder	88	73	84	65	69
Video Game	42	..	19	8	20
Fax	..	8	2	4	3
PC modem	15	..	4	3	1
<b>Network Infrastructure</b>					
Digital main lines <sup>1</sup>	65	72	75	37	86
House with cable	65	..	4	47	9
House passed by cable	83	..	16	56	23
House with satellite	..	27	11	20	2

.. not available  
1. 1993

Source: OECD

6. Graham Vickery and Gregory Wurzburg, 'Intangible Investment: Missing Pieces in the Productivity Puzzle', *The OECD Observer*, No. 178, October/November 1992.

# The Knowledge-driven Economy



The measurement of knowledge, and its economic and social impact, will require a new family of indicators.

R&D and other knowledge inputs. This step involves gauging the benefits *v.* the costs of investment to individuals, firms and entire sectors, measured in employment, output, productivity and competitiveness. Both enterprises and governments want concrete measures of the results of their investments in science and technology. Firms are calling for information on where investment would be most profitable – in long-term research, improvements to product quality, or in advertising? Countries want to know where to target expenditures to improve their competitiveness – to tax incentives to R&D, training the labour force or encouraging computer networks? Until better indicators are developed, the effects of technology on the

economy and employment will not be completely understood.



In knowledge-based economies government policies have to put more emphasis on upgrading human capital through providing access to general education and incentives to continuous work-related training.<sup>7</sup> Education is at the centre of the knowledge-based economy, and learning is the tool of individual and organisational advancement.

Science and technology policies are looking for a new emphasis. Support to innovation should be broadened from 'mission-oriented' projects aimed at specific research outcomes, such as a new combat aircraft, to 'diffusion-oriented' programmes, such as educating small firms about new products and processes. The links and networks between public, private and

academic sectors are also a prime factor in innovation, and the dissemination of technology to a range of sectors and firms a vital element of productivity growth. Governments are responsible for providing the framework conditions for innovative collaborations, technology dissemination and development of information infrastructures – all crucial to performance in knowledge-based economies. ■

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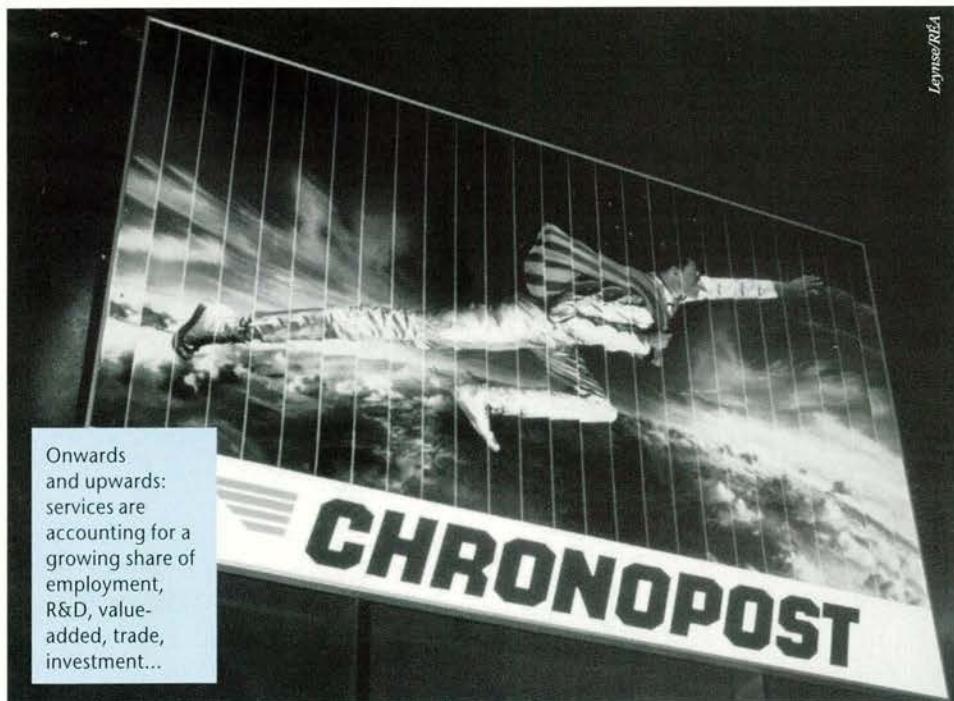
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<sup>7</sup> Abrar Hasan and Albert Tuijnman, 'Linking Education and Work', *The OECD Observer*, No. 199, April/May 1996.

# The Growing Strength of Services

Andrew Wyckoff

*The industries of the future will not resemble those of today. Manufacturing will increasingly emphasise service-like characteristics such as quality, tailoring products to the requirements of individual customers and 'just-in-time' delivery systems, with technologies such as flexible manufacturing systems reducing the necessity of maintaining large inventories. This change is reflected in the fact that nearly all new jobs over the past decade in manufacturing have been in white-collar occupations. And services will look more like manufacturing, as is already evident from a wide range of indicators: susceptibility to economic cycles, trends in tangible and intangible investment, exposure to international trade and, in some cases, growth in productivity.<sup>1</sup>*



The convergence of manufacturing and services is likely to accelerate as information and communication technologies increase the 'codification of knowledge' in such activities as finance (through programme trading), medicine (using telemedicine to advise and treat patients at a distance) and law (expert systems, which can perform simple legal tasks, such as drafting a will), allowing these services to be inventoried and traded internationally.<sup>2</sup> The diffusion of information and communication technologies will also facilitate the formation of networks of service and manufacturing firms that link up with one another in 'value-added chains', further eroding the distinction between the two categories as these chains abandon the earlier focus on individual firms or industries to pursue efficiency gains across a whole spectrum of economic activity.

The jobs of the future will be in new industries, some of which will be hybrids of old ones. Time was, for example, when you bought your car from a car dealer, got a loan from a bank, and had the car repaired at a neighbourhood garage; now all three of these services are provided by the same business. This fusion is the result of the continued advance and diffusion of information and communication technologies that allow firms to cross the boundaries of manufacturing and services in their development of new knowledge-based products. So-called 'smart' products – tyres that tell drivers when pressure is low or vending machines that call distributors when they have to be restocked – are early examples of new knowledge-based products that are based on existing ones (box, p. 12).

But the biggest opportunities lie in applying technology in a way that essentially creates a new product altogether. This is the 'reverse

1. *Science, Technology and Industry Outlook*, OECD Publications, Paris, forthcoming 1996.

2. Vivian Bayar and Pierre Montagnier, 'The Information Technology Industry,' *The OECD Observer*, No. 198, February/March 1996.

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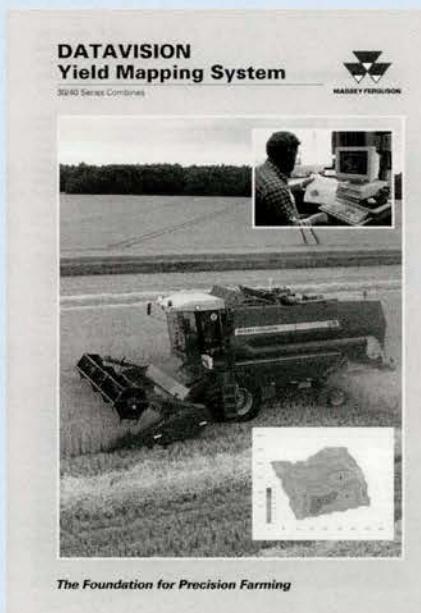
# The Growing Strength of Services

## FOCUS

### Knowledge-based Farm Tractors

An example of new hybrid industries is provided by the farm-tractor manufacturer, Massey Ferguson, who is combining information and communication equipment with its tractors to push it into a new industry: crop yield management.<sup>1</sup> The new tractors are connected to a satellite-based Global Positioning System that records the exact location of the tractor and the harvest yield from that plot. These data are combined with information about the soil (nutrients, moisture), the weather and various farming techniques and sent to the farmer in the form of yield maps from which he can target specific changes, such as reducing the soil compaction in a particular part of the field. Analysts speculate that this knowledge-based system may soon be worth more than Massey Ferguson's primary business.

*1. Stan Davis and Jim Botkin, 'The Coming of Knowledge-Based Business', The Harvard Business Review, September/October 1994.*



product cycle', in the first stage of which a firm adopts information technologies to improve the efficiency of an existing process. In the second stage this new process generates a substantial improvement in quality of the product. The third stage occurs when it becomes evident that the basis for an entirely new product exists, usually in a different area altogether.<sup>2</sup> This trend is particularly applicable to services, the classic example of which is the development of the 'Sabre' reservation system by American Airlines. Originally developed to improve the process of booking tickets, the system was then adapted so that other airlines could use it, resulting in a better rate of return for American Airlines than they were obtaining from their traditional business of flying people. It was then extended to include reservations for hotels and rental cars, creating a value-added network of travel. Now American Airlines has used this expertise to extend into the field of processing insurance claims

and airport management in general.

Underlying these changes are a number of trends that force a re-thinking of the role of services, both in terms of their economic impact and in the formation of economic policies.

### Different Downturns

Services are playing a bigger role in economic upturns and downturns. In the four countries which led the OECD into the downturn in the recession of the early 1990s – the United States, the United Kingdom, Australia and Canada – the service sector contributed to a much larger degree than in the recession of a decade earlier. In the United Kingdom, for example, in both recessions, the rate of output growth contracted by over two percentage points, with the manu-

facturing and service sectors both contributing. But where in the early 1980s the share of manufacturing in the downturn was ten times that of services, in the early '90s manufacturing was only about one-and-a-half times as important. In the United States services have always shown positive rates of growth, but the service-sector downturn from 1990 to 1991 was nearly two-and-a-half times as large as during the previous two-year low in 1980 and 1981.

This phenomenon also occurred in Italy and Japan. As their economies began to shrink, their service sectors registered negative growth for the first time in the decade-and-a-half in question. Likewise in France, which has always enjoyed real growth in its service sector, the slowing from 1992 to 1993 was three times larger than in 1982 and 1983. Indeed, of the large OECD countries, only Germany did not obviously display the trend, perhaps simply because of an absence of detailed, up-to-date data as the German economy slid into recession in 1993.

The notion that services are somehow insulated from cyclical swings was never correct. Their decline, relative to manufacturing, may have been more pronounced in the early '90s, it is true, but some sectors, such as wholesale and retail trade and transport and storage, have always experienced cyclical swings (Figure 1). That is not surprising in view of their role as intermediary in other transactions in the economy: as transactions slow, so should the activity of these sectors. The difference in the early '90s was that the fastest-growing segment of services – financial services – also experienced a decline, causing the service sector as a whole to play a much larger role in the downturn than had been the case in the past. It is uncertain whether or not this downturn was due to cyclical factors or was a one-time correction, as the Japanese economy struggles with the restructuring of its financial sector and those of the United States and the United Kingdom go through a period of reassessment after a decade of strong growth. It nevertheless appears likely that as more service sectors (health care, telecommunications and transport, particularly air, for instance) undergo regulatory reform, competition will heighten and increase the vulnerability

of services to economic contractions.

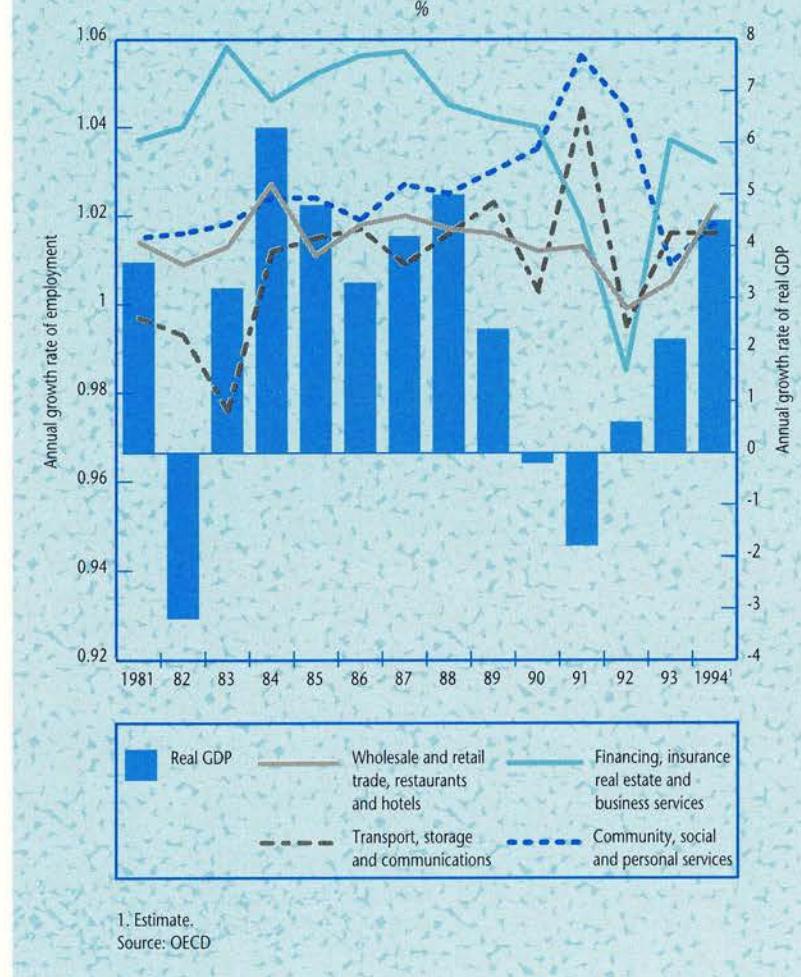
## Services as Investors

Some services, like trucking, pipelines and telecommunications, have always been intensive users of capital equipment, usually exceeding the average intensity of use by manufacturing. What is new is that other service sectors, not least financial services and community and social services, are becoming more capital-intensive. The typical share of investment consumed by the financial-services sector exceeds that of manufacturing as a whole (Table 1, p. 14). Documenting the change over time in the purchase of computer and communication equipment is statistically difficult because of the rapid decline in prices and the large improvement in quality. Even defining what is meant by 'capital equipment' is difficult.<sup>4</sup> In the early 1970s, for example, 80% of the value of an IBM computer was hardware and 20% was the cost of writing software to run the hardware. In

the 1980s, the shares were reversed and ever since have moved in a direction where the cost of the hardware as a portion of the total cost continues to decline. A similar trend is occurring in other types of traditional capital equipment as disparate as aeroplanes and tractors.

Static snap-shots of investment reveal that about 80% of information technologies (computers, communications equipment, telephone PBX systems) sold in the United States and nearly three-quarters of the computer systems sold in Britain are purchased by service industries. Indeed, six service industries (air transport,

Figure 1  
Employment Trends by Industry Grouping  
in the G7 Countries, 1981-94



1. Estimate.  
Source: OECD

telecommunications, retail and wholesale trade, health care, banking and insurance) are estimated to account for half of all IT expenditures by industry. The annual IT investment of these industries grew by 70% over the last decade.

## Services as Innovators

Services are generally thought of as users, not generators, of technologies, innovations and R&D. To some degree, this belief was a reflect-

ion of statistics which surveyed only the manufacturing sector. The importance of the service sector has now been recognised and in some countries the collection of R&D data has been expanded, the better to capture the innovation performance of services.<sup>5</sup> anything up to a quarter, even a third, of business expenditure on R&D is in services (Table 2, p. 14). The highest share is in real estate, renting and business activity, where anywhere from 46 to 96% of service R&D occurs.

These statistics are still in their formative stage and lack the international comparability, detail and robustness of manufacturing R&D data. It is likely that much of the R&D performed by services is conducted by separate research laboratories or is dedicated to developing new software. These trends, combined with further statistical improvements, suggest that an increasing proportion of business R&D will likely be performed by services.

Many of the innovations emanating from the service sector are not associated with formal R&D; instead, they are the result of using and developing new applications for information and communication technologies. Thus, as these technologies continue to diffuse and advance, it is natural to expect that services will become a larger contributor to innovation in general. These innovations are likely to have a sizable impact on productivity in the service sector, providing

3. Richard Barras, 'Towards a Theory of Innovation in Services', *Research Policy*, August 1986.

4. Graham Vickery and Gregory Wurzburg, 'Intangible Investment: Missing Pieces in the Productivity Puzzle', *The OECD Observer*, No. 178, October/November 1992.

5. Alison Young, 'What Goes into R&D?', *The OECD Observer*, No. 183, August/September 1993.

# The Growing Strength of Services

Table 1  
Gross Fixed Capital Formation by Sector and Country, 1993

%

	Australia	Belgium	Canada	Denmark	Finland	France	Germany	Italy <sup>1</sup>	Japan <sup>2</sup>	Netherlands	Norway <sup>3</sup>	Sweden	United Kingdom <sup>1</sup>	United States
Manufacturing	9.2	18.7	10.4	15.3	18.0	13.4	15.9	18.7	19.1	14.8 <sup>b</sup>	10.3	15.2	13.5	13.6
Services	..	64.1	60.7	..	50.5	61.0	65.9 <sup>b</sup>	58.9	45.3	..	39.4	57.2	64.6	62.4
Wholesale and retail trade and restaurants and hotels	..	12.6	4.6	..	7.6	7.9	7.6 <sup>b</sup>	8.6	6.1	8.4	4.2	7.3	8.4	10.0
Transport, storage and communications	9.7	10.3	8.0	18.6 <sup>a</sup>	10.2	9.4	7.3 <sup>b</sup>	12.8	6.7	10.9	16.7	10.9	8.6	5.7
Finance, insurance, real estate and business services	41.3	27.3	45.0	19.6 <sup>a</sup>	29.5	39.6	32.6	27.6	21.3	..	16.6	35.4	38.9	39.8
Community, social and personal services	4.7	13.9	3.2	8.3 <sup>a</sup>	3.2	4.0	18.4 <sup>b</sup>	9.9	11.3	15.6	1.9	3.5	8.6	6.8

.. not available

1. 1990.

2. 1985 prices.

3. 1991.

a. 1991.

b. 1992.

Source: OECD

gains in large areas of OECD economies where substantial productivity gains were never expected – in education, for example.

## Services as Traders

The share of services in world trade has risen from a quarter in 1975 to more than one third by 1993. The global trade in services is dominated by a few large countries: on the credit side the

United States (in financial services and education), France (travel) and Germany (military transactions) and on the debit side the United States (military goods and services), Germany (travel) and Japan (travel). Some 30% of exports are attributable to trade in the transport and financial service sectors in France and Sweden, making France the largest exporter of services in the EU. Increasing trade in services reflects the expansion of financial transactions, between OECD countries and the globalisation of capital markets. Financial services and communication and business services, such as distribution, accounting, engineering and legal services, increased by 10 share points (from 22 to 32%) between 1970 to 1989, offsetting declines in transport and travel services.

An increasing proportion of foreign direct investment (FDI) is in services rather than manufacturing (Figure 2). Although the value of services delivered to clients by way of foreign affiliates is not officially counted as an export or an import, it is in many instances the only way services can be distributed internationally because of the importance of a close and continuing contact between producers and customers.

FDI in services exhibits strong cyclical tendencies. That was especially evident in the early 1990s, with a substantial decline in both inward and outward FDI – in the earlier recession growth had merely levelled off. Likewise, with recovery in the '80s FDI staged a strong comeback, although total FDI (as of 1994) still has not reached its 1990 figures. The main characteristic of the recent recovery is the renewal of inward and outward FDI, especially in services, to the United States. Investment in services in and by Japan and Europe has been relatively flat, al-

though in these two countries foreign investment in services continues to outpace that in manufacturing. And although the recession of



Table 2  
Business Expenditure on R&D in the Services, 1981–93

%

	1981	1991	1993
Australia	17.1	33.9	31.8
Canada	9.2	26.6	30.6
Denmark	18.8	28.5	32.5
United Kingdom	1.3	16.5	18.2
United States	4.2 <sup>a</sup>	24.1	26.1

a. 1982

Source: OECD

the early 1980s had little or no impact on FDI in services – instead it was mainly localised in manufacturing – the downturn of the '90s affected FDI in both manufacturing and services.



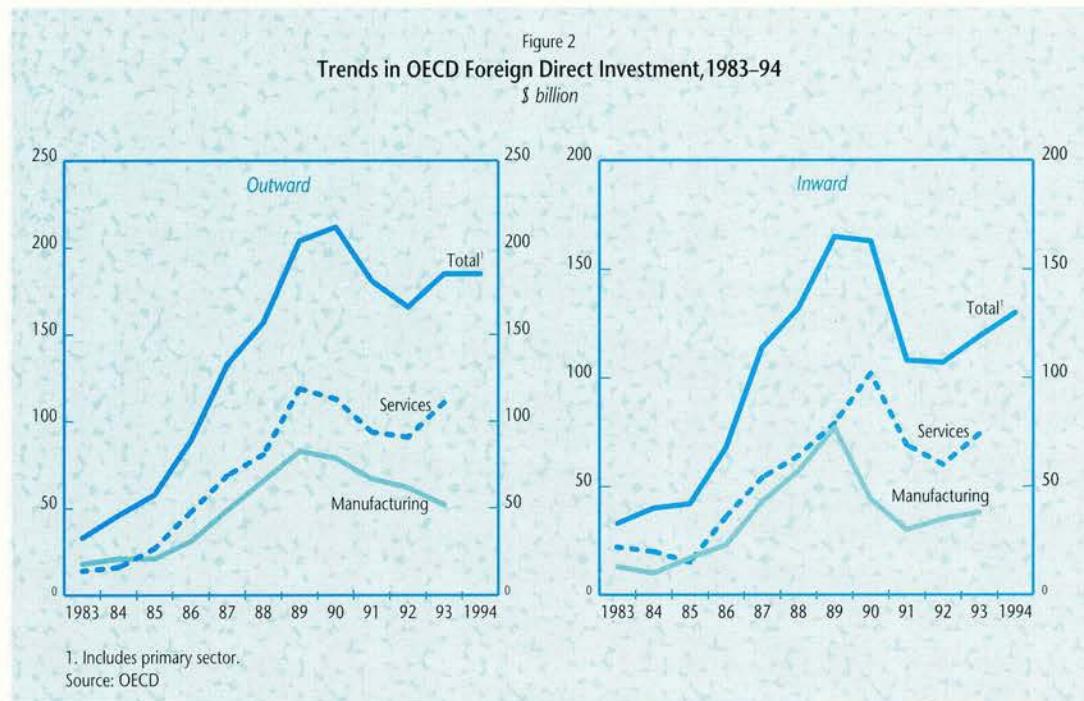
The usefulness of devising science, technology or industrial policies that emphasise manufacturing over services is increasingly limited. The focus of policy aimed at economic development should be on economy-wide gains that maximise the efficiency of integrating different industries rather than focusing on the isolated performance of individual sectors. Basic improvements to the economic infrastructure – such as in transport, communication and education systems that connect the different sectors – are particularly important.

Likewise, new policies should be considered that reflect the changing nature of manufac-

ting and services – among them enlarging the pool of projects to which governments provide direct or indirect assistance for R&D, undertaking government-led demonstration projects in the development of new service-based industries, and deregulating services – so that more experimentation and boundary-crossing can occur.

In addition to formulating new policies that reflect the merger of manufacturing and services, it is also important to account for the unique characteristics of services in existing policy frameworks, much of which have been formed with manufacturing in mind. Labour policies will have to contend with a larger amount of turnover in service workers as regulatory reform steps up price-competition, as more exposure to foreign competition increases the insecurity of these jobs, and as technology is adapted to sectors that previously had little exposure. Competition policy will have to address new types of anti-competitive practices as the formation of networks of businesses increases and traditional market boundaries are easier to overcome and as technology undermines the rationale for monopoly privileges granted to many service activities. Trade policy may have to adopt new multilateral approaches as the nature of services emphasises differences

in market *v.* non-market services (health care, education), regulatory frameworks (telecommunications), cultural attitudes (entertainment) and standards (pornography, privacy). And monetary policy will have to grapple with the awkward truth that measuring price changes in a knowledge-based economy where tacit knowledge and quality changes play a large role will be increasingly difficult. ■



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# Helping Industry

Mario Cervantes

*Industrial policies in the OECD countries are moving away from the allocation of support for specific sectors and firms to improving the broad underlying conditions for efficient industrial performance.<sup>1</sup>*

The continuing shift in industrial policy in many OECD countries – away from direct financial assistance, often to failing or high-unemployment industries and towards the stimulation of a healthy business environment – can be ascribed in part to constraints on public spending. Other factors play a role, of course: disillusion with past industrial policies that hampered structural adjustment; rapid technological change which has accelerated the trend towards services and knowledge-based activities;<sup>2</sup> and the globalisation of firms whose cross-border and cross-sectoral activities make it difficult to identify targets for more interventionist policies.

Many OECD countries are enhancing competition and innovation through comprehensive programmes of regulatory reform. Reviews are being mounted to identify regulations that do not efficiently serve the purposes for which they were adopted or impose burdens on industry which outweigh their benefits. A National Performance Review in the United States has targeted hundreds of regulations for change. The United Kingdom has earmarked more than a thousand regulations for amendment or repeal. The Deregulation Action Plan in Japan is aimed at reform in a wide range of sectors, including retail distribution, transport, telecommunications, financial services and energy. And Canada has selected specific sectors for regulatory review, including biotechnology, health, mining, automobiles and forest products.

Changing the way regulations are made and implemented is one broad objective. The United States is encouraging private-sector participation in the regulating process. In Norway, a special review unit will vet all new forms being sent to

enterprises. In the United Kingdom, new regulations must be accompanied by a 'litmus test' to minimise disproportionate costs on smaller firms.<sup>3</sup>

'Natural' monopolies in many infrastructure services, not least telecommunications and transport, have been dissipated by new technologies. The United States continues its comprehensive reform of telecommunications, from local telephone markets to long-distance services, and the European Union plans to open telecommunications markets in infrastructure and services to full competition by 1998. New markets in legal, accounting, architectural and engineering services are also being opened-up by information technology, requiring changes in rules governing market access. Belgium, for instance, is reviewing regulations on entry into various business and professional services, and the Netherlands is liberalising its legal profession.

The winding-down of government involvement in industrial activities – both nationally and locally – is reflected in the continuing trend towards privatisation. Governments are selling off all or part of their shares in state-owned enterprises in both manufacturing and service sectors. Germany has privatised both Deutsche Telekom and Lufthansa, and the Netherlands is floating shares in the National Telecommunications Enterprise (KPN). The Swedish government has sold most of its equity in manufacturing companies in the pharmaceuticals, mining and pulp and paper sectors. Austria and other newer members of the European Union are privatising their

state-owned sectors as part of the conditions of entry. Mexico has made privatisation a pillar of its modernisation strategy since the late 1980s. And other countries, such as Turkey, are finding it necessary to privatise further as part of their programmes of structural reform.

## Investment and Employment

OECD governments are also removing disincentives to private investment and improving access to venture and equity capital. More use is being made of tax codes to encourage investment by easing the financial burden on firms. Tax relief can be across-the-board and non-targeted or geared to specific aims (such as encouraging technology-related investments).<sup>4</sup> An array of financial instruments assists firms in obtaining or securing bank loans or credits for modernisation. This is the function of the National Development Bank in Mexico, the

Lufthansa Bildarchiv

Sign of times: Lufthansa is one of many enterprises to have been privatised as government retreats from direct involvement in industry.

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# Help Itself

nationally owned Development Companies in Sweden and the People's Bank in Turkey.

Investment incentives may also have a regional or local focus, as with tax credits for regional investment in Canada. In the United States, the provision of low-cost loans, guarantees, interest subsidies and other forms of assisted financing is a staple of the economic-development programmes of virtually all of the states. In some countries, questions about corporate governance have come to the fore in this context with the concern that certain features of governance systems – not least the over-reliance on credit as a source of external finance, weak disclosure to stockholders or tax and bankruptcy rules – may act as disincentives to the development of equity markets.<sup>5</sup> Governance systems that rely on long-term relations and credit bestow benefits on insiders but inhibit the access to capital by newer firms, particularly high-risk technology start-ups.

The main targets of many OECD initiatives on investment and employment are small and

medium-sized enterprises (SMEs), in view of their importance in creating jobs. The policy measure that is proving most popular involves improving access to venture capital for smaller start-ups through soft loans, tax provisions and various financing schemes. In 1995, the Netherlands issued a White Paper entitled *Jobs through Enterprise*, which introduced new financing measures for SMEs. In 1995, New Zealand re-organised its Business Development Programme to focus on the requirements of smaller firms. In France, in 1994, the *Fonds de développement des PMI* was created to regroup various financial instruments to promote investment in SMEs. The 'Agenda for Growth' programme in Sweden announced in late 1995 special tax provisions and measures to increase the availability of risk capital for smaller firms. And the United Kingdom has set up two new vehicles to allow tax concessions for investment in SMEs: the 'Enterprise Investment Scheme' and the 'Venture Capital Trusts'.

Foreign firms, too, are being courted as a source of investment and jobs. Many countries are relaxing controls on inward investment, foreign ownership and currency movements to create an environment conducive to international business. The competition to attract multinationals is intense. In Scandinavia, for example, it has prompted active marketing efforts in all three countries. Through its 'Regional Headquarters Program', Australia is using tax incentives and streamlined immigration procedures to encourage companies to establish their Asia-Pacific offices there. Austria has published a *Handbook for Investors* to advertise opportunities to foreign investors. And the Netherlands is trying to attract high-technology industries through special fiscal incentives.

improving returns to R&D by diffusing technology throughout the economy and fostering linkages among institutions and individuals conducting research in the public, private and academic sectors.<sup>6</sup> In 1995 a policy statement called 'Innovate Australia' announced new measures to help diffuse technology and commercialise research. Denmark unveiled a new 'National Research and Development Strategy' in 1995 aimed at stimulating technology transfer and innovation. A recent White Paper in the Netherlands, *Knowledge in Action*, outlined measures for improving industrial performance in a knowledge-based economy.

A main instrument for deploying and diffusing technology can be found in consultancy services funded wholly or in part by governments. Many countries have such schemes, like the Techno-Counselling Programme in Austria which advises business on management and organisational aspects of acquiring and using new technologies. In the United Kingdom, the Innovation and Technology Counsellors of the Business Links Network counsel firms on gaining access to technology. The United States has a Manufacturing Extension Partnership, where counsellors across the nation assess the technology requirements of firms, help select equipment and assist in developing technical solutions to manufacturing problems. Canada has long maintained an Industrial Research Assistance Programme (IRAP), which supports a network of counsellors to advise industry on using new technologies to increase efficiency and output.

Many small firms perform little R&D and have limited access to technology because they lack sufficient capital or human resources or a research tradition. That is why many OECD



## National Innovation Systems

Competitiveness strategies in the OECD countries often have a focus on technology. Government support for research and development remains a priority in the OECD, despite tight budgets. But more emphasis is being given to

1. *Science, Technology and Industry Outlook*. OECD Publications, Paris, forthcoming 1996.

2. See pp. 11–15.

3. Mario Pezzini, 'Entrepreneurial Towns', *The OECD Observer*, No. 197, December 1995/January 1996.

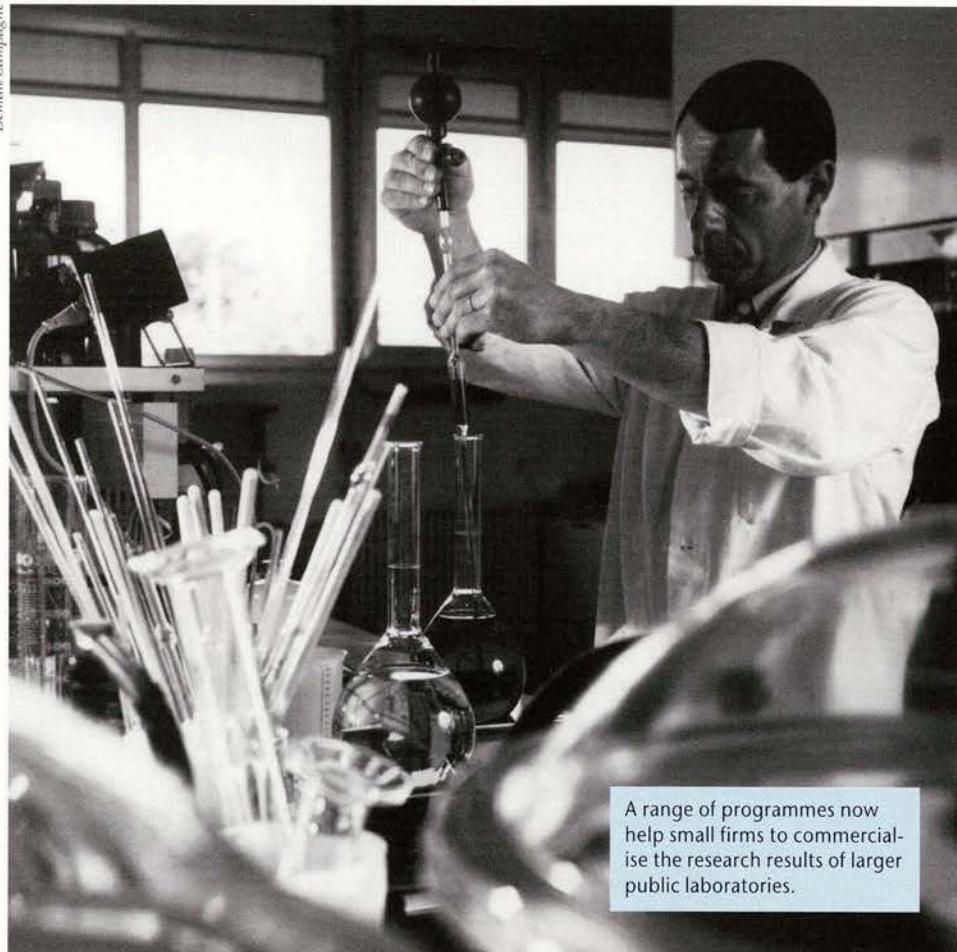
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6. Raif Gönenc, 'A New Approach to Industrial Policy', *The OECD Observer*, No. 187, April/May 1994.

# Helping Industry Help Itself

Demand/Campaign



A range of programmes now help small firms to commercialise the research results of larger public laboratories.

governments are attempting to link entrepreneurs to the research community and increase awareness and funding for new technologies.<sup>7</sup> The Danish Technological Service Institutes, for example, help transfer technology from public research institutes to small firms. Similarly, Norway maintains schemes on Innovation and Entrepreneurship (FORNY) to speed commercialisation of public research by SMEs. In Austria, the Association for the Promotion of Modernisation of Production Technology supports technology co-operation among large and small firms. And the French *Centres de Ressources Technologiques* disseminate technology to SMEs on a regional basis.

But innovation also depends on the feedback loops in the research system and between producers and consumers. Many OECD governments are thus attempting to create synergies among

the public, private and university sectors in developing new products and processes such as techniques to reduce requirements of scale for making vertical integrated circuits. Many countries provide partial funding for co-operative research by industry and public research institutes, as do the Development Contract Scheme in Denmark and the Competence Centres in Sweden. Others bring the producers and users of technology together through informal networks, such as the Technology Networks in Australia and Canada, and there are similar schemes in Greece and Portugal. Or they may use information technology to establish communications networks linking universities and research

7. Gabriel Drilhon and Marie-Florence Estimé, 'Technology Watch and the Small Firm', *The OECD Observer*, No. 182, June/July 1993.

8. *Information Technology Outlook*, OECD Publications, Paris, 1995.

centres such as the Supernet in the United Kingdom, Switch in Switzerland or the RENATER in France.

## A Different Helping Hand

Direct support to industrial sectors has not disappeared, although the focus no longer tends to be on sheltering traditional or declining industries. Instead, governments are helping basic industries modernise to cope with global competition. Textiles and clothing, shipbuilding, steel, wood products and food-processing may receive support to help with restructuring, generally within the context of regional and multi-lateral trade agreements. And because these industries often play a major role in local economies, assistance is frequently given within the framework of regional-development policies sometimes in conjunction with EU programmes. Portugal, for example, has launched a series of programmes: 'ReTex' to assist in the industrial reconversion of textile-producing regions, the 'ReChar 2' for coal-producing regions and 'ReSider 2' for iron and steel-producing regions. Similarly, the Textile-Clothing Industry Plan in Spain provides support to textile firms in depressed regions.

Sector-specific policies are increasingly directed to newer industries embodying generic technologies, such as new materials, biotechnology and information technologies. One Portuguese project aims to bring together environmental technologies and the capital-goods sector to form a new eco-industries branch through, for example, combining pollution-control techniques with appropriate equipment producers. Canada, the United Kingdom and the United States have launched similar efforts. The information-technology sector is perhaps the most popular target of government attention at the moment.<sup>8</sup> All major OECD countries are developing their information infrastructures – including computer and communications hardware, software, services, standards and regulatory frameworks – with a view to becoming advanced 'information societies'.



State assistance is now often a part of regional, not industrial, policies: Portugal and Spain, for example, provide help to textile firms in depressed regions.

Several OECD governments are also identifying and supporting strategic industrial 'clusters', or groups of supplier industries with links to user industries downstream, an approach which conserves on resources and can have beneficial secondary effects on employment and technology development. Austria's 'cluster-oriented' policy supports enterprises which have horizontal, vertical or diagonal links in such sectors as the wood and paper or telecommunications industries. 'Cluster projects' in the Netherlands foster partnerships among innovative firms, including manufacturers, their suppliers and clients, to develop, for example, new food products.

Danish policy is directed to 'national strongholds' or leading industrial subsectors such as food and beverages, health/welfare services, and transport and communication, which receive support for training, research and infrastructure development. In Belgium, technology supports are targeted to branches – such as agri-food, multimedia and precision engineering – characterised by important links with other sectors, upstream or downstream, thus having a multiplier effect on the economy.

More and more often now, sector-specific programmes are taking the form of partnerships with industry, where the government acts as a catalyst to stimulate industrial or technological development along specified paths. This is less interventionist and less costly than earlier forms of government support.

A leading example is the Sponsorship Programme in the United Kingdom, where government and industry share expertise and identify ways to improve competitiveness in sectors such as pharmaceuticals, aerospace and construction. Government-industry partnerships in the United States include the 'Clean Car Initiative', intended to help develop a new generation of motor vehicles. Through the 'Sector Competitive Framework', Canada is working with firms to develop business-development strategies whereby the government provides guidance to specific sectors as well as technology roadmaps, which are government-led but industry-initiated forecasts of critical technologies to meet future industry demands. These partnership arrangements are harbingers of the industry-related policies of the next century, which will be characterised by less formal co-operation between industry and gov-

ernment to tackle jointly the issues raised by technological change and globalisation.

■ ■

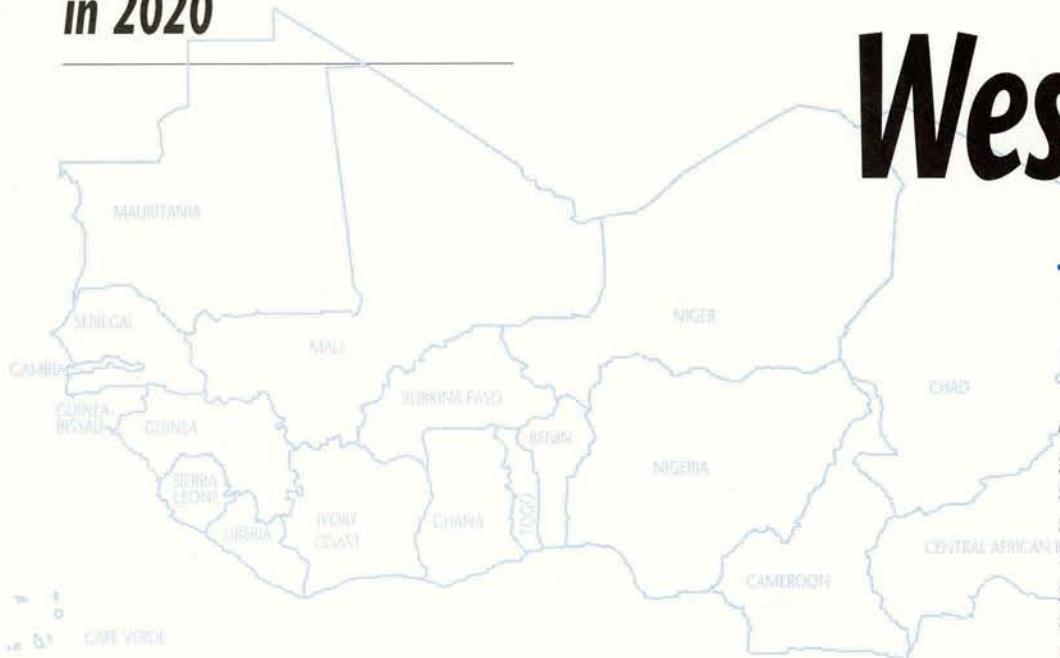
As OECD economies become more knowledge-based, organisational change in the workplace and the development of human capital inside and outside the firm becomes a prerequisite for improving industrial performance. Enhancing the fundamental conditions for growth and jobs has become integral elements of science, technology and industry policies and will continue to drive changes in production and innovation systems. ■

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## West Africa in 2020



Jean-Marie Cour and David Naudet

*The West Africa Long Term Perspective Study (WALTPS) shortly to be published by the OECD offers a novel vision of the transformations taking place in that part of the world. Focusing on a regional area of 19 countries over a long period of time – 1960–2020 – the study deliberately breaks with traditional country analyses centred on economic conditions. It offers new instruments of measurement that are better suited to gauging the size of the 'informal' sector, the life-blood of the West African economy.*

*The resulting assessment is less pessimistic than the image of Africa generally projected. It reveals the vitality of societies which in a matter of decades have undergone a phase of structural adjustment that in most other regions of the world was spread over a far longer period of time, encompassing shifts in population, urbanisation, the growth of a market economy, changing social and political systems, and so on.*

*Without minimising the strains associated with this process, the study demonstrates that in West Africa, as elsewhere, urbanisation is one of the conditions for development, including rural development. It spotlights the emergence of competition throughout society, as well as the important role that the private sector and local authorities are being called on to play alongside that of the state.<sup>1</sup>*

# West Africa

When people look at Africa these days, they see crisis. The main signs of current trends on the continent all involve disorder and violence: ethnic conflict, widespread poverty, anarchic city growth, desertification, extinction of traditional societies, and more. In every area – political, social, economic, financial, food, education, health – crises are multiplying and seem to be gradually taking over the whole of African societies. The future of Africa is thus generally perceived to be unpredictable chaos or at best a process of regression.

As a result, the changes occurring in Africa are becoming an incomprehensible series of events. But the continent is not simply reacting to shocks in the world economy, the policies of its leaders and repeated social crises. It is also moving in response to powerful internal forces for change. In particular, a double transformation is occurring, and at enormous speed. First, Africa is going through a phase of accelerated population change. In brief, its population will have increased tenfold in the century from 1930 to 2030, and its urban population one-hundredfold (Figure). The population of Africa is about to become mainly urban very soon after being almost exclusively rural.<sup>2</sup> In West Africa, for example, 85% of people lived in rural areas in 1960. By 2020, the urban ratio will likely be around 60%.<sup>3</sup>

At the same time, Africa is undergoing another major change: integration into the world economy. Stimulated by the general globalisation of the economy, Africa's opening-up to the world has been increased by local factors: decolonisation and the resulting 'Balkanisation', openness to the movement of goods and information, urbanisation and concentrated settlement, improved education, contact with the international aid system, and the like. In 1960, African coun-

Jean-Marie Cour, an engineering graduate of the École Polytechnique and the École Nationale des Ponts et Chaussées in Paris, provided the inspiration for the West Africa Long Term Perspective Study (WALTPS); he is on secondment to the Club du Sahel. David Naudet, an economist with the DIAL science centre in Paris, is one of the study's chief authors.

# in 2020

tries had relations with few countries other than their neighbours (through migration) and their colonial powers. The continent now appears to be wide open to the world as far as migration, trade and culture are concerned.

These two profound changes have radically altered the functioning of African societies. In the past, small, separated, mostly rural communities were based on internal unity and complementarity with neighbouring communities. They operated by arbitrary decision and restricted consensus based on omnipresent social and family ties. Now, there are many diversified, built-up areas close to one another, connected to increasingly interdependent markets, integrated into common frameworks and institutions in contact with the world at large. In brief, competition is heavily influencing the functioning of West African societies.

This is an abrupt transformation. Within a few generations, not only have living conditions and relations with the outside world changed profoundly for African communities, but the very functioning of their society – social relationships, the purpose of economic activity – has altered radically. This sort of change can only cause sharp imbalances. The gulf between the generations is a deep one. Competitiveness has not yet reached the foundations of the economic system. Even when institutions, mainly governments, do not actually refuse change, they only manage to keep up with it rather than control or lead it.

In the light of these changes, it may be easier to explain why the current crises keep recurring, and to understand the apparent disorder seen in African societies. This disorder is not chaos, for it has a purpose. It is part of the movement within African societies: from unity to diversity and the organisation of civil society, from self-sufficiency and complementary trade to competitive trade and the introduction of the market, from arbitration to rule-based conduct and the introduction

of law, from restricted consensus to decision by collective choice and the introduction of democratic institutions, from omnipresent traditional social ties to anonymity and the beginnings of contracts. Seen in the long term, it is undeniable that, with a few exceptions, African societies are all moving in this direction.

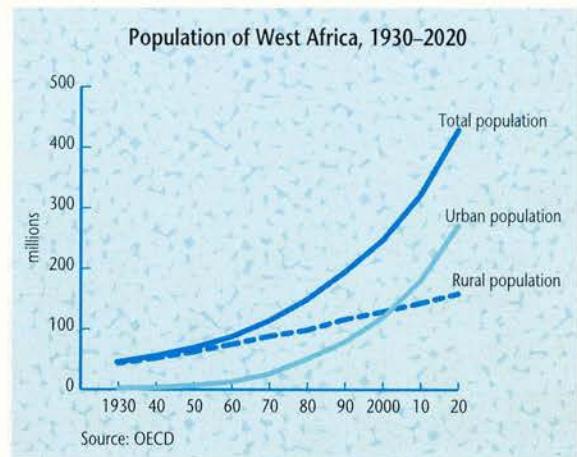
## Disorder Teeming with Life

The disorder in African societies is not simply an inhibiting factor; it is also evidence of teeming life. Along with attitudes of rejection and passivity towards change, and the violence that change can bring, examples of adaptive and innovative behavior can be seen in every activity. Many government officials, experts and western public opinion see African farming as facing catastrophe. Its main features are widespread poverty, malnutrition, destruction of the environment and lack of modernisation, with city-dwellers buying their food from abroad. The World Bank, for example, in a recent report, states that farm output in sub-Saharan Africa has increased at a rate of 1.5% a year over the last 25 years, resulting in a 40% drop in per capita output.<sup>1</sup>

The reality is much more complex, and the aggregate figures do not reflect it. African city-dwellers eat mainly locally produced food. Food imports in Africa have increased very slowly over the last twenty years, more slowly than in other parts of the world. Consequently, urbanisation can be seen as a major opportunity for agriculture, not only because of its effect on demand and the division of labour, but also because it is mainly city-dwellers who buy land and invest in it. Peri-urban farming is booming,

*When we have made an experience or a chaos into a story we have transformed it, made sense of it, transmuted experience, domesticated the chaos.*

**Ben Okri, Birds of Heaven**



especially in fruit, vegetables, and small-scale livestock operations. In some rural areas, specialists are even talking of a green revolution in farming. This is true for parts of Nigeria, the Ivory Coast, Zimbabwe and several of the Sahel countries.

Similar changes are happening on the social front. What draws most attention is ethnic and religious radicalism, mindless violence from young people and the painful demise of ancient traditions undermined by poverty. Less recognition is given to the fact that civil society in Africa has recently emerged in a highly dynamic fashion. A wide range of associations, usually a matter of choice rather than origin, are being set up to meet essential requirements, supplement the failings of public services and attempt to promote their own interests.

(continued on p. 24)

1. *A Vision of West Africa in the Year 2020*, OECD Publications, Paris, forthcoming 1996. This study was carried out as part of the CINERGIE project, a joint initiative of the African Development Bank (ADB), the Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) and the Club du Sahel/OECD. It was conducted by an international multidisciplinary team co-ordinated by Anne de Latre, Brab Mabamane, Jean-Marie Cour and Jean-Marc Pradelle. Funding was provided by the European Union, the World Bank and co-operation agencies in Belgium, Canada, France, the Netherlands and the United States.

2. Nicole Massignon, 'The Urban Explosion in the Third World', *The OECD Observer*, No. 182, June/July 1993.

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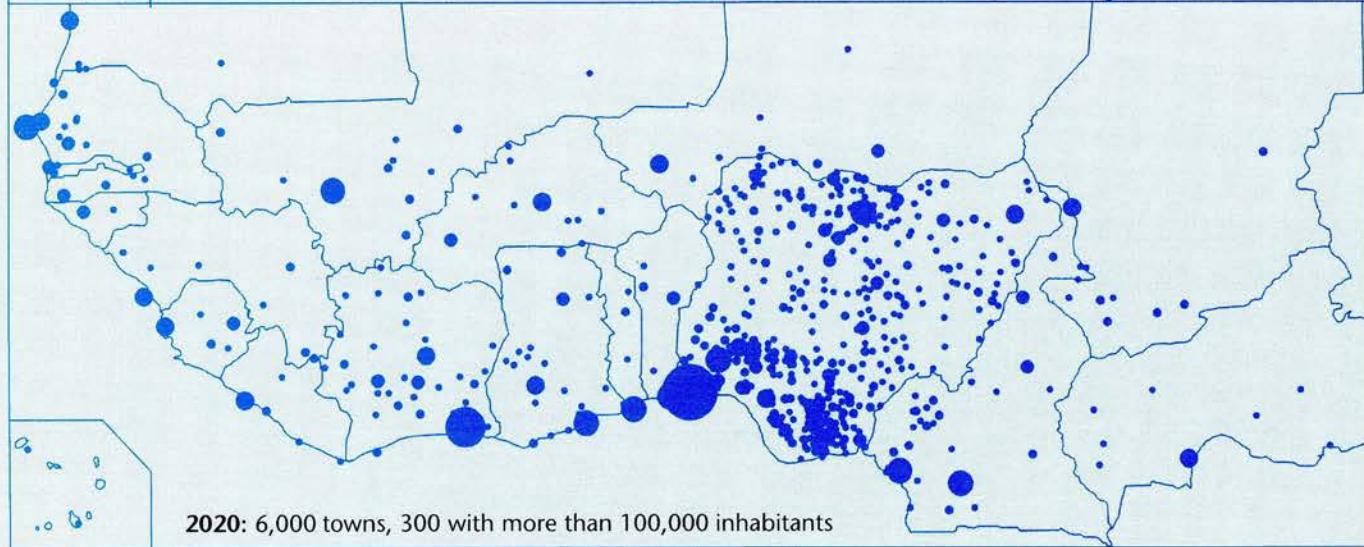
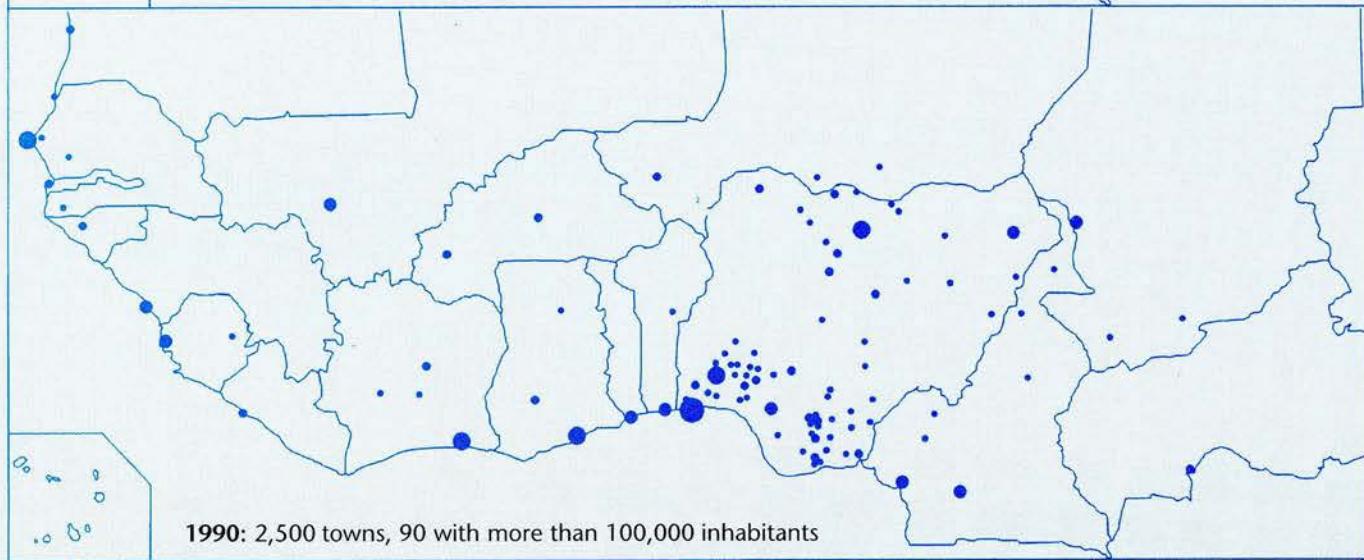
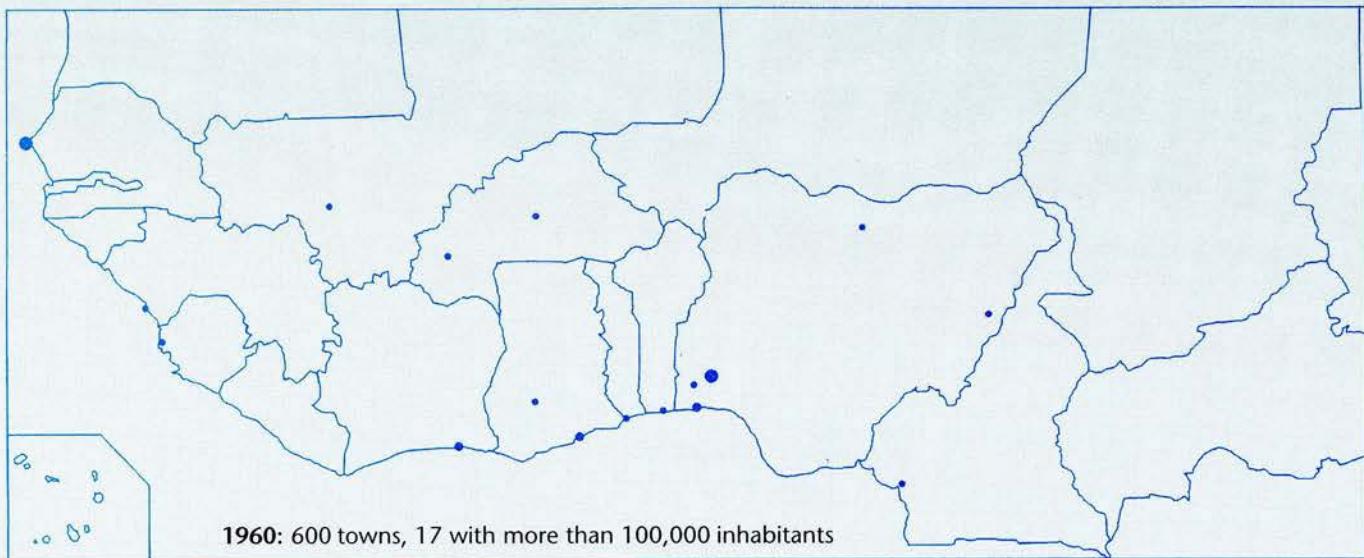
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**Number of Towns  
with more than 100,000 Inhabitants  
in West Africa  
1960–1990–2020**

**Populations**

- 100,000 to 200,000
- 200,000 to 500,000
- 500,000 to 1 million
- 1 to 2 million

- 2 to 5 million
- 5 to 10 million
- over 10 million



Source: CINERGIE BAD/OECD/CILSS and Club du Sahel/OECD

**The OECD OBSERVER** No. 200 June/July 1996

## FOCUS

**Market-based Agricultural Specialisation**

Serge Snrech

*West Africa is in the midst of a rapid transition. With a swiftly expanding rural population and the ensuing saturation of usable farmland, the region has gone in a matter of decades from an agriculture dominated by strategies of self-sufficiency to one that is market-led. The study of West Africa endeavoured to grasp the effects of this simultaneous rise in constraints (land pressures) and opportunities (the market). To this end, a special indicator of 'market attractiveness' was created to gauge the effect of urban demand in all rural areas (maps, left). What emerged was a strong correlation between proximity to markets, rural population density and agricultural productivity, thus highlighting the essential role of the market in boosting farm output.*

*Proper strategies for commercial production of surplus foodstuffs have been developed particularly in the vicinity of large metropolitan areas, where outlets are sufficiently dependable and lucrative: in the region's most highly urbanised countries (Ivory Coast and Nigeria), cash crops have been developed on a large scale and supply the bulk of domestic food requirements.*

*Two trends have been observed in the areas surrounding these markets: the most labour-intensive activities (market-gardening, fruit-growing, small stock-breeding farms, dairy-farming) tend to be concentrated in densely populated urban perimeters, and the income they generate is supplemented by non-agricultural pursuits (trade, processing of farm products, jobs in towns). In contrast, products – and particularly grains – for which capital could be more easily substituted for labour and generate substantial economies of scale tend to be found in an outer perimeter with fewer constraints on land, on farms which are above average in size and capital and which derive synergies from export crops. Still farther out, a number of regions exploit their particular environmental conditions to supply livestock, onions and off-season crops, thereby breaking their isolation.*

*Even so, because of a lack of access to markets (because markets are too small or the factors of production inaccessible), most agricultural undertakings are still dominated by strategies of self-sufficiency and risk-minimisation. For them, agriculture is still only a means of survival. In the future, growth and the gradual*

*development of the region's agri-food markets should speed the process of specialisation in rural areas and sharpen social distinctions: even if city-dwellers make up two-thirds of the population (as is projected for 2020), markets will remain too thin to accommodate everyone.*

*In any event, it will be increasingly difficult to devise agriculture policies using statistical tools that highlight average values more than geographical and social disparities, since it is those very disparities that reflect the region's most far-reaching patterns of change. The ability to focus more closely on groups and regions with widely varying requirements and profiles will probably become a condition for the success of economic policies and social programmes alike.*

I. Benoit Ninnin, 'Economic Geography of West Africa: Markets, Settlement Patterns, Agriculture, Roads: Modelling for 1960-90', WALIPS Working Paper No. 4, Club du Sahel/OECD, 1994; available free of charge from the Club du Sahel.

Serge Snrech, an agronomist, directs the analyses undertaken at the Club du Sahel of economic transformation in the region.

### Stimulating Local-government Spending through New Means of Payment

*The current indigence of most local authorities in Africa is as troubling as the poverty of their people: local governments have per capita budgets that are roughly a thousand times smaller than in Europe, although they have to cope with population growth of some 5% per year. The less a municipality spends, the less it can tap resources and the less it is able to form a vision of the future and convince its citizens of the utility of the public service.*

*How can this vicious circle be broken? How can this dearth of local government investment be sustainably remedied? The first step is to get local economic agents back to work by enabling communities to spend judiciously. Local requirements are easy to identify, and the skills, labour and materials required to plan and carry out locally beneficial work are usually available, but all too often there is no way of paying for them, since local economies are cruelly short of cash. The private sector can get by through resorting to barter or informal financing methods (such as tontines, illicit trafficking, and so on), but local authorities are generally not in a position to do so.*

*Under what conditions could monetary measures help break the current deadlock? Why not try putting a kind of 'local currency' in circulation, with limited, deferred convertibility? One possible source of inspiration would be to look back at historical solutions of countries that are now developed.*

*Along these lines, in 1685, Jacques de Meillles, the intendant of justice, police and finance of Canada, lacked the cash he required to buy furs and pay the salaries of the civil service, because the ship that was to have brought the money from France probably sank. I found myself in the direst of necessities, verging on subsistence. No longer knowing where to turn, since money had become exceedingly scarce, I had the idea of making playing cards legal tender. I issued an ordinance requiring all inhabitants to accept this currency in payment, pledging to redeem them personally at a later date. Nobody refused them, and it worked so well that the troops were able to go about their lives normally.' In spite of the fury of the King, succeeding intendants continued to issue card money until the British navy expelled the French from Canada. In 1763, in the Treaty of Paris, the King of France pledged to reimburse holders of the cards by redeeming them for a quarter of their face value. In the meantime, for more than seventy years 'La Belle Province' had been able to prosper and acquire amenities thanks to this card money, from which the Scottish financier John Law derived inspiration.*

*Why should Africa's cities pay cash for their growth (without spending more than they generate in resources), whereas many cities in the developed countries have acquired their amenities by creating the necessary means of payment in the form of loans that were never repaid or money that was simply created? This will not necessarily result in high inflation if, as is often the case, local enterprises are operating well below their productive capacity.*

# West Africa in 2020

Georg Gessler/Rapido



Much more than peanuts: the statistics disguise the dramatic growth of farming.

Two very different examples, among many, illustrate this phenomenon. In Chad, parents' associations, cut off from central government by civil war, have managed to run the education system, build 3,500 classrooms in the 1980s and pay in cash and kind the salaries of 2,500 teachers. A recent association of business people, young managers of mid-sized firms, now has 300 members in 11 West African countries. Its aim is to do business and lobby on behalf of regional trade. It has already had a practical effect on national policy in Nigeria and Ghana. It intends to pressure governments to reduce prevarication over, and to remove obstacles to, the free movement of goods. These examples contradict the conventional wisdom of a passive, victimised society, revealing instead one that is resisting and adapting in the first case, and advancing and fighting in the second.

There are many similar examples in other areas. Nigeria, with the largest population in Africa, is a good illustration of a disorder that is both creative and frightening. There is violence, military dictatorship, ethnic extremism and drug use, but also the beginnings of a green revolution, the emergence of African industrialisation in a part of the south-east known as the African

Hong Kong, a lively civil society (including pressure for human rights) and a quality press. Nigeria is a country of risk in every sense of the word, and profits last year on the Nigerian stock-exchange were among the world's highest.

## A Change in Perspective

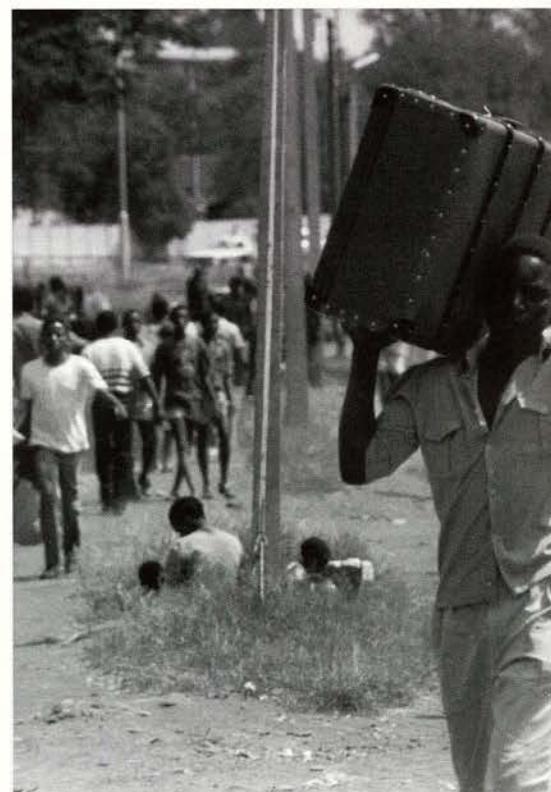
Why do observers see in these changes neither their purpose nor their diversity but only the most worrying features? Is it because they are the most numerous and significant, or because one sees only what one is prepared to see? Change in a society can be judged only by the reference point of the assumptions made about it. Events that fit within that framework may support or refute the ideas held, but anything that happens outside it is barely perceived at all.

African statistics illustrate this point perfectly. When systems of data-collection were set up, development was clearly expected in a definite set of areas: state-run public services, a modern sector with capital mainly from the state or abroad, a mining and farm export sector, and a

few farming activities such as large-scale cereals farming and cattle breeding. All these areas have been unsuccessful to various degrees, and the information systems have faithfully recorded the fact.

In the meantime, other major dynamics have emerged: in small businesses, in civil society, which supply public services, and in a range of secondary crops (vegetables) or new ones (maize). The information systems were not designed to measure this change and have not done so. The evidence of failure revealed by official statistics shows mainly that development of the expected sort did not occur, but hardly reflects the reality of the African economy.

The same could probably be said of many economic, political and social analyses of Africa. They are unknowingly based on a vision of chaos, violence and widespread poverty. Anything that confirms that picture is accurately perceived and regarded as important. Any evidence that might directly refute it – social and political stability, sustained economic growth – could also

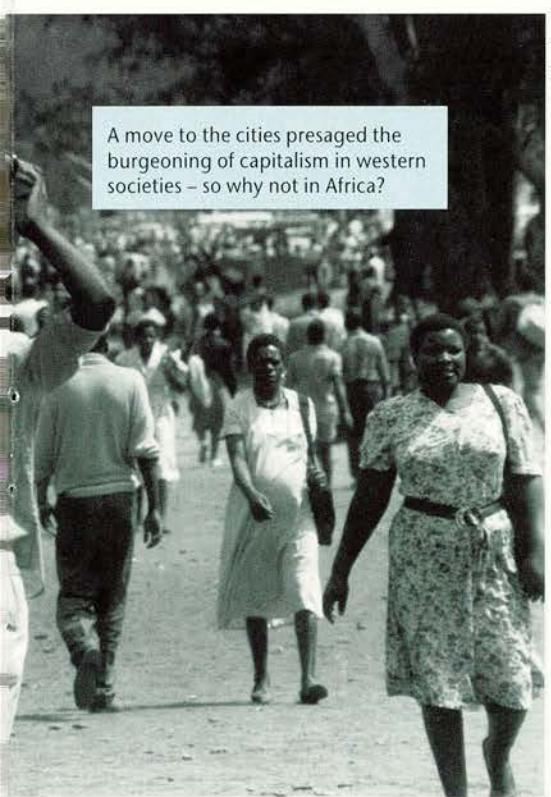


be detected, but how can that be expected in a period of upheaval? And whatever lies outside the field of vision does not show up. Anything hidden in the disorder is disregarded. No one looks for the overall movement and so it is not seen. If Africa is to be looked upon with different eyes, one must first change this unwitting image of its future.

## New Criteria for Judgement

That explains why changes generally seen as beneficial in western history are now perceived as adverse in Africa. This is true of the main forces driving change there – denser population, urbanisation, internationalisation, competition – and of a whole range of important and less important changes occurring all over Africa. The increasing number of intermediaries in the circulation of goods, seen as evidence of the arrival of the market in pre-capitalist Europe, is per-

A move to the cities presaged the burgeoning of capitalism in western societies – so why not in Africa?



J. Maillard/BUT

## Organising International Transfers of Resources

*Between 1950 and 2020, the urban population of the developing countries will have expanded by a factor of twenty, and that of sub-Saharan Africa by more than thirty. In this region, where for years the accumulation of physical capital remained scant, a support framework (of physical infrastructure, housing, and so on) has to be built urgently so that people can settle, the division of labour occur and markets evolve. Once this framework is in place, investment of a more directly productive nature can develop. Requirements for population-related investment have grown rapidly over the past two decades, but per capita net inflows of financial transfers to countries with expanding populations have shrunk considerably. Non-preferential loans, which impose payback periods and interest rates that are ill-suited to settlement investment, frequently result in negative net transfers.*

*West Africa's net external borrowing requirement, corresponding to settlement investment alone, amounts to some 3–4% of its real gross regional product.<sup>1</sup> In all, then, the total requirement is some \$5–7 billion, rising by 5% annually, and West Africa will not be able to count on a significant net inflow of foreign direct investment to finance its infrastructure for a long time yet.<sup>2</sup> How can the necessary net transfers be made more predictable and more regular without falling into the trap of mounting debt? Since the financing requirement generated by settlement is long-lasting and not cyclical, the simplest solution would be systematically to use official transfers that do not have to be repaid, for both the least advanced countries and those with intermediate incomes, which are also immigration countries. Moreover, the main purpose of government development aid ought to be to help provide amenities and stimulate private initiative and factor mobility, including human mobility, within the region.*

*How should such transfers be financed, now that rich countries are falling farther and farther short of the target of 0.7% of GDP for government development aid and tying that aid to increasingly restrictive conditions?*

*The simplest and most effective way to organise these government transfers would be to create special drawing rights (SDRs). These would constitute claims on the economies of countries with reserve currencies and thus impose a levy on their wealth and on holders of their currencies. Such a levy would be logical, modest and effective. It would be logical, because population growth is a problem for which all countries, rich and poor alike, are responsible. And transfers are, in a sense, the price that rich countries have to pay for the restrictions put on international migration in a world where there is free movement of factors other than people. Relative to the volume of activity in the rich countries, the levy would be modest in comparison with sums paid out in the past, when the new world was being settled or during the periods of reconstruction that followed major conflicts. Lastly, a new round of spending on infrastructure would bring both immediate and indirect benefits for rich-country economies, for which the levy would probably be less inflationary than the current cycle of lending, rescheduling and ultimate debt forgiveness.*

1. Jean-Marie Cour, 'The Real Economy of the West Africa Region: Retrospective Analysis 1960–1990 and Alternative Visions for 2020', WALTPS Working Paper No. 2, Club du Sahel/OECD, 1994; available free of charge from the Club du Sahel.

2. Jean-Marie Cour and David Naudet, 'External Finance for Development in West Africa: Trends in Resource Transfers and Discussion of Official Development Aid 1960–90', WALTPS Working Paper No. 6, Club du Sahel/OECD, 1994; available free of charge from the Club du Sahel.

# West Africa in 2020

Rocher/Jerican



Small businesses are an important factor in Africa's emerging dynamism.

ceived in Africa as an anarchic obstacle to state authority and economic activity. The intensive use of farmland is seen as destruction of the environment. Urbanisation is held to be the results of misguided policies. Such examples abound.

What is the source of this negative perception of change in Africa in the minds of the international community and also of some African leaders and intellectuals? It probably comes from the projection of one's own problems on to Africa and the judgement passed on the 'solutions' Africa has adopted. The succession of different priorities the international aid system has adopted for development bears out this argument. Broadly speaking, in the 1950s the priority was infrastructure, in the 1960s it was industrialisation, in the 1970s the quest for a new world order and the denunciation of unequal trade (after the oil shock), in the 1980s financial rigour and liberalisation. In the 1990s, the concerns seem to be

more varied, but they can be gathered under the headings of citizenship (democracy, decentralisation, equality of the sexes, and so on), combating poverty, and the environment. This overview is enough to show that the western international community finds it hard to do other than reproduce its own patterns of interest.

Africans are thus supposed to address all these issues, which are not necessarily the ones they would choose. And they are supposed to perform faultlessly. The type of development that the international community is currently proposing is one that respects human beings and the environment (through the sustainable human development, defined by the UN), that is fair and involves participation and democracy. The contrast with reality is stark. How can the present state of affairs be judged by such a yardstick? The challenge (not negotiable, of course) that the specialists throw down for African farming goes beyond a mere green revolution; it has to

be a green revolution that also respects the environment. Seen in this light, Africa will always lag behind, get low marks, and remain the despair of its well-intentioned, enthusiastic teachers.

Exaggeration apart, there is a real problem here. The 'philosophy' of development is largely the making of multilateral institutions, whose legitimacy is a moral one. It is hard for them to defend or encourage any process that is not beneficial on all fronts at once. But the history of development shows that, at least until a certain stage, such processes are few in number.

■ ■ ■

For all these reasons, most analysts are probably largely mistaken about what is happening in Africa. Until the major transformations – in population, urbanisation,

openness to the outside world, the emergence of competition – are complete, there is unlikely to be political and social stability, regular, sustained economic growth and the preservation of financial and environmental balances. If those signs alone continue to be sought as evidence of progress, the incomprehension and impression of chaos will endure. A bumpy ride has to be expected, a mixture of risk and progress. Only then shall the analysts be able to understand the changes in African societies, make out the major trends, and perhaps play a role in this last act in the world's history of development. ■

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# Ministerial Commuiqué

*The Council of the OECD met on 21 and 22 May 1996 at Ministerial level. The meeting was chaired by Franz Vranitzky, Federal Chancellor, and Viktor Klima, Federal Minister of Finance, of Austria. Vice-Chairmen were Antonio Luciano de Sousa Franco, Minister of Finance, and Francisco Manuel Seixas da Costa, Secretary of State for European Affairs, of Portugal, and Joseph Stiglitz, Chairman of the Council of Economic Advisors, of the United States. Prior to the meeting, the Chair led consultations with the Business and Industry Advisory Committee (BIAC) and the Trade Union Advisory Committee (TUAC) to the OECD; both organisations submitted statements for the consideration of Ministers. Ministers endorsed the conclusions of the recent OECD meetings of Ministers of Science and Technology, of Education, of Environment, of Public Management and of Development Co-operation.*

Ministers welcomed the accession of the Czech Republic and Hungary to the Organisation since they last met in 1995.

Ministers expressed their deep appreciation and gratitude to the Secretary-General, Jean-Claude Paye, for his strong leadership and outstanding dedication to the Organisation and to the cause of international economic co-operation over the past 12 years. They wished him well for the future. The Council welcomed Donald Johnston as his successor, with effect from 1st June 1996.

Ministers considered that the strong fundamen-

tals in many OECD countries strengthen prospects for better economic growth after the recent and unexpected slowdown in activity in some. Inflation is generally low; interest rates have come down substantially; and the broad movements in the exchange rates of the major currencies have improved the prospects for non-inflationary growth. However, there are serious challenges. Though high budget deficits and public debt are now being seriously addressed in most countries, they remain key problems. Unemployment remains unacceptably high in many OECD economies. The unequal distribution of income is a concern in

some. Structural rigidities weaken resiliency and adaptability to change. Recognising that conditions in OECD countries are inextricably linked to events and conditions in non-member countries, Ministers resolve to work together to generate sustainable development and non-inflationary growth in the OECD and beyond by creating more jobs, reducing poverty and exclusion, protecting the environment, and increasing confidence.

The globalisation of the economy is the product of the interaction between trade and technological progress. It gives all countries the possibility of participating in world development and all consumers the assurance of benefiting from increasingly vigorous competition between producers. To take advantage of these prospects for improved living conditions and progress, individuals, enterprises and countries must show themselves capable of rapid adjustment and continuous innovation. This is the challenge, particularly for member countries.

Ministers intend to rely in particular on the OECD's capacity to undertake analysis and develop policy proposals in order to meet together this challenge, on the basis of a jointly-agreed strategy whose principal elements are:

- the search for sustainable economic development at as high a level as possible, while maintaining social cohesion
- the continuous strengthening of the system of multilateral rules necessary for the proper functioning of a globalised economy
- diversified interaction with non-member countries.

Ministers adopted the following plan for action by OECD governments and guidelines for the work of the Organisation.

## Plan of Action

### Ministers resolve to:

- implement macro-economic and structural policies which should be mutually reinforcing and which will raise growth potential, increase job creation, maintain inflation at a low level and promote sustainable development
- continue to fight unemployment as their most urgent challenge, particularly as it affects the low-skilled, youth and the long-term unemployed and risks increasing social and regional disparities: in order to do so they will implement with firm determination the

recommendations of the OECD Jobs Strategy; positive results from policies consistent with this strategy have begun to show up in several member countries

- reduce fiscal deficits, by limiting public expenditure where appropriate, restore sound public finances and improve public sector management in order to improve growth prospects and help prepare for social and economic changes in the future
- pursue sound monetary policy and, in so doing, contribute to securing price stability and to creating a more favourable and predictable environment for investment and consumption decisions
- continue to co-operate on economic policies and exchange rates, thereby helping to improve the fundamentals for sustained growth, to promote greater stability in financial markets and to contribute to continued expansion of international trade and investment
- further promote adequate prudential supervision of banking and non-banking financial institutions and greater transparency and better dissemination of information in financial markets
- strengthen structural reforms in order to take full advantage of the beneficial effects of globalisation and technological advances and to create favourable business conditions, including for small and medium-sized enterprises (SMEs)
- promote innovation systems and use the full potential of information and communication technologies
- ensure that everyone has a sound foundation for lifelong learning and has or can acquire the necessary qualifications and skills to enhance employability in an evolving labour market and a knowledge-based society
- pursue regulatory reform, particularly by improving the quality of regulation and easing the transition to ever more competitive markets, thereby facilitating in a non-discriminatory way enhanced trade and investment opportunities
- pursue the integration of environmental with economic and other policies
- underscore equal opportunities as a priority objective of society and promote the role of women in the labour market.

**Ministers stress that strengthening the open and rules-based multilateral system will give renewed impetus to ongoing multilateral trade liberalisation efforts, and will map future directions for the multilateral trading system in support of**

**sustainable real growth, employment and development. To that end they commit to:**

- reaffirm the very high priority they attach to an effective and dynamic multilateral trading system, in particular by:
  - working to strengthen the confidence in and credibility of the multilateral trading system by avoiding taking trade and investment measures that would be in contradiction with World Trade Organisation (WTO) rules and OECD codes, and by using and complying with any applicable provisions for consultation and dispute settlement when differences arise
  - adhering to WTO rules, resisting all forms of protectionist pressure, ensuring full and effective implementation of commitments in accordance with the agreed timetables, including notification requirements, and pursuing focused efforts to achieve a successful conclusion to unfinished negotiations in certain service sectors and on non-preferential rules of origin
  - ensuring and enhancing, through the use of the WTO Committee on Regional Trade Agreements and other appropriate fora, the consistency of regional integration with an open multilateral trading system
  - working to widen WTO membership on agreed terms while safeguarding the integrity of the system as a whole; in this connection, effective market access in goods and services and effective enforcement of intellectual property rights is critical
- work for a successful first WTO Ministerial Conference to consolidate and build on the momentum of the Uruguay Round through a balanced, consensual agenda reflecting the interests of all WTO members, including developing and transition economies
- co-operate actively in ensuring progress on the WTO 'built-in' agenda for review, further work, or negotiations, including:
  - continued preparatory work already under way in the various WTO Committees and Working Groups
  - as mandated at Marrakesh, review of the report and recommendations of the WTO Committee on Trade and Environment with a view to making substantive progress on this issue
  - establishment of a work programme for the preparation and pursuit of the built-in agenda, where this is not already defined
- address the growing need for the further development of the multilateral trading system by:
  - pursuing all possibilities for further trade liberalisation, noting current work towards an information technology agreement; recalling OECD work on new issues,<sup>1</sup> giving further consideration to these issues with a view to determining how to proceed
  - giving new impetus to non-discriminatory multilateral liberalisation and rule-making, including through building on the momentum of regional co-operation
  - looking ahead beyond Singapore, noting the priority of the WTO in providing a forum for trade liberalisation and the future expiry of the mandates of the built-in agenda, and exploring various possibilities and modalities to ensure that the process of comprehensive multilateral trade liberalisation continues into the next century
- begin an examination of trade and investment in the WTO and work towards a consensus which might include the possibility of negotiations
- further the progress made so far in the negotiation of a Multilateral Agreement on Investment (MAI):
  - reach an agreement by the Ministerial meeting in 1997, with high standards of investment liberalisation and protection and effective dispute settlement procedures and aim at achieving a higher level of liberalisation
  - engage in an intensified dialogue with non-member countries, in particular those interested in acceding to the MAI
- maintain the momentum of work on OECD Transfer Pricing Guidelines and work towards a common approach to the problems posed by harmful tax competition
- further work for liberalising, in the interests of all, international air transport within bilateral and multilateral frameworks in order to ensure that the aviation sector contributes fully to economic development in OECD countries and in the world more generally
- continue to encourage the removal of remaining capital controls in member countries
- re-examine the tax deductibility of bribes to foreign public officials, with the intention of denying this deductibility in those member countries which do not already do so, recognising that such action may be facilitated by the trend to treat bribes of foreign officials as illegal; and criminalise such bribery in an

effective and co-ordinated manner in order to combat bribery in international business transactions, and for that purpose, further examine the modalities and appropriate international instruments to facilitate criminalisation and consider proposals in 1997

- continue working for the promotion of core labour standards around the world. They welcomed the conclusions of the OECD report on trade, employment and labour standards as making an important contribution to the understanding of this issue. They encouraged member governments to discuss these conclusions, as well as the Secretariat's analytical report on the subject, with a wider, non-member audience, with a view to considering any further action; this discussion could start in the context of the Policy Dialogue with Dynamic Non-Member Economies due to take place in the autumn
- maintain the momentum of the work of all participants of the 'Export Credit Arrangement', especially on the guiding principles for premia setting and on the Outline Understanding on agricultural products with a view to concluding agreements by the 1997 Ministerial meeting
- make every effort to obtain ratification of the 'Shipbuilding Agreement' by all participants within the agreed timeframe so that the Agreement enters into force by 15 July 1996, and encourage other countries to become parties to the Agreement
- proceed with the agricultural policy reform process in line with OECD principles and by fully implementing Uruguay Round commitments, and develop innovative and better targeted ways to address policy objectives such as those related to the environment, the rural economy and food security, and undertake work in preparation for the next meeting of OECD Agriculture Ministers.

**Ministers recognise that sustainable progress in developing countries is of increasing global importance and that the linkages between developing and developed countries should be mutually reinforcing and supportive of devel-**

1. Ministers received the following reports: on trade and investment, the report of the MAI Negotiating Group; on trade and competition, the Joint Report of the Trade Committee and the Committee on Competition Law and Policy; on trade, employment and labour standards, the Joint Report of the Trade Committee and the Committee on Education, Employment, Labour and Social Affairs as well as the Secretariat's analytical report to be de-restricted under the responsibility of the Secretary-General.

### **opment. In a spirit of new global partnership they agree to:**

- work together as bilateral donors and with multi-lateral development institutions to promote the integration of developing countries into the globalising world economy and to maximise the effectiveness and co-ordination of the global aid system
- endorse the long-term development strategy approved at the High-Level meeting of the Development Assistance Committee and, in particular, call on the developing countries to make efforts together with the developed countries towards the achievement of its output-oriented development objectives
- while recognising the need to increase the volume of development assistance, mobilise as much official bilateral and multilateral financing as possible, particularly adequate levels of Official Development Assistance; promote the flow of private resources and investment; and encourage the efficient and effective use of all these resources while reinforcing the self-help efforts of developing countries;

**As ever more countries embrace the market economy, pluralistic democracy and respect for human rights, as the world economy undergoes globalisation and as the overall architecture of international organisations evolves, the OECD must respond by adapting ever more rapidly. It must tackle new problems and reach out to new partners – both among and within States – while at the same time preserving the shared values and characteristics on which its relevance and effectiveness are based.**

In addition to the three countries for which the accession processes are well underway, several other non-member countries have expressed their wish to adhere to the OECD Convention. Some of these are participating in various Committees of the Organisation. Ministers welcome this interest and re-affirm that the OECD must remain open to countries sharing the same values, but also remain selective and maintain the tradition of high standards for OECD membership. OECD's membership has to continue to evolve, in accordance with a changing world and the interests of its members. In order to prepare the Organisation for future enlargement, while preserving its efficiency and usefulness, there is a need to take stock, define and introduce any necessary changes. Ministers expect a report on this subject in 1997.

Ministers are pleased with the quality of the dia-

logue and co-operation that has been established with a number of emerging and dynamic market economies and economies in transition. They firmly support these activities and will ensure that they continue to evolve in a coherent way and fulfil the mutual interest in an effective and differentiated manner.

**Ministers conclude that the OECD is an essential component of the multilateral system. The ambitious plan of action agreed by Ministers underscores the vital role of the Organisation in reinforcing democracy and demonstrating the values and dynamism of the free market. Ministers, while bearing in mind the constrained budgetary environment, call on the Secretary-General to meet the challenges of bringing the OECD into the 21st century, working with member countries to provide them with an OECD which continues to be ever more focused, efficient and effective.**

## **Guidelines for the Work of the Organisation**

**To facilitate the implementation of their commitments, bearing in mind the requirement to fit new work within a constrained budget, by concentrating on core priorities, Ministers request the OECD to:**

### **Growth and Employment**

- carry out analysis and exercise monitoring of macro-economic and structural policies and provide recommendations for sustained high non-inflationary growth, particularly on issues of common interest or with significant international spillovers
- follow up the Jobs Study work, including elements requested by G-7 Ministers, summarised in the report *Pushing Ahead with the Strategy* and support more rapid implementation of its recommendations by:

- undertaking further work on the interaction between macro-economic policies and structural reforms
- continuing the analysis and surveillance of country-specific issues and policies in the economic surveys and reporting to Ministers in 1997 on the common themes and lessons learned from the first full cycle of reviews
- working with member countries in a well co-ordinated horizontal manner to find practical poli-

cies, strategies and programmes to implement the findings of the Technology, Productivity and Job Creation report, and developing new work to identify 'best practices' in policies for innovation and technology diffusion and providing an interim report to Ministers by 1997, as well as continuing the analysis of the interaction between trade and technology

- continuing the reviews of labour markets and education and training policies, including with respect to the young, as well as completing the thematic work on entrepreneurship and job creation

- continuing to analyse issues and identify the policies relating to supporting the most vulnerable groups and to enhancing their ability to increase their participation in work and in society and to increase their living standards over time; including a review of the impact of social protection policies and their interactions with macro-economic and structural policies

• pursue forward-looking work on approaches that ensure that the public service is dynamic and well-equipped to respond to the challenges facing governments and to implement public policy effectively and efficiently

• deepen its work on a comprehensive policy framework to facilitate further development of the Global Information Infrastructure and related products and services, including the development of cryptography policy guidelines which would enhance security and protect intellectual property rights in this area, and analyse the economic and social impacts

• endorse the work plan on regulatory reform, bearing in mind that well-founded reform will improve economic efficiency and growth, promote technological innovation, serve consumer interests, support international trade and investment, and enhance government effectiveness

• disseminate the first report on the policy implications of ageing populations and further the analysis of the challenges in key policy areas such as pensions, health and long-term care, and report back in 1998

• continue its work on international migration

• develop an initial set of indicators of human capital investment based on existing data, analyse areas where significant gaps remain in internationally-comparable data, identify the costs of development and data col-

lection for new measures and performance indicators, and report to Ministers in 1998

- undertake further examination of the potential for environmental (or 'green') tax reform and analysis of the elimination or reform of environmentally harmful subsidies, with a view to presenting reports to Ministers in 1997 and 1998 respectively
- continue work on territorial policies, including for urban and rural areas

#### **Strengthening the Multilateral System**

- explore future directions for the further development of the multilateral trading system, making full use of its capacity for interdisciplinary analysis to identify important trade issues for possible future multilateral discussions and negotiations and trade disciplines in areas insufficiently or not currently covered by multilateral trade rules
- continue monitoring of regional and inter-regional developments, including their impacts on the multilateral system
- deepen understanding of new dimensions of market access and market presence, with a particular focus on the interaction between trade and competition policies

- develop its work on corporate governance and framework conditions
- monitor the implementation and extend the application of the OECD Transfer Pricing Guidelines and analyse and develop measures to counter the distorting effects of harmful tax competition on investment and financing decisions, and the consequences for national tax bases, and report back in 1998

#### **Development Co-operation into the 21st Century**

- follow up the intensive reflections on the strategic orientations for development co-operation into the next century and develop a work programme that supports more intensified work in the area of comprehensive approach and policy coherence
- complete, by 1997, policy orientations for donors on Conflict, Peace and Development Co-operation, together with an agenda addressing excessive military expenditures in developing countries and the implications for development assistance effectiveness, peace and global security
- follow up on the effect given to the recommendation on anti-corruption proposals for bilateral and multilateral aid procurement endorsed by the Development Assistance Committee

#### **Charting the Future of the OECD**

- bring to an early and satisfactory conclusion the accession processes for Poland as well as for Korea and the Slovak Republic as soon as each of these countries is ready and able to assume all the responsibilities of OECD membership
- define and implement measures now becoming necessary as the Organisation evolves and its relations with non-members become more diversified
- develop and rationalise, on the basis of a comprehensive, coherent and efficient strategy, the various forms of dialogue and co-operation with non-member economies. Within this framework, support further reform efforts in transition economies; strengthen co-operation with Russia; develop dialogue with dynamic non-member economies and, more generally, with emerging market economies; and intensify co-operation with the major economies of the various regions of the world
- complete the study on *Globalisation and Linkages to 2020: Challenges and Opportunities for OECD Countries* and submit a report in 1997.

**Ministers call on the OECD to accelerate the process of structural change in the Organisation, in particular by adopting more stringent priority-setting and by formulating and implementing reforms of management and working methods, with a view to further enhancing the relevance, efficiency and effectiveness of the Organisation, consistent with available resources. In light of this, Ministers request the Secretary-General to convene a special Council meeting at the earliest possible date in order to address these issues, and in particular to consider the Organisation's budgetary situation and prospects.**

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**Ministers recalled that the origins of the OEEC and its successor, the OECD, grew out of the vision George Marshall expressed in a speech at Harvard nearly 50 years ago. Ministers expect to celebrate this anniversary at their meeting next year. Looking to the future, and recalling the OECD's global context, Ministers expressed their expectation that the OECD will continue to play its role as catalyst and pathfinder in international economic co-operation and development.**

# Lower Military Spending in the Regions

Patrick Dubarle and Jacques de Saint-Martin

*'Brittany Troubled by Peace' – a newspaper headline that sums up the paradox facing the regions in most large industrial countries as a result of the reduction in military spending. The end of the Cold War, the changing nature of conflict, the fall of the Berlin wall and other developments have led to disarmament initiatives that have already had a major impact and are continuing apace.<sup>1</sup>*

**A**fter the crises in the coal, steel and textile industries, a 'military crisis' is affecting, or could affect, many areas in the European Union (EU) and North America.<sup>2</sup> The 'downsizing' of defence has been going on for a few years now, and a number of military installations have been closed down. Defence contractors faced with shrinking order books are therefore tending to redeploy their efforts and concentrate their factories on a smaller number of sites. They are, of course, trying to increase their exports, but are having to face growing competi-

tion in other markets in countries often already heavily equipped. A 20% decline in the Middle East market, for instance, is predicted between 1993 and 1997.<sup>3</sup>

Optimists are ultimately banking on beneficial spin-offs from the cuts in military spending: considerable financial resources<sup>4</sup> allocated to other uses, R&D switched to new civilian applications, growing requirements of the population met by using the skills, facilities and equipment now available, and so on.

But there is no escaping the fact that the short-term impact on the sites and regions affected will mainly be adverse. A town hit by the closure of a factory or a military installation has quickly to come to terms not only with the job losses but also with a drop in inhabitants' income, a reduction in tax revenue and economic imbal-

Patrick Dubarle works on regional development issues in the OECD Territorial Development Service; Jacques de Saint-Martin worked as a consultant on the study on which this article is based, in collaboration with the Institut du Développement Régional et de l'Espace Européen.



ENA/REIA

ances. Traders, sub-contractors, even the man in the street (not least because of improvements in public infrastructure) used to benefit from mili-

1. Reconversion of Defence-based Activities: A Micro-economic Approach, working document available free of charge from the OECD Territorial Development Service.

2. In the United States, downsizing started back in the 1960s (100 military bases were closed between 1960 and 1988).

3. Department of Trade and Industry, London.

4. The BICC (Bonn International Center for Conversion) puts the 'dividends of peace' (total savings) at \$3,200 billion for the period 1987-2000.

# Lower Military Spending in the Regions

## FOCUS

### Conversion of the Kevekaer-Twisteden Munitions Dump into an Equestrian Training Centre (Rhine-Westfalia)

The Federal Land of Rhine-Westfalia is currently endeavouring to re-allocate almost 7,000 hectares vacated by the armed forces. In spite of considerable efforts (150 sites have been re-used out of 350), it has recently been estimated that 80% of available space will – as far as practicable – have to be returned to nature as there is no demand for it.<sup>1</sup> The Kevekaer-Twisteden munitions dump, which covers 160 hectares (85 of which are woodland), had 15km of surfaced roads, 350 bunkers, an administrative building, accommodation and electricity and water-supply installations.

After being given possession in 1993, the Kevekaer local authority managed to attract a private investor, who bought the site in June 1994. This investment company, 'Traberpark Den Heyberg Kevekaer GmbH' plans to build a training centre for trotting horses, with eight stalls in each bunker, training tracks, administration and reception premises and accommodation for staff and users of the centre (trainers and others).

The centre is in a good location, close to several race courses (including Münchengladbach, Gelsenkirchen and Recklinghausen). The only other centre of its kind is the Grosbois centre in France. The aim is to train 1,000 horses in 1997 with a staff of 200.

Some spin-offs are expected for the local economy:

- the centre will, as part of the programme launched by the Niederrhein region, be promoted as a tourist attraction
- jobs may be saved or created in order to service the centre (horse feed, straw, other supplies).

1. 'Konversionsbericht Band II – Folgen und Chancen des Truppenabbaus in Nordrhein-Westfalen', Ministerium für Wirtschaft, Mittelstand und Technologie des Landes Nordrhein-Westfalen, Hannover, March 1995; *Süddeutsche Zeitung*, 1–2 April 1995.



The departure of local military personnel can substantially reduce demand for local goods and services.

tary spin-offs. To replace these externalities and maintain standards of living, a town that is affected has to find alternatives.

Not all areas are touched in the same way. First, military activities have often been located on separate sites, so that many regions will be affected only very slightly by the changes. And a distinction should be made between military and industrial cut-backs. The new deployment of military bases and barracks shows that downsizing is relatively evenly spread out, although job losses in defence-related firms are more concentrated, and therefore affect fewer regions.<sup>5</sup> The economic weight of these industries is also more important. Various studies have shown that the multiplier ratio (number of jobs under threat for one job lost) lies within an approximate range of 1.1 to 1.5 where there is downsizing on a military site, whereas it is 1.7

to 2.0 where there are redundancies in an arms industry.

Faced with this situation, many defence firms are trying to switch at least some of their activities to the civilian sector. Several highly specific characteristics of the military sector make this move rather difficult.<sup>6</sup> Apart from exports, these industries are largely dependent on government budgets, and orders usually depend on the special relationships forged over the years with the authorities responsible for defence procurement. Further, the high volume of investment in R&D and in production in small batches leads to high unit costs. Hierarchical organisational structures lead to specialisation. The military research environment, moreover, is highly specific, dominated by standards, special technical requirements and different time-frames – competitiveness does not have the same import-



ance as in the civilian market place. Finally, industrial approaches have been strongly influenced by the notions of independence and secrecy; a move into the civilian sector therefore requires a complete change of mentality.

Another approach to reducing the cost of restructuring production is to encourage research that has both military and civilian applications (the idea of dual-use). Most countries have tried such measures, but the differences in approach in the civilian and military sectors often make the process either too complex or too expensive. There have been some success stories, but the results are generally not as good as expected, mainly because of institutional inflexibility: the potential of dual-use technology is often to be found at a very early stage of development and mainly concerns large companies with good R&D departments of their own.

## National Initiatives

Numerous governments and the European Union have adopted special measures to convert the military/industrial complex. They have been introduced only gradually since, although lessons have been learned quickly from practical experience, aspects of the theory and methodology have taken longer to work out.

Local initiatives have been, and still are, guided by the chief concerns: to implement conversion initiatives within the context of a general strategy of local development, supported if necessary by socio-economic studies; to involve local elements in the development and implementation of projects; and to work within national and regional policy frameworks for development.

The main roles for central government vary from country to country. But in virtually all coun-

tries it is still the defence ministry that is at the heart of policy-making (military downsizing, closures of military bases, and so on). In contrast, it is generally other ministries (trade, trade and industry, treasury) who are responsible for conversion measures further downstream. France is an exception. Here, the responsibility of the defence ministry for restructuring extends from studies of the likely local impact, undertaken before any decisions are made, through to support for the introduction of conversion measures. These initiatives are closely co-ordinated with other national or local bodies (ministries; the *Délégation à l'Aménagement du Territoire et à l'Action Régionale* (DATAR), the regional development agency; *préfectures*). The other exception is the United States, where the Advanced Research Projects Agency is involved in programmes to promote dual-use technologies in the civilian sector.

In spite of these differences in the institutional response and in the volume of financial resources made available, there are quite a few similarities in how problems are treated locally. This consistency has now been reinforced in Europe by the introduction of the 'Konver' initiative.<sup>7</sup> This is a multifaceted approach to promote alternatives to the defence economy through technical support to civilian firms, particularly small and medium-sized enterprises, measures to overhaul military sites and stimulate tourism, and training for the displaced workforce.

## A Decentralised Approach

Whatever the effectiveness of central initiatives, governments are now turning more to micro-economic approaches, aimed at increasing local authority involvement. There are several reasons:

- a macro-economic angle, even a regional approach, conceals the real situation in some areas where the labour market is hard-hit
- national measures are often clumsy and ill-adapted and in some instances may have a huge impact locally

## FOCUS

### Scotland: Transfer of Expertise

*In Scotland, a large number of jobs are directly dependent on defence-related budget decisions. With a programme of reduction in the offing, the Institute of Technology Management at Heriot-Watt University in Edinburgh (ITM) was commissioned to lead a programme part-funded by Science and Technology for Regional Innovation and Development in Europe (STRIDE).<sup>8</sup>*

*The first step was to choose senior staff from large defence firms. They were given six weeks' training and then assigned to industrial SMEs as consultants. They were able to consult the ITM experts at any time during their assignments. The operation had a total budget of roughly £40,000 (50% funding from the European Community; 35% local or regional authority funding; 15% from participating SMEs).*

*In two years, thirty or so firms thus received a considerable injection of brain-power for a modest sum: about £2,150 for twenty weeks of input from a senior manager. Initial estimates indicate that 90 jobs were created and 120 saved; 150 new jobs are in the pipeline.*

1. The STRIDE programme of the European Community (1991-94) was set up to strengthen science and technology in regions categorised as 'objective one' (backward regions) and 'objective 2' (regions characterised by industrial decline).

5. Analyses by the European Commission have identified 19 regions potentially threatened by the restructuring of defence industries and 31 regions which are particularly vulnerable because of the importance of their military installations (the 12 EU Member States of the time were divided into 184 regions). The criterion used in selecting these regions was that the share of military employment in total employment exceeded twice the Community average (Competitiveness and Cohesion: Trends in the Regions, European Commission, Brussels, 1994).

6. Elhan B. Kapstein and C. Marshall Mills, 'Defence Conversion in Russia's Regions', *The OECD Observer*, No. 192, February/March 1995; Hans-Peter Gassmann, 'Krasnoyarsk-26', *The OECD Observer*, No. 177, August/September 1992.

7. Assistance from the European Commission under the 'Konver' initiative concerns conversion projects designed to accelerate the diversification of local activities to make them less dependent on defence; encourage the development of viable and innovative firms; present an integrated approach to conversion; mobilise funds from other sources; demonstrate a high degree of co-operation between local authorities. Grants can be substantial; for instance, the United Kingdom has received 100 million Ecu under Konver II.

# Lower Military Spending in the Regions

## FOCUS

### Fort Wolters Training Camp (Texas)

In 1971, the United States army announced the closure of Fort Wolters, its largest helicopter training camp, near the small town of Mineral Wells (19,000 inhabitants) in Texas. A large number of people were employed at the base at that time: 9,000 servicemen and women, 700 army employees and 1,200 civilians.

The elected representatives in Mineral Wells and in two counties, faced with a bleak future, set up a conversion committee comprising representatives from 30 local authorities. Negotiations were started with the army which had – up until that point – intended that the facility would remain federal property.

Once the army had agreed to consider handing the site over to the local authorities, the hurdles involved had to be assessed. The first study into options for reallocating all the real estate involved (subsidised by two Federal Ministries to the tune of \$45,000) outlined a plan to put the land and buildings to several different uses (industrial areas, education complex, airport, low-cost housing, leisure centre). A more detailed study was also financed out of federal funds at a cost of \$470,000. The local authorities, without sufficient resources, per-

suaded the Defense Department to rent premises to interested industrial companies and to plough back the rent (\$90,000 a year) into a municipal management service. In 1976, planning, management and promotion functions on the site were transferred to a non profit-making body, the Mineral Wells Industrial Foundation. The local community found a novel way to overcome the barrier of financing the purchase of installations: vacant land and buildings remain federal property but the community undertakes to maintain them. As soon as a buyer comes along, the local authority purchases land required and sells it on to the private buyer.

The results have been excellent:

- jobs created in the industrial area – 650 in 1980, 2,600 in 1989
- several educational establishments with a total of 500 pupils
- creation of a 2,200-hectare state park (co-financed by the State of Texas)
- other projects – youth centre, premises for social services, tennis courts, leisure activities (a swimming pool, and so on).

• decentralised initiatives, rooted in a specific area, are better placed to enable defence firms to overcome the 'culture shock' that occurs when they have to find civilian markets for their activities; the same is true for local communities (garrison towns, military ports) given the opportunity through such initiatives to take charge of their own future.

Local community leaders have to have the right tools if they are to assess the situation and introduce an appropriate package of redeployment plans. These tools and methods for formulating strategies do exist, and are often adapted from those used by consultancies for auditing company management. Obviously, they have to be revised to suit each particular community and the type of problems involved. In any event, it should be borne in mind that if they are to be

used in a given community, a good deal of training will be necessary.

One example of these new methods of 'change management' that has to be evolved (a creative approach, an approach which takes likely developments into account, and so on) is the 'project bank'. Knowledge of experiences on other sites and especially in other countries can be very valuable since it helps considerably to broaden the thinking of community leaders or those whose job it is to help them.

The use of these banks nevertheless requires some care. It is particularly important that a distinction be made between exogenous success factors (the pre-existing advantages of a site) and endogenous ones (those associated with the interplay of the institutions concerned).

Decision-makers will find their work easier if

they take account of a number of points. First, mobilising local institutions and individuals around a comprehensive development project will ensure that initiatives are more effective. In this way, many towns or areas have been able to implement conversion measures as part of a coherent package, involving partners from the armed forces or large arms firms which previously would not have been consulted.

Second, innovative attitudes play a key role. Local communities, like firms, are faced with a climate of increasingly fierce competition when it comes to attracting new activities or redeploying existing potential. Innovation is even more necessary in this respect to the extent that there are cultural barriers to be overcome. As in industry, innovation may involve products or processes (in the sense of original management methods or systems).

Third, conversion is expensive and requires new sources of funds to mobilise collective efforts.

■ ■ ■

Defence restructuring, although it does obviously have some specific features, is fundamentally no different from the restructuring going on in other sectors of the economy. And as there, these changes carry the inherent risk of destabilising local economies. To eliminate this risk, communities have to act with rigour and imagination to seize the opportunities as they arise. ■

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# Compatibility for Data Transmission?

Georges Ferné

*The new global information infrastructure will prove effective only if it can guarantee high-speed transmission of all kinds of data – text, images, sound or film – without hiccups or breaks. The challenge to technology is how to transfer large volumes of data between terminals (PCs, for example) which have different architectures and operating systems, across a network made up of an assortment of old copper wiring, fibre-optic cables and wireless communication media. The ensuing problems in interfacing lie at the heart of the current debate on standardisation. To assess more precisely the implications the OECD sought the advice of a group of experts from the private sector, each responsible for the standardisation of information and communications technologies in their respective companies.<sup>1</sup>*

Balanced and co-ordinated use of new technologies is bound to promote economic growth and employment world-wide. To encourage the growth of international markets and businesses, large or small, information and communications technologies (ICT) require standardisation efforts so that global networks can adapt to the emerging demand for the high-speed transmission of large volumes of data; indeed, this is a prerequisite for generating and

diversifying innovative activities in industry and services.

Large international companies are able to survive and grow (if more slowly) with only a limited range of international standards because they have the resources to create their own

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solutions.<sup>2</sup> For smaller firms, by contrast, growth depends on the establishment of global standards. Without them, SMEs will probably not be able to cope with increased competition on domestic markets, nor will they be able to break into foreign ones.

## User Participation

Some large users – airlines, banks, retailers – have already helped to create standards for ticket reservation, transactions between banks and the now ubiquitous bar-codes. But most users have remained outside the standardisation process, which is dominated by manufacturers and service providers. Since the applications of a number of new technologies have met with insufficient demand, user participation might be encouraged to communicate market requirements more clearly. But this is easier said than done, as users tend to formulate their requirements in terms of applications (can they use different peripherals, the same software on different machines, and so on) and show little interest in the lengthy technical discussions entailed in the standardisation process. One solution might be to define more clearly the different stages of standardisation so that users can take part at points that are of interest to them – prioritising, finalising projects or the analysis of results; the standards development organisations (SDOs)<sup>3</sup> must make the process more accessible.

The established standardisation procedures are facing a number of new developments, such as the pace of innovation in information

1. This group of top-level industrialists, set up in 1993, comprised representatives of users, manufacturers of ICT equipment and service providers.

2. Georges Ferné, *IT Standardisation and the Disparate User*, *The OECD Observer*, No. 189, August/September 1994.

3. Because of the large number of national institutional arrangements for standardisation, SDOs are difficult to define (some, for example are classed as part of the public administration, some are not). What is generally meant here are the recognised national standardisation bodies whose primary task is to take part in international discussions. Other bodies, such as consortia or fora, are termed informal.

# Compatibility for Data Transmission?

Daniel White



Widespread use has helped establish standards for bar-codes.

technology, the convergence of information and telecommunications technologies, the complex interests at stake, the growing number of institutions and the sense of urgency arising from the clear requirement for quicker standardisation.<sup>4</sup>

As things now stand, there is much competition and little co-ordination between official and unofficial SDOs. Any institution, state or private, can draw up a draft standard regardless of the fact that the same work may be being done elsewhere and without having to make its scope and objectives publicly known. So as to avoid wasting resources, creating delays and producing too many incompatible standards the work of SDOs has to be better co-ordinated. ICT standards are being developed ever more rapidly since the optimal use of the technology depends on the efficiency of the interface. The lifetime and level of compatibility of standards are likewise essential, particularly for users who cannot afford to keep on moving time and time again to a more up-to-date standard which is then incompatible with the previous one. They would like to see changes as part of a

continuous process which would give them more flexibility when adopting new technical solutions.

In recent years the major international SDOs have speeded up their work and the time required to draw up an internationally agreed standard has fallen substantially. But this hasn't satisfied users and producers, judging from the proliferation of private groups in which they have joined forces. Because they are more flexible these groups can work more quickly, but the process often becomes less open, less representative and less consensual. So a middle ground has to be found between the two.

4. **Information Technology Standards: The Economic Dimension**, OECD Publications, Paris, 1991; Georges Ferné, 'IT Standardisation and the Disparate User', *The OECD Observer*, No. 189, August/September 1994.

5. This is consistent with European legislation (Council Directive 83/189/EEC) which defines a standard as follows: 'a technical specification approved by a recognised standardising body for repeated or continuous application, with which compliance is not compulsory'.

6. **The Economic Dimension of Electronic Data Interchange**, OECD/ISO, Geneva, 1996; Georges Ferné and Richard Hawkins 'A New Electronic Tool for Business', *The OECD Observer*, No. 196, October/November 1995.

SDOs should therefore take the initiative and establish effective working relationships with the informal groups (whether consortia or fora) which users and/or producers have set up. They can then work as partners rather than competitors.

## Specifications for Standards

Given a minimum of training and ability and a suitable manual, anybody should be able to use a standardised product to its full potential. A standard must fulfil the following basic criteria. The documentation must be comprehensive, simple and readable and it must be readily available. It should contain no exclusive or proprietary information unless it is available to everybody.<sup>5</sup> The ability to interface (communicate) between computers of different makes is crucial; if a standard is to be comprehensive, it must include (or be associated with) international standard profiles, statements of conformance and the necessary test methods.

Thus the goals of standardisation should be:

- to create universally recognised specifications
- to facilitate interfacing
- to make different producers' products compatible with each other
- to avoid variations in components and products during manufacturing
- to establish 'inter-generational' compatibility (upstream and downstream), thereby safeguarding the value of past investments.

## Establishing Priorities

Standardisation requirements are shaped by a complex interplay of factors: aside from the problems and constraints generated by the evolving economic environment, the diffusion of technological advances will be influenced by the 'active past', that is, the massive investment in previous generations of ICT. Enormous efforts would have to be made to standardise the technological legacy of the recent past for

functions as basic as providing shipping documents, porting them between trading partners, and so on.

There are many examples to illustrate the consequences of the lack of broad coherence in standardisation and the difficulty of overcoming existing barriers resulting from the proliferation of specialised proprietary solutions. One is Electronic Data Interchange (EDI),<sup>6</sup> where incompatible solutions have been produced by diverse economic and regional groupings. At present, it is of paramount importance to guarantee interoperability rather than to make systems 'portable' – although, of course, users want both. In fact, the two are related, since the practical requirements of interoperability will stimulate demands for improvements in portability. Interoperability covers a range of elements, from emission and reception of data to connections with peripheral equipment, and includes the communicability of results obtained from software applications, which in turn refers to portability.

This interaction of technological supply, standardisation, and the diversification and evaluation of demands holds the key to reconciling market logic and standardisation logic. Competition is a prerequisite of technological progress: any form of standardisation which would impede such progress should be condemned. The required priorities for standardisation should not therefore focus on applications where differentiation is essential. They should set boundaries, find ways of bridging gaps and establish procedures rather than define products. In other words, they should be limited to aspects that have a direct impact on all machine-machine and man-machine interfaces, such as:

- operating systems which will affect programming and provide bases for future applications
- various conditions for access to data, communication and translation, extending beyond technical issues to include vocabulary, names, definitions, classification of data, and so on.

In order to maximise their lifespan, standards must be flexible and designed to evolve without discontinuities, in tune with technology and the emergence of new requirements. New

## RECOMMENDATIONS

### **The Process of International Standardisation**

*International standardisation should proceed according to the following principles:*

- the standardisation process should be market-driven and voluntary, based on an open process in which everyone with a stake in the issue can participate
- formal standardisation efforts should focus on aspects relevant for interoperability of products and services
- the contributions of industry-led consortia, fora and other 'informal' bodies in providing technical input into the formal standardisation process should be recognised and encouraged
- the importance of intellectual property rights as a means to protect investment in the development of new technologies should be recognised, but fair competition among market players should also be maintained
- government intervention should be limited to areas where regulation is essential – for example, when safety considerations are at stake
- users should be encouraged to organise themselves, so that they can play their appropriate role in the process
- governments should promote the adoption of international standards in preference to national standards whenever possible; as users, governments should also act as role models in referencing internationally established standards in public procurement policies.

### **Global Information Standards and Infrastructure**

- Identify the targets to be met in terms of critical interfaces at an early stage
- draw up a credible implementation scheme including specific targets, timetable and distribution of tasks
- ensure that appropriate collaboration and consultation of interested parties is maintained throughout the development process
- monitor the development work to alert

approaches are increasingly necessary, such as long-lived 'meta standards' that combine the definition of broad but flexible standardisation frameworks and architectures with the development of more circumscribed modules.

relevant bodies to progress achieved, possible delays and new standardisation challenges resulting from technological advance

- If necessary, launch and maintain special initiatives to gain the requisite consensus for rapid agreement on the timetables and goals that will promote the necessary changes.

### **Role of Governments**

- Draw up guidelines on governments' own role in the standardisation process
- interact with standardisation efforts in a non-directive way that safeguards their open and voluntary nature
- monitor the implementation of fair and non-discriminatory standards, so as to avoid possible distortion of free competition in the market.

### **New Mechanisms**

Since many standardisation bodies believe that their own programmes of reform are capable of meeting new challenges effectively and that further mechanisms and procedures are unnecessary, the group of experts from industry appointed by the OECD has made the following recommendations:

- interested parties should set up a central body to co-ordinate activities worldwide
- there should be a clear division of labour, including accurate and readily available specification of the responsibilities of committees and working groups
- standardisation work should be monitored so that information is readily available on who does what and where
- there should be more user participation in the choice of areas where standards are required, in the definition of priorities and in the assessment of results
- modern methods (network communication, for example, should be applied to the development of standards and the dissemination of specifications so that all interested parties can participate
- standardisers should adopt a code of conduct
- appropriate standards-related programmes should be provided in professional education.

In summary, standardisation priorities should focus on:

- hardware/software interfaces rather than products
- critical interfaces by means of 'formal open

# Compatibility for Data Transmission?

Serge Attal



Large international corporations can establish proprietary standards – at what cost for smaller firms?

standards', rather than by proprietary specifications

- inter-service interfaces, as with accessing the reservation systems of different companies and modes of transport
- broad standardisation frameworks that anticipate future technological advances and suggest desirable trajectories
- small/modular standards for interoperability
- inclusion of the necessary international standardised profile(s), conformance statements and test methods/test suites such that interoperability of multivendor products can be assured
- standards flexible enough to allow for maximum creativity in evolving technological areas.

## Government and Market

Although most national SDOs have some kind of official association with government, the SDO system worldwide has developed no consistent

pattern of relationships between the public and private sectors. Relations between member bodies of the International Organization for Standards (ISO) and their respective governments range from no official association (United States), to recognised status as an official, government-funded service (Japan). In OECD countries, direct support from government for the activities of the national accrediting authorities accounts on average for some 30% of their total budget.<sup>7</sup>

Perhaps the largest single challenge to established public/private relations in standardisation has come from the single European market. Through across-the-board interpolation of a regional degree of standardisation, established relations between national SDOs and their members, and between national and international standardisation organisations, have been modified. The European 'experiment' has increased the profile of standards internationally and forced national governments and inter-governmental organisations to act. This has sometimes led to parallel regional initiatives and even to an excessive proliferation of competing standardisation bodies. This development may favour the selection of solutions based on purely

national – if not intra-agency – considerations. Such national action has serious implications for the development of the global ICT infrastructure, and the likelihood of achieving a truly interoperable and seamless global capability.

Governments have special responsibilities in the standardisation process, for two reasons: its economic implications, and the fact that they can mobilise resources for long-term goals to serve the common good. Governments can often act as catalysts by putting pressure on the economic actors to establish priorities, by encouraging standardisation practices that are equitable and ensure that national interests are adequately represented in international fora.

Problems arise when governments treat standardisation as part of industrial policy, as simply a matter of making 'adjustments' to the technical infrastructure without regard for its constraints, logic or particular requirements. This approach could lead to the adoption of ineffective, limited or inappropriate standards – as has already happened in a number of cases – delaying developments and applications in new technologies.

Nevertheless, governments can now participate as major users of ICT products and services and support the various stages of standardisation. In particular, public bodies should cover their fair share of the costs of standards development by selecting products and services that conform to existing international standards, in order to discourage the spread of incompatible national applications. ■

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# Science and Technology in Korea

Jean-Eric Aubert

*South Korea has experienced remarkable economic growth, with real per capita income increasing about ten-fold between the mid-1950s and today, when it has reached nearly \$10,000. In many industrial sectors, such as semiconductors, electronics, shipbuilding and steel, it ranks among the world leaders. As it stands on the threshold of OECD membership, Korea is determined to be one of the major industrialised nations within a decade. One of the main conditions for meeting that goal is to raise the standard of its technology so that in time it can compete on an equal footing with the most highly advanced economies.<sup>1</sup>*

Improving the standard of Korea's technology goes hand in hand with the importance of investing in new, more 'sophisticated' sectors like information technologies, aerospace and biomedicine and to leave its conquests of years past, such as textiles and consumer electronics (Table 1, p. 36), to the second generation of dynamic Asian economies. One reason is that the average cost of Korean labour doubled in the three years after democracy was established in 1988.

To this end, Korea must strengthen its capacity for innovation. Like Japan in the past and, more recently, the other dynamic Asian economies, Korea has based much of its industrial development on imports of foreign technologies. But this is a source that is bound to run dry, since foreign firms are increasingly reluctant to transfer their technologies to Korean firms – and

for good reason, in view of the phenomenal export performance Korean companies have achieved as a result. Moreover, it is an inherent feature of techno-industrial competition that the more one side progresses, the more it has to bolster its own R&D capabilities, even if it chooses to remain a 'follower' and an 'adapter'.

Korea has had considerable difficulty in shedding its dependence on foreign technology, despite the exceptional R&D drive of the past fifteen years: from less than 0.8% of GDP in 1980 to more than 2.3% in 1994. But during the same period, technology imports decreased only slightly in relation to R&D outlays and, as measured by licensing royalties, seem to have bottomed out at a relatively high position and would have difficulty going any lower (Table 2, p. 36). Although the positions are not strictly comparable, the contrast with Japan in the early

stages of its industrialisation is startling: in 1975, Japan's imports of technology accounted for less than 5% of its R&D expenditure.

The issues facing Korea involve not only the development of its own innovative capacity but also the way it harnesses technology for industry and the economy as a whole. Here, too, efficiency has to be increased substantially. Korea has not escaped the low-productivity syndrome characteristic of the 'Asian miracle' economies.<sup>2</sup>

Korea's interest in science and technology is not new. To consider only modern times, a Ministry of Science and Technology (MoST) was created in 1967, a year after the Korean Institute of Science and Technology (KIST) – a major R&D organisation that gave early impetus to the country's efforts in this area. In the 1970s the focus shifted to the establishment of a large number of other government research institutes whose primary function was to supply the infrastructure and skills necessary to adapt foreign technologies in a wide range of areas. Science and technology policy was closely tied in with industrial policy, which took a highly interventionist approach to building up selected export-intensive sectors, initially in light industries such as textiles and later in heavy industries like petrochemicals and steel.

At the beginning of the 1990s, the government realised that the country's own capacity for innovation would have to be developed, and it altered its policies markedly, while simultaneously providing more resources – for science and technology policy in particular, where appropriations rose by more than 20% in each of the past two years, against only 15% or so for the central government budget as a whole. Ambitious programmes were launched, such as the Highly Advanced National Project (HAN), which aims to propel Korean technology in a variety of activities (for example, next-generation vehicles, high-definition television, broadband integrated services and data networks, advanced production systems, and so on) to the standard of the G7 countries by the end of the century, with funding of up to 4% of public R&D expenditure. A major project to computerise society was also established and assigned to a new Ministry of Information and Communications specially

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1. *Reviews of National Science and Technology Policy: Korea*, OECD Publications, Paris, 1996.

2. P. Krugman, 'The Myth of Asia's Miracle', Foreign Affairs, November/December 1994.

# Science and Technology in Korea

Table 1  
World Positions of Korean Industry, 1994

	Market Share %	World Rank
Electronics	6.4	5
Semiconductors	11.5	3
Cars	4.6	6
Shipbuilding	22.2	2
Iron and Steel	4.7	6
Petrochemical	4.6	5
Textiles	7.6	5

Source: Korean Development Bank

created to that end. Programmes to strengthen R&D infrastructure to benefit industry (in training, standards, and so on) were also set up, with substantial funding. As it turned out, adherence to the rules of the Uruguay Round obliged Korea to shift its industrial policy from targeted sectorial measures to broader provisions for industry as a whole.<sup>3</sup>

The OECD's recent review of Korea's science and technology policy highlighted, *inter alia*, three main areas that still require more attention: expanding basic research; creating a climate more conducive to innovation in industry (and SMEs in particular); and enhancing interdepartmental co-ordination of policies affecting science and technology.

## The Science and Technology System

The R&D system is built up around three main sets of participants:

- the fifty-odd government research institutes which until recent years constituted the core of Korean R&D and which still supply over 20% of aggregate R&D and account for a little over 15% of the country's scientific and technical employment; most are located in Daeduk Science Town, 250 km south of Seoul
- the hundred or so universities that perform only a small proportion (7%) of the total research effort but employ 29% of the R&D workforce (an overstated figure, since teachers engage in

little research and no full-time equivalent data are available); the university system is dominated by a few prestigious institutions and particularly, for research, by Seoul National University and the Korean Advanced Institute of Science and Technology (KAIST), also in Daeduk

- industry, which currently finances over 70% of all R&D and employs 55% of the people involved (which is similar to the figures for Japan, Germany, Finland and Switzerland); the twenty largest conglomerates (*chaebol*) – Samsung, Hyundai, Daewoo and others – account for 90% of industrial research outlays.

In terms of human resources, the percentage of scientists in Korea – which has a remarkable system of mass education – is fairly close to the OECD average, with just under 50 researchers and engineers per 10,000 in the labour force (Table 3). At the same time, these scientific workers have fewer financial and material resources because of the lower degree of economic development. As measured by the number of science and technology graduates (PhDs and master's degrees per capita), Korea is more or less comparable to Japan, but with a higher concentration in science and fewer engineering degrees (Table 4). Lastly, more than 15,000 PhDs (about 40% of the total) were earned abroad, mainly in the United States, and a majority (estimated at over two-thirds) of these graduates have not gone back to Korea.

By its very nature, the performance of the research system is difficult to assess, but the usual bibliometric indicators rank Korea below the top 25 in the world, its contribution to global science having been marginal until now. With approximately 4,000 articles in international publications



Charev/RETA

listed in the *Science Citations Index* for 1994, Korea trailed far behind Japan, the United Kingdom, Germany and France (from 38,000 to 65,000). Technical creativity, as measured by patents, has also been modest but is improving all the time: with nearly 800 patents (many in electronics) obtained in the United States in 1993, Korea ranks just below the world's major industrial powers and Switzerland, the Netherlands and Chinese Taipei. As a result, Korea's technical creativity is gradually catching up with its industrial might.

Table 2  
Technology Imports v. R&D

	1977-81	1982-86	1987-93
Technology imports (\$ million)	90.2	236.8	879.5
R&D (\$ million)	427.4	1,184.2	4,903.0
Technology imports/R&D (%)	21	20	18

Source: MOST



Flagship of Korean industrial success: shipbuilding is one of the sectors where the country is among the world leaders.

Rounding out the overall assessment is Korea's performance in trade in manufactured goods. In practically all mass-production sectors – from the simplest, like textiles, to the most sophisticated, like dynamic random-access memory (DRAM) chips – Korea runs a surplus. In contrast, it has serious problems in 'infra-industrial' sectors such as machinery and other capital goods, measuring instruments and the like. More generally, growth in industrial output in recent years has

*3. Science, Technology and Industry Outlook, OECD Publications, Paris, forthcoming 1996, Part IV.*

been accompanied by a sharp rise in manufactured imports, primarily from Japan; Korea's deficit with Japan hit \$10 billion in 1995.

## Developing Basic Research

In modern economies, a strong capability in basic research is essential in the acquisition of a suitable degree of technological skills. The natural place to develop this capability ought to be the universities, but academia has so far failed to produce much research, even though it employs over 70% of Korean PhDs. There are many reasons. First, the government has given universities extremely heavy teaching loads, leaving instructors practically no time for research. In addition, the 'intellectual climate' has hardly been propitious for exploratory, abstract research: as in other Asian countries, research necessarily has a very practical orientation, while Confucian doctrine, which is deeply rooted in Korea, introduces rigidities which affect creativity and initiative. Lastly, funding for university research has been less than generous.

The Ministry of Education (MoE) has paid scant attention to university research, providing only modest support through a poorly endowed foundation for academic research. The most important initiatives have come from the Ministry of Science and Technology. The most significant (those that have had a major impact on the science system over the past two decades) have been the creation of the Korean Advanced Insti-

Table 4  
PhDs and Masters  
in Korea, Japan and the United States

Korea 1993	United States 1989	Japan 1990
Completed Masters per 1,000 population (science and engineering)		
0.157	0.207	0.129
Completed PhDs per 1,000 population (science and engineering)		
0.027	0.058	0.022
Ratio of PhDs to Masters		
0.17	0.28	0.17
Ratio of Engineering Masters to Science Masters		
1.89	2.74	4.40
Ratio of Engineering PhDs to Science PhDs		
1.43	0.64	2.36

Sources: KITA and NISTEP (Japan)

tute for Science and Technology (KAIST), the Korean Science and Engineering Foundation (KOSEF) and some forty centres of excellence at Korean universities (modelled on those of the National Science Foundation in the United States). More recently, an advanced science institute was created in order to bring a hundred of the country's most brilliant young researchers together with some fifty top-rank foreign researchers.

But these measures, while very useful, only partially address the necessity of a thorough overhaul of the university research environment. In particular, steps should be taken to focus on no more than ten high-quality public and private universities that have critical mass in a number of disciplines, to repeal regulations that limit research activity, to generalise procedures for the evaluation and promotion of teacher/researchers (in accordance with Western-style peer review), and to increase average grants for individual projects, which are inadequate by international standards.

The other natural environment in which to develop basic research is the government-sponsored research institutes (GRIs). Originally set up to carry out highly specific applied tasks (such as testing, reverse engineering and standardisation) that have now been largely taken over by industry, the GRIs are having serious problems adapting. To help them evolve, the Ministry of

Table 3  
R&D Personnel and Expenditures, 1993

	United States	EU (15)	Japan	Korea
Number of researchers (thousands)	887	609 <sup>a</sup>	518	98
Researchers in active population (per 10,000)	76	44	78	46
Expenditures per researcher (\$ thousand)	142	..	195	77
.. not available				
a. 1989				

Sources: OECD, EEC, KITA

# Science and Technology in Korea

Chorpen REA



University teaching loads are very heavy, leaving academics little time for research.

Science and Technology, which oversees the institutes, recently set up a project-financing scheme under which the funding of fixed costs (in some cases including wages) is conditional upon winning contracts from ministries and other government bodies. Theoretically, this is a powerful incentive to stimulate flexibility, forcing the GRIs to take more account of economic and social requirements, but it is not necessarily conducive to long-term research, which requires a certain volume of dependable support if it is to flourish. And with this new financing mechanism, such support may be in somewhat short supply, even though contracts are expected to span fairly lengthy periods (between six and nine years).

Lastly, the third pillar of the research system – big business – should not be neglected. Curiously, it is here that investment in basic research is highest. The fact that statistics are defined rather loosely – industry classifies all long-term research as ‘basic’ – casts some doubt on the value of this statement, yet some of the enormous profits of the *chaebol* have clearly been invested in high-quality research centres which are extremely well

equipped. Although one might question the use to which the large consortia are putting these centres or the somewhat luxurious nature of investments that have little relevance to business strategies or core operations, they do hold out real potential.

Today it can be seen that what is known as ‘basic technological research’ is expanding worldwide, whereas distinctions between fundamental, technical and applied research are fading. Since Korea is obviously well placed to follow that trend, it is important that a suitable framework be established.

## Stimulating the Middle-sized Company

The *chaebol* around which Korean industry is built up are large, family-owned, multi-sectorial groups which are heavily supported by the state and on which is based the intensive national export drive that has underpinned the development policy of every Korean government since the early 1960s. These large groups per-

form the lion’s share of R&D. Alongside them are a myriad of micro-firms but few medium-sized companies (there are 8,000 in the manufacturing sector, with between 50 and 300 employees), which are having serious problems growing, or indeed merely keeping afloat. Herein lies a structural problem which has to be remedied: the Korean economy is being deprived of a major source of innovation and vitality.

The authorities have taken a series of important steps to raise the technological standard of SMEs, including tax incentives to establish ‘private research institutions’, at times by joining forces in consortia. Measures to extend and strengthen assistance and technical information mechanisms have been enacted, as have packages of financial aid tailored to the R&D projects of SMEs. But the weaknesses of these firms stem from the overall context in which they operate.

Their first weakness may be ascribed to cultural factors. Most of the firms are run in a highly traditional manner, and the scientific and technical attainment of their employees is low. Graduates are attracted by the large groups, which pay much higher salaries and have far more prestige. Changing this situation will undoubtedly be difficult, but possible approaches might include the setting up of training schemes and exchange programmes with the *chaebol*, with adequate government incentives and the development of work-study schemes under which business and engineering students would spend part of their time in SMEs.

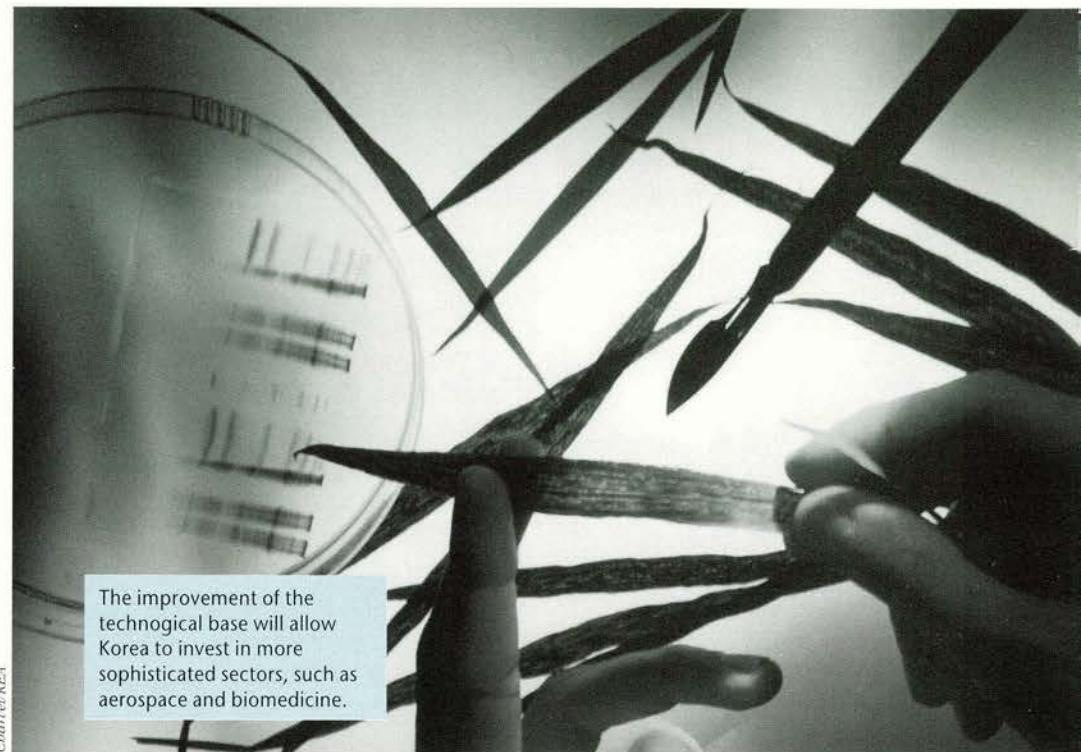
The second problem is the funding requirements for innovation and the upgrading of SMEs. For years, of course, the government has tried to facilitate investment by these firms, *inter alia* by requiring banks to extend them concessionary loans, but because the venture capital market is thin, this approach is not enough. Building on the general measures already enacted to modernise the financial system,<sup>4</sup> a whole series of steps is required to promote the funding of innovation and SME expansion, using tax incentives, banking regulations and financial-market institutions. Transactions, which all too often are still carried out on a sort of black market or with covert payments between partners, acquaintances or relatives, have to be formalised.

The third problem is that SMEs are at a disadvantage when they compete or co-operate with the large groups, given the lack of relatively codified rules governing subcontracting and other business relationships of the kind found in many OECD countries. Examples abound of big corporations seizing upon innovations developed by SMEs which are never fairly compensated for their efforts. Competition laws should probably be strengthened, or at least more strictly enforced.

## Enhancing Policy Co-ordination

In Korea, as in all countries, R&D and innovation are not the province of a single ministry, but the Ministry of Science and Technology does play a prominent role – first among equals – in co-ordinating the national budget for public R&D. This is a difficult task, as the MoST has to come to terms and negotiate with all other ministries that have even the slightest involvement in S&T policy. The Ministry of Industry (also responsible for trade and energy) is becoming increasingly important through its action to support, guide and oversee industrial research. This role can sometimes lead to friction with the MoST, even if the MoST focuses primarily on basic research and major R&D programmes. The Ministry of Education plays a key role with regard to academic research but research is not the MoE's priority. Appropriate sharing of responsibility has also to be sought with the recently created Ministry of Information and Communications. Lastly, there is the all-powerful Ministry of Finance and the Economy, which as in many other countries has the final say over budget matters.

The situation becomes even more complex when science and technology have to be integrated into overall policy for economic development. Although S&T is said to be a national priority, the mechanisms that could translate those words into deeds do not work very well – and for several reasons. First, the former Economic Planning Bureau, which for three decades played a vital role in the formulation and



*Charvet/RCA*

The improvement of the technological base will allow Korea to invest in more sophisticated sectors, such as aerospace and biomedicine.

implementation of the country's development policy, and in this connection was responsible for science and technology matters, was merged with the Ministry of Finance and the Economy (and thus to some extent dissolved). Next, the mechanism for interministerial co-operation – the National Council for Science and Technology, chaired by the Prime Minister – merely records decisions that have already been negotiated between ministries; and the Presidential Council on Science and Technology, comprised of experts who report to the President, has little more than an advisory role and not much influence.

Democratisation is raising new and hitherto unencountered problems of institutional co-ordination. Regions and municipalities are expected to take more and more initiatives, and the National Assembly, through its specialised committees, is taking an expanding interest in science and technology and growing increasingly accustomed to exerting its authority in this area as in others.

Such problems of policy co-ordination are not limited to science and technology. They stem from the fact that Korea is currently in a state of transition in which three different types of politico-administrative regimes are all exerting their influence: the presidential democracy that is gradually taking root; the authoritarianism that prevailed in the decades following the Second World War; and a variation on the centuries-old

feudal system, in which territorial fiefdoms have been transformed into administrative fiefdoms in the form of government ministries. The three regimes play by different rules, and a certain period of adjustment will be necessary until a balance is struck and suitable compromises can be found.

It is plain to see that Korea is still deeply marked by its traditions, which show through in its institutions and in people's behaviour. This influence is felt in many activities, including education, finance, research, industry and government. There is nothing surprising about that; it is a result of the extraordinarily rapid growth that the country has undergone over a period of time that by the scale of history has been very short. Preserving the best of the traditions and age-old values that underlie its remarkable success and removing the obstacles to the progress ahead – such is the heart of the challenge that faces 'the Land of Morning Calm'. ■

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# New Zealand

## Reform of the Public Sector

Hannes Suppanz

**B**eginning in the mid-1980s, the New Zealand government has undertaken an ambitious and wide-ranging reform of the public sector. It has privatised many of its trading operations, and those that it still owns are generally run as commercial businesses without subsidies or legislative protection from competition. It has also overhauled the way it manages its major departments, contracting them to produce outputs and giving them authority to choose which inputs to use to this end. In addition, it has replaced cash-based accounting with private-sector-like accounts that provide balance-sheet information for departments, agencies and for the government as a whole. In health care, it has, among other things, separated purchasers from providers, and in education it has moved to give students and parents more choice. Other countries have taken similar measures, but New Zealand's public-sector reforms have been more radical and comprehensive, in particular in the area of management, budgeting and accounting.<sup>1</sup>

Although the reforms in New Zealand have been numerous and diverse, there are common threads running through them. They have aimed at clarifying objectives and devising incentive structures which promote good performance, at monitoring performance against expectations, and at enhancing transparency. In particular, their main elements can be seen as attempts to solve some fundamental problems that have traditionally impaired government performance.

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First, government agencies often do not face strong competition in their product markets, and as a result they may be inefficient. Many of the New Zealand reforms address this problem: government-owned businesses have had legislative monopolies removed; educational and health providers have been encouraged to compete with one another for public funds; government services suppliers have been required to institute user charges so as to enhance competition from private providers; and capital charges have been introduced for government agencies to improve allocative efficiency.

Second, government agencies as a rule are not affected by market competition for their ownership and thus lack an important incentive for good management. The New Zealand government has responded by selling many of the businesses it used to own, so as to subject them to monitoring by the capital market and improve their performance. In addition, it has facilitated the entry of privately owned providers in education, health and elsewhere into the market for public funding.

Third, government agencies have often had complex and incoherent goals, and unclear accountability for their achievement. That has often meant that governments have had poor information about what their agencies have been doing and at what cost. Almost all the New Zealand reforms have attempted to deal with these problems. Heads of government departments have been made more clearly accountable to ministers; government-owned trading enterprises have been made responsible solely for commercial goals; and the governor of the central bank has been made accountable for price stability, and nothing else. At the same time, the government

has introduced new systems of information and accounting to help it monitor the work of its agencies, and new mechanisms for encouraging better performance (such as fixed-term contracts and performance-related pay).

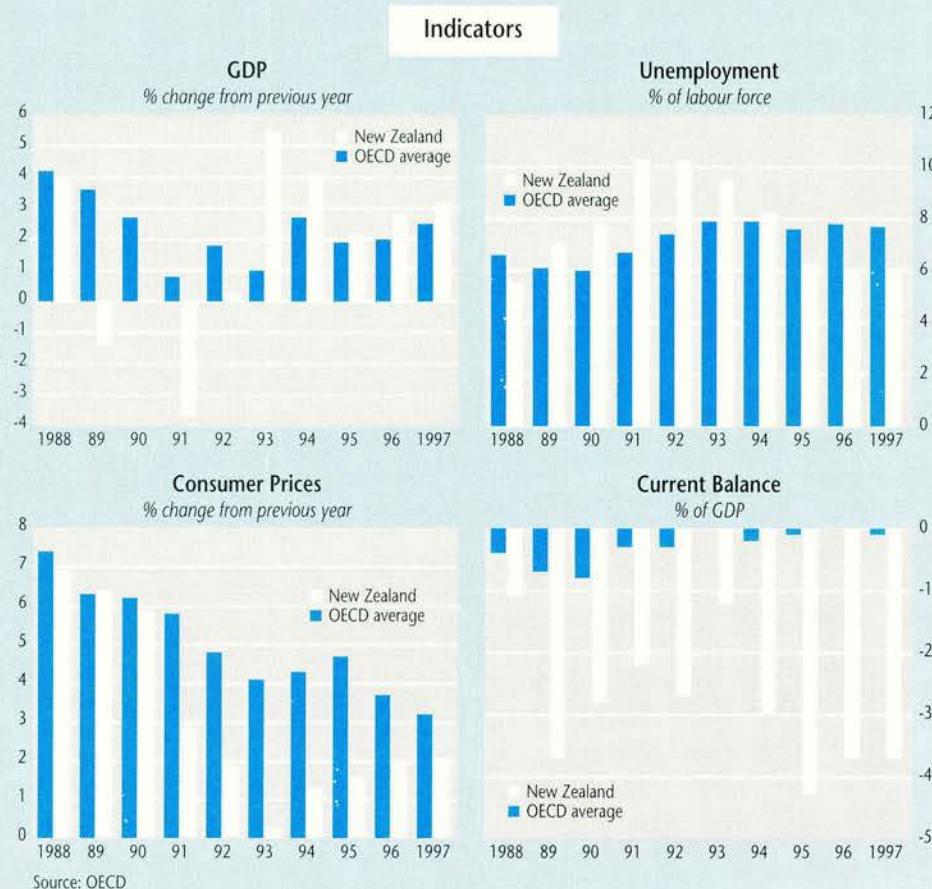
Fourth, government agencies have often had limited authority to make decisions about how to attain their objectives, with regulations commonly believed to have prevented them from achieving the government's goals efficiently. In New Zealand, the authorities therefore chose to drop most controls on input choices throughout the public sector and to rely instead on the new mechanisms in producing the outputs the government has asked them to provide (and in particular the monitoring of departmental performance).

Finally, it is in the nature of political decision-making that governments face incentives to pursue policies with widely distributed or disguised costs and concentrated or salient benefits. Deficit-spending or import barriers may be examples. A number of public-management reforms in New Zealand are aimed at reducing this problem by requiring the authorities to provide more information to the public on its activities and their costs. For instance, if the government wants state-owned businesses to perform non-commercial functions, it has to pay them explicit subsidies. More generally, the Fiscal Responsibility Act of 1994 requires the government regularly to publish information on its strategic and detailed budgetary plans and on its subsequent performance, drawing public attention to, among other things, the public debt and the government's net worth.

### Results – and Unfinished Business

The reforms have brought about a marked reduction in the scope of the government's activities and in its size relative to the rest of the economy. Employment in the public sector has fallen from 27 to 20% of the total, with much of this decline resulting from the privatisation of government businesses. Excluding business

1. *OECD Economic Surveys: New Zealand*, OECD Publications, Paris, 1996.



operations, employment in the core government sector as a share of the total has also dropped, from 16½% to about 15%; at the same time, government expenditure as a proportion of GDP has fallen from over 40% to 36%. On both measures, New Zealand is now again among those OECD countries where the government plays a smaller role in the economy.

Empirical evidence, though limited, generally suggests that the reforms have been helpful. Corporatisation of government agencies and enterprises has increased managerial incentives and discretion over inputs, contributing to large gains in efficiency and profitability. There are also indications that privatisation has produced similar improvements in company performance. Budget, management and accounting reforms in the core public sector have given departments clear and transparent objectives and the autonomy to achieve them, all the while strengthening accountability mechanisms. The new framework appears to enjoy widespread, though qualified, support among those involved, if not the general public, and the evaluation studies available all show improvements in cost performance of government departments. In local government, the number of authorities has been drastically reduced, and reforms have been introduced along the lines implemented for central government.

Among the elements of the health-care reforms that should, over time, have beneficial effects are improved information and accounting, the requirement to make a return on capital, the devolution of decision-making to regional authorities, the integration of the purchase of health services, and the separation of the functions of funding and providing care. And reforms in education have already given parents and students more opportunity to influence the performance of schools and other providers, who also benefit from increased autonomy, not least in the use of resources.

Nonetheless, there is still unfinished business. Although corporatisation has introduced market mechanisms and improved the measurement of costs, additional financial reporting information could be provided to simulate some capital-market discipline and give a better picture of company profitability. Moreover, many businesses still owned by central and local government could be privatised, without raising regulatory issues. In the core public sector, the government could do more to encourage and enable its agencies to improve their performance installing better systems for evaluating policies by result. Improving the efficiency of local authorities as a major supplier of infrastructure services would also be an important step to raising the performance of the government sector.

In health care, where the reforms are more recent, hospitals have to restructure services in a way appropriate for the new competitive environment and also to develop the necessary costing and information systems to allow them to manage demand effectively and equitably.

In education, much remains to be done to generalise direct resourcing of schools, improving the functioning of school boards, develop information on the quality of institutions, and make the system more responsive to parental and student demand. More specifically, the continuation of centralised practices in the contracting of teachers and in the negotiation of their wage rates acts as a rigidity to the ability of schools to move swiftly in meeting emerging demands.

The reforms have seen the general budgeting, management and accounting methods embedded throughout the government sector. But the extent to which behaviour has changed still varies across public-sector entities. The efficiencies made possible by the freedom of chief executives to manage agencies and the specification of outputs will only continue where accountability is enforced. In some cases, such accountability could be clearer, in particular for the relatively large 'Crown entity' sector (which includes government bodies, such as hospitals, that are neither departments nor 'state-owned enterprises'). One way to address this problem would be through further improvements in monitoring the performance of agencies and the clarification of responsibilities to that end. Among the useful mechanisms which could be applied here are an encouragement of market testing and the introduction of more transparent standards for delivery. Additionally, more detailed evaluation of existing policies is likely to improve the quality of decision-making and provide a spur for continuing innovation in their design and delivery. ■

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# Indicators

AUSTRALIA		
	period	% change from previous period
		year
Gross Domestic Product	Q4 95	0.5 2.4
Leading Indicator	Jan. 96	0.4 -4.4
Consumer Price Index	Q4 95	0.8 5.1
		current period same period last year
Current Balance	Jan. 96	-1.39 -1.99
Unemployment Rate	Jan. 96	8.4 8.9
Interest Rate	Feb. 96	7.50 8.15

## Definitions and Notes

Gross Domestic Product	Seasonally adjusted volume series except for Portugal
Leading Indicator	A composite indicator, based on other indicators of economic activity (employment, sales, income, etc.), which signals cyclical movements in industrial production from six to nine months in advance
Consumer Price Index	Measures changes in average retail prices of a fixed basket of goods and services
Current Balance	\$ billion; not seasonally adjusted except for the United Kingdom and the United States
Unemployment Rate	% of total labour force – ILO standardised unemployment rate; national definitions for Austria, Denmark, Iceland, Mexico, Switzerland and Turkey; seasonally adjusted apart from Turkey
Interest Rate	Three months, except for Greece (twelve months)

Source: Main Economic Indicators, OECD Publications, Paris, April 1996.

AUSTRIA		
	period	% change from previous period
		year
Gross Domestic Product	Q4 95	0.0 0.3
Leading Indicator	Jan. 96	-0.1 -1.3
Consumer Price Index	Jan. 96	0.8 1.9
		current period same period last year
Current Balance	Jan. 96	0.61 0.33
Unemployment Rate	Feb. 96	7.2 6.4
Interest Rate	Feb. 96	3.32 5.00

BELGIUM		
	period	% change from previous period
		year
Gross Domestic Product	1994	2.2
Leading Indicator	Feb. 96	-0.1 -3.8
Consumer Price Index	Mar. 96	-0.1 1.9
		current period same period last year
Current Balance	Q4 94	3.87 4.07
Unemployment Rate	Feb. 96	9.5 9.4
Interest Rate	Mar. 96	3.30 6.34

CANADA		
	period	% change from previous period
		year
Gross Domestic Product	Q4 95	0.2 0.6
Leading Indicator	Jan. 96	0.4 -1.4
Consumer Price Index	Feb. 96	0.1 1.3
		current period same period last year
Current Balance	Q4 95	0.11 -1.95
Unemployment Rate	Jan. 96	9.5 9.6
Interest Rate	Mar. 96	5.18 8.21

DENMARK		
	period	% change from previous period
		year
Gross Domestic Product	Q3 95	0.5 2.9
Leading Indicator	Dec. 95	-0.2 -2.6
Consumer Price Index	Feb. 96	0.6 1.8
		current period same period last year
Current Balance	Q3 95	1.15 1.55
Unemployment Rate	Jan. 96	9.1 10.7
Interest Rate	Feb. 96	4.40 6.00

FINLAND		
	period	% change from previous period
		year
Gross Domestic Product	Q4 95	-0.9 2.3
Leading Indicator	Oct. 95	-1.1 -5.0
Consumer Price Index	Feb. 96	0.3 0.5
		current period same period last year
Current Balance	Jan. 96	0.01 0.27
Unemployment Rate	Jan. 96	16.7 17.9
Interest Rate	Mar. 96	4.01 6.06

FRANCE		
	period	% change from previous period
		year
Gross Domestic Product	Q4 95	-0.3 0.7
Leading Indicator	Feb. 96	0.9 -1.7
Consumer Price Index	Feb. 96	0.4 2.0
		current period same period last year
Current Balance	Q3 95	1.11 2.57
Unemployment Rate	Feb. 96	11.8 11.8
Interest Rate	Mar. 96	4.27 8.06

GERMANY		
	period	% change from previous period
		year
Gross Domestic Product	Q4 95	-0.4 1.0
Leading Indicator	Feb. 96	-0.5 -2.6
Consumer Price Index	Feb. 96	0.5 1.6
		current period same period last year
Current Balance	Dec. 95	-2.42 -2.54
Unemployment Rate	Dec. 95	8.6 8.1
Interest Rate	Mar. 96	3.36 5.07

GREECE		
	period	% change from previous period
		year
Gross Domestic Product	1994	1.5
Leading Indicator	Jan. 96	-2.2 -0.4
Consumer Price Index	Feb. 96	-0.3 8.5
		current period same period last year
Current Balance	Nov. 95	0.02 -0.34
Unemployment Rate		.. ..
Interest Rate	Mar. 96	13.30 16.75

ICELAND		
	period	% change from previous period
		year
Gross Domestic Product	1994	3.6
Leading Indicator		.. ..
Consumer Price Index	Mar. 96	0.2 2.0
		current period same period last year
Current Balance	Q4 95	-0.02 0.00
Unemployment Rate	Feb. 96	3.9 4.7
Interest Rate	Feb. 96	7.60 6.70



## IRELAND

	period	% change from previous period	year
Gross Domestic Product	1994	6.7	
Leading Indicator	Feb. 96	-1.1	1.0
Consumer Price Index	Q1 96	0.4	2.0
		current period	same period last year
Current Balance	Q3 95	1.56	1.16
Unemployment Rate	Feb. 96	13.0	12.9
Interest Rate	Feb. 96	5.13	6.44



## ITALY

	period	% change from previous period	year
Gross Domestic Product	Q3 95	2.0	3.4
Leading Indicator	Jan. 96	0.2	-0.8
Consumer Price Index	Feb. 96	0.3	5.0
		current period	same period last year
Current Balance	Nov. 95	3.19	1.17
Unemployment Rate	Q3 95	12.1	10.9
Interest Rate	Feb. 96	9.93	9.09



## JAPAN

	period	% change from previous period	year
Gross Domestic Product	Q4 95	0.9	2.2
Leading Indicator	Feb. 96	0.6	4.7
Consumer Price Index	Feb. 96	-0.2	-0.2
		current period	same period last year
Current Balance	Jan. 96	-0.02	3.28
Unemployment Rate	Feb. 96	3.3	2.9
Interest Rate	Feb. 96	0.61	2.29



## LUXEMBOURG

	period	% change from previous period	year
Gross Domestic Product	1994	3.3	
Leading Indicator	Feb. 96	-0.5	-4.6
Consumer Price Index	Mar. 96	0.2	1.2
		current period	same period last year
Current Balance	..	..	..
Unemployment Rate	..	..	..
Interest Rate	..	..	..



## MEXICO

	period	% change from previous period	year
Gross Domestic Product	Q4 95	2.5	-6.8
Leading Indicator	..	..	..
Consumer Price Index	Feb. 96	2.3	49.0
		current period	same period last year
Current Balance	Q4 95	-0.46	-7.32
Unemployment Rate	Feb. 96	6.1	5.1
Interest Rate	Mar. 96	42.94	71.20



## NETHERLANDS

	period	% change from previous period	year
Gross Domestic Product	Q3 95	0.3	2.1
Leading Indicator	Feb. 96	0.4	1.2
Consumer Price Index	Feb. 96	0.3	1.8
		current period	same period last year
Current Balance	Q3 95	3.84	3.47
Unemployment Rate	Jan. 96	6.6	6.8
Interest Rate	Mar. 96	3.17	5.10



## NEW ZEALAND

	period	% change from previous period	year
Gross Domestic Product	Q3 95	0.1	2.3
Leading Indicator	..	..	..
Consumer Price Index	Q4 95	0.6	2.9
		current period	same period last year
Current Balance	Q3 95	-1.15	-0.84
Unemployment Rate	Q4 95	6.1	7.3
Interest Rate	Feb. 96	8.50	9.38



## NORWAY

	period	% change from previous period	year
Gross Domestic Product	Q3 95	1.0	4.2
Leading Indicator	Oct. 95	0.4	-1.3
Consumer Price Index	Feb. 96	0.0	0.9
		current period	same period last year
Current Balance	Q3 95	1.16	0.79
Unemployment Rate	Q4 95	4.3	5.2
Interest Rate	Feb. 96	5.26	5.46



## PORTUGAL

	period	% change from previous period	year
Gross Domestic Product	Q4 94	1.0	0.1
Leading Indicator	Dec. 95	2.0	-1.0
Consumer Price Index	Feb. 96	0.6	2.5
		current period	same period last year
Current Balance	Q4 94	-0.94	0.02
Unemployment Rate	Q4 95	7.1	6.9
Interest Rate	Feb. 96	7.91	9.94



## SPAIN

	period	% change from previous period	year
Gross Domestic Product	Q4 95	0.4	2.6
Leading Indicator	Jan. 96	-0.7	-4.4
Consumer Price Index	Feb. 96	0.3	3.7
		current period	same period last year
Current Balance	Dec. 95	1.10	-0.20
Unemployment Rate	Q4 95	22.5	23.5
Interest Rate	Mar. 96	8.44	9.56



## SWEDEN

	period	% change from previous period	year
Gross Domestic Product	Q4 95	-0.4	1.7
Leading Indicator	Jan. 96	0.4	-1.5
Consumer Price Index	Feb. 96	0.1	1.4
		current period	same period last year
Current Balance	Jan. 96	0.80	0.34
Unemployment Rate	Jan. 96	9.2	9.6
Interest Rate	Mar. 96	7.08	8.67



## SWITZERLAND

	period	% change from previous period	year
Gross Domestic Product	Q4 95	-0.1	-0.2
Leading Indicator	Feb. 96	-0.2	1.9
Consumer Price Index	Mar. 96	0.1	0.9
		current period	same period last year
Current Balance	Q1 95	5.83	6.13
Unemployment Rate	Feb. 96	4.4	4.3
Interest Rate	Feb. 96	1.60	3.77



## TURKEY

	period	% change from previous period	year
Gross Domestic Product	Q4 95	0.1	6.4
Leading Indicator	..	..	..
Consumer Price Index	Feb. 96	4.5	77.5
		current period	same period last year
Current Balance	Q3 95	-0.04	2.01
Unemployment Rate	Q2 95	7.2	8.4
Interest Rate	Jan. 96	111.99	108.07



## UNITED KINGDOM

	period	% change from previous period	year
Gross Domestic Product	Q4 95	0.5	1.9
Leading Indicator	Feb. 96	0.3	-0.1
Consumer Price Index	Feb. 96	0.5	2.7
		current period	same period last year
Current Balance	Q4 95	-2.86	-1.11
Unemployment Rate	Feb. 96	8.4	8.7
Interest Rate	Feb. 96	6.16	6.75



## UNITED STATES

	period	% change from previous period	year
Gross Domestic Product	Q4 95	0.2	1.4
Leading Indicator	Feb. 96	0.4	-0.1
Consumer Price Index	Feb. 96	0.3	2.7
		current period	same period last year
Current Balance	Q4 95	-31.07	-43.28
Unemployment Rate	Feb. 96	5.5	5.4
Interest Rate	Mar. 96	5.29	6.15

Note: figures for the Czech Republic are in preparation.

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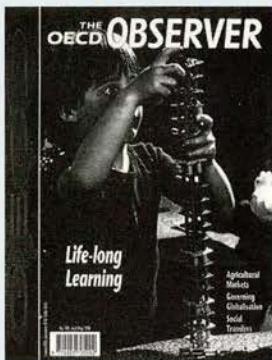
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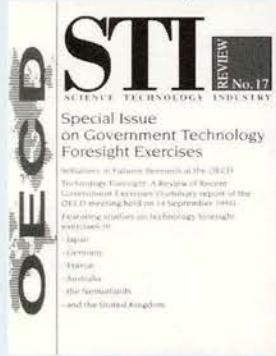
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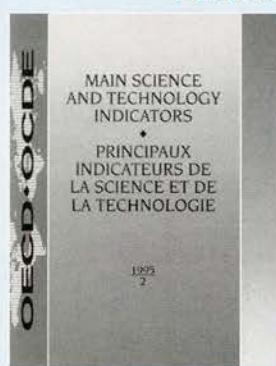
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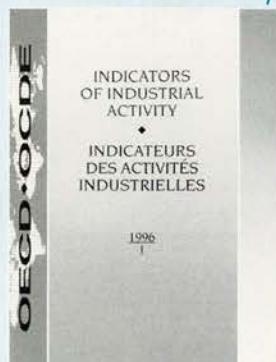
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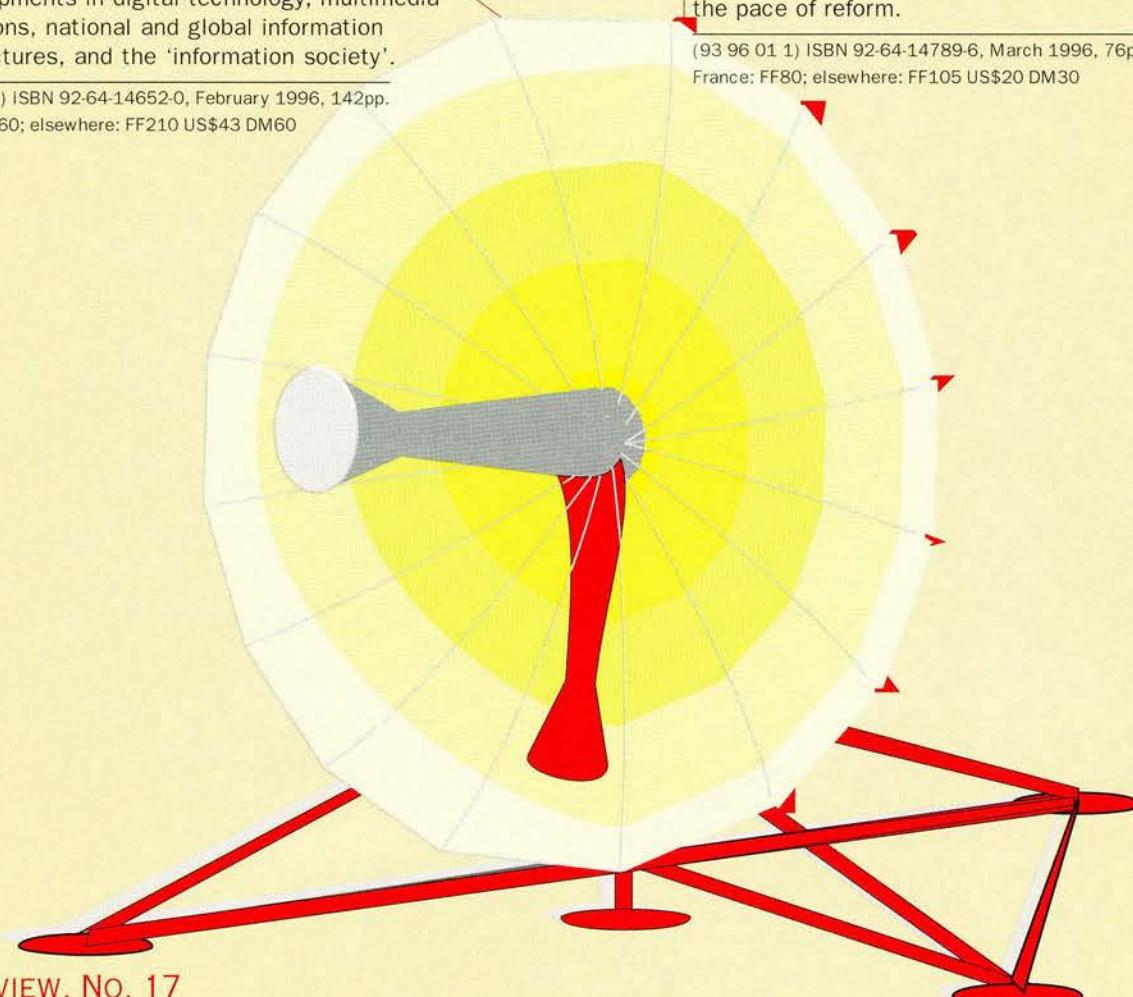
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