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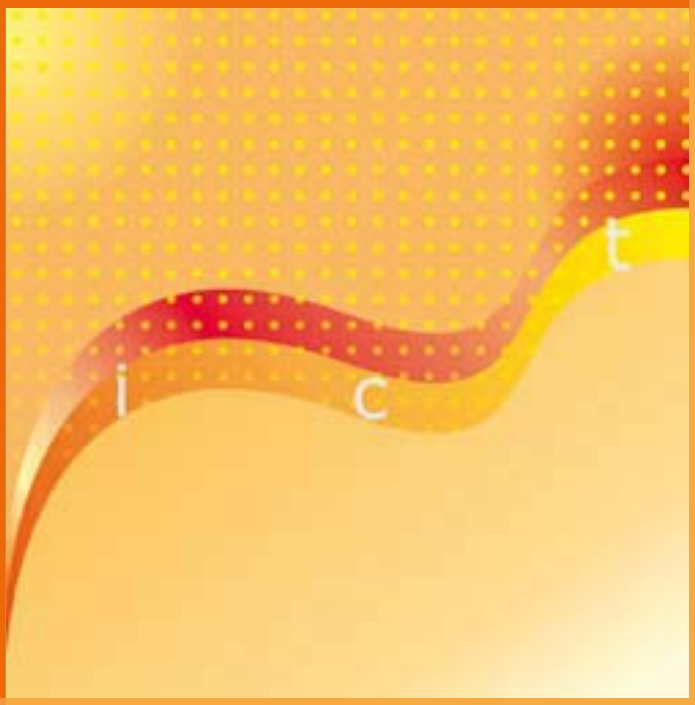
United Nations Conference on Trade and Development

INFORMATION ECONOMY REPORT 2006

The Development Perspective



United Nations

Chapter 5

ICTs, ENTERPRISES AND JOBS: WHAT POLICIES?

A. Introduction

To understand the poverty effects of information and communication technologies (ICTs), it is necessary to know how these technologies alter labour markets. Ultimately, jobs are the only sustainable poverty eradication tool because they are the source of income both for the population through wages and for Governments through taxation. ICTs are important contributors to business performance. For this reason, policymakers must develop strategies to promote competitive enterprises (particularly small and medium-sized ones) that generate decent work (ILO, 2001). Effective enterprises require competent managers and productive workers. Human resource development is therefore an indispensable component of any ICT-related economic and social growth policy.

The benefits of *the information technology revolution are today unevenly distributed between the developed and developing countries and within societies.*[1] This "digital divide" is the result of prevailing social and economic inequalities within and between countries. A major concern is to adopt corrective policies so that this divide does not prolong and deepen existing socio-economic inequalities. The introduction of ICTs is not neutral. Without intervention, the greater use of ICTs can increase existing social and economic divides. This is true between and within countries. Social and equity issues must be considered. This is particularly true in the case of ICTs. Financial and human resources are required in order to exploit ICTs advantageously. This is true for an individual, for an enterprise and for an economy. Enterprises or persons that understand how to use information can exploit the comparative advantage bestowed by both hardware and software. Economies must face such a challenge too. In so doing, they become more competitive: ICTs thus leverage and amplify existing social and economic divides unless corrective action is taken. Countries with large human resource pools and solid social security systems have the capacity to adapt, to finance retraining and to cushion the costs of transformations. In so doing, they can increase their productivity and become more competitive, thus widening the gap between them and less developed economies. The policy challenge is to ensure that the less privileged strata of society, of firms and of countries can benefit from the enhancements that new technologies provide.

It is in the developed world that many of the effects of ICTs on production processes and labour markets can be observed at this time. It is there that most investments have been made, and it is there that evidence is readily available. This is true both in industries that produce directly ICT goods and services and in other enterprises that use these to improve their performance. It is therefore important to emphasize that even if most of the evidence available reflects experiences in the developed countries, indirect and anecdotal information seems to indicate that the process is being replicated in the developing world. For example, while there do not seem to be standardized employment figures for Indian business services, the data on external trade in this sector would seem to suggest that employment there must have grown significantly (see chart 5.6). Similar output figures for other developing countries for which data are available tend to confirm this hypothesis. The first section of this chapter will review some of the factors that explain why ICTs have considerable effects on labour markets. The second will examine the technologically induced changes in the structure of the economy. The third section will show that the introduction of automation at the "factory" (or production) level has shifted employment away from production into managerial and other non-production employment and to the services sector. A common belief is that this results in offshoring: work previously carried out in high-cost areas is displaced to low-labour-cost economies. The fourth section, however, argues that the scant evidence available tends to *disprove* this notion. Indeed, the employment levels of skilled workers in many developing countries tend to show a trend of labour market segmentation similar to that seen in the developed economies. In all these countries there is evidence of an increase in either the employment or the wage levels of skilled workers and a fall in these same factors for others. It will be also argued in the fourth section that these changes are the result of technological change. The final section will examine some consequences of these shifts and the

policies that countries will need to adopt in order to face the challenges posed by ICTs.

B. How do ICTs interact with the world of work?

ICTs are important factors in determining how, where, when and who works. They do so directly through the transformation of machinery and equipment used in the production of goods and services. Occupations have disappeared and been created: who had heard of web page designers some fifteen years ago? Similarly, how many typographers does industry need now? Clerical tasks carried out by telephonists, data entry personnel and secretaries have been changed beyond recognition. Indeed, repetitive tasks of increasing complexity can now be - and are being - automated at an ever more rapid pace.

The fall of microprocessor prices and the increase in their performance have led to rapid implementation of automation, the creation of powerful optimizing algorithms and data mining technologies. Thanks to these developments, new administrative and control processes are possible, permitting greater inventory and logistics management and new marketing processes. There is ample evidence already that, under specific conditions (Dorgan and Dowdy, 2004), investments in ICTs improve the productivity of firms (OECD, 2003; Indjikian and Siegel, 2005), ICTs become competitive tools and their use becomes indispensable. This poses a real challenge to developing countries, where there are few financial and human resources to implement the changes required in order to make full use of investments in those technologies.

The market effects of ICTs could be just as significant. The reduction of transaction and search costs has improved the performance of markets (Eggleston, Jensen and Zeckhauser, 2002). It is now possible for most firms to ascertain the prices charged by their competitors and to identify low-cost suppliers, thus improving their competitive position. This can, in turn, lead firms to assess their value chain and to identify those activities that could – or should – be subcontracted and those that give them a competitive edge. It also allows customers to find the best prices for the products or services they seek to acquire. The market operates in a more effective manner by increasing the number of actors that can operate in any market and by making prices of intermediary and final goods much more transparent.

The rapid growth of the Internet and the consequential reduction of transmission costs have made it possible and economical to transmit vast amounts of information across large distances. This, in turn, has allowed the trade in services that have permitted coordination and planning of production processes across both time and space. No longer is it necessary to have research and development teams physically near production or marketing teams; no longer do back-office tasks need to be near cost centres. A critical component of enterprises' strategies is now to determine what to subcontract and what to produce in-house. Globalization and technology have jointly made it possible not only to subcontract a number of activities, but also to do so at an international level: it is increasingly simpler to make jobs – rather than workers – migrate. ICTs have the potential to transform production methods, processes and management in all enterprises regardless of size and location. The transformation is, however, clearly evident in the IT industry itself, which has led in adopting significant structural changes in the recent past.

The transformations of production methods and processes do not, by any means, imply the loss of total jobs in an economy. They require a change in the structure of competencies. Unfortunately, the pace of change of productivity is often greater than that of the rate of transformation of the skill mix of a society, and this can lead to transitory rises in unemployment levels. Historically, however, technological change has led to productivity growth, greater innovation and, ultimately, increases in the standard of living (Broadberry and Irwin, 2005). The policy challenge is to speed up and facilitate the transformations required of the labour force and reduce the costs resulting from these changes. This must be considered for equity reasons and also to facilitate the adoption of new technologies. Workers who do not fear change and are equipped to benefit from it will be much more amenable to the adaptations resulting from the adoption of ICTs.

C. Economic "sector" shifts

During the Industrial Revolution productivity rose significantly in agriculture (Stokey, 2001) and there was a shift of employment and production from farms and households to "factories" (Mokyr, 2000; Piore and Sabel, 1990). It is very likely that the ICTs are currently having a similar effect, transferring activities from manufacturing to the *business* services sector: new production models rely on "high skill" activities such

as design, research and development and supply chain management and marketing at the corporate level. The production of goods and services is subcontracted to first-tier producers (Auer, Besse and Méda, 2006). Services, particularly business services, can increasingly be traded.

Changes in the structure of production of goods and services can be divided into changes that alter the production processes within enterprises themselves and changes that lead to the suppression of activities within an enterprise and that are subsequently acquired in the marketplace – the "horizontalization" of enterprises. Many of the internal production changes result in productivity increases and changes in the demand for labour. These will be briefly examined in section E of this chapter, which will review available data on shifts from manufacturing to those services that were traditionally carried out within firms and are now increasingly subcontracted. Therefore, the changes that will be examined here concern manufacturing and financial intermediation, real estate, renting and business activities.

The definition of economic sectors and their dynamics must be viewed with some caution. The development of supply chains facilitated by highly effective data processing equipment and increased market openness makes it possible to separate the pure production of goods (or services) from their design, marketing and distribution. This process is amplified by economies of scale, specialization and different innovation practices. Indeed, by making it possible to distribute goods and services over wider geographical areas it is possible to achieve much larger returns to scale. Thus, some enterprises can specialize in product development and marketing, while others thrive on process innovation. This increased specialization can modify the nature of firms, leading to possible errors of classification: when electronic industries subcontract the production of their goods and concentrate on design, marketing and supply chain management, do they belong to the "manufacturing" sector? The changes in the forms of distribution of content (music, text and cinema) will reduce the production of goods too. The production of tapes or compact disks is being replaced by the electronic distribution of content: is content a good or a service? The same might happen in the future with books. There is thus a need to explore the shift from the manufacturing to the business services sector and to the production of intangibles (content), taking into account that there are significant risks of mis-classification because of the changing nature of business and the absence of fine-grain, comparative data on the subject.

Chart 5.1

Output of business services and manufacturing output as a proportion of total output

Chart 5.1a - Ratio of manufacturing to total output at PPP

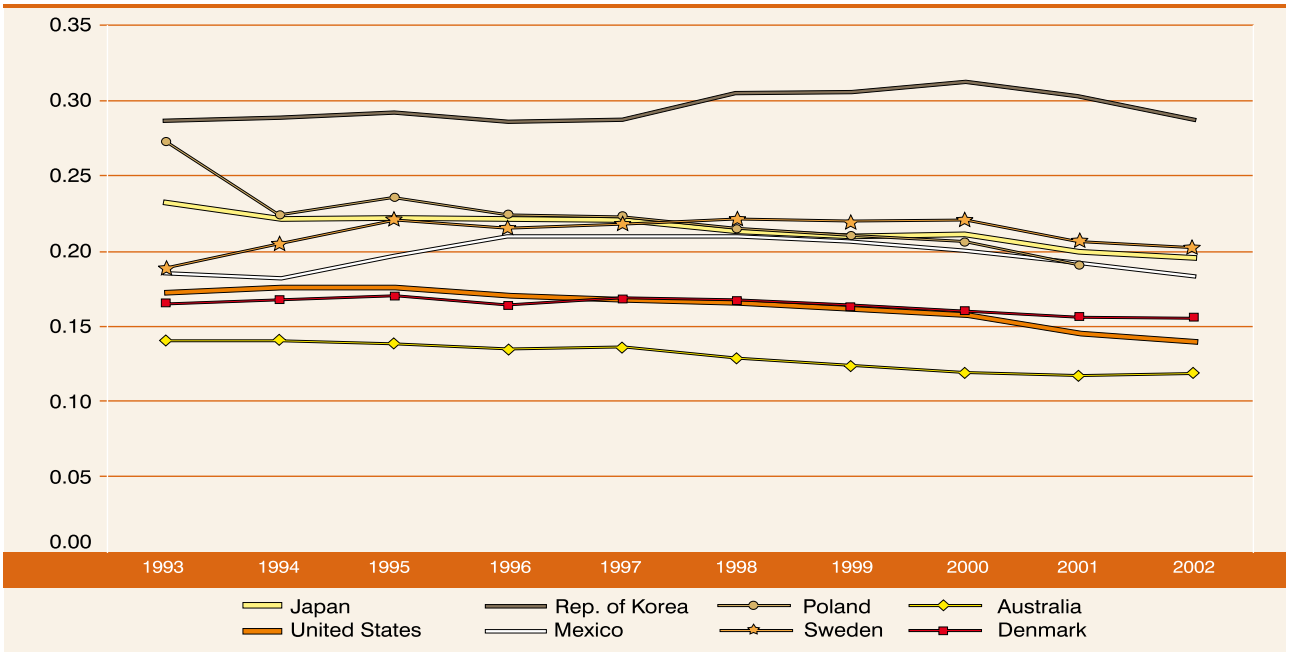
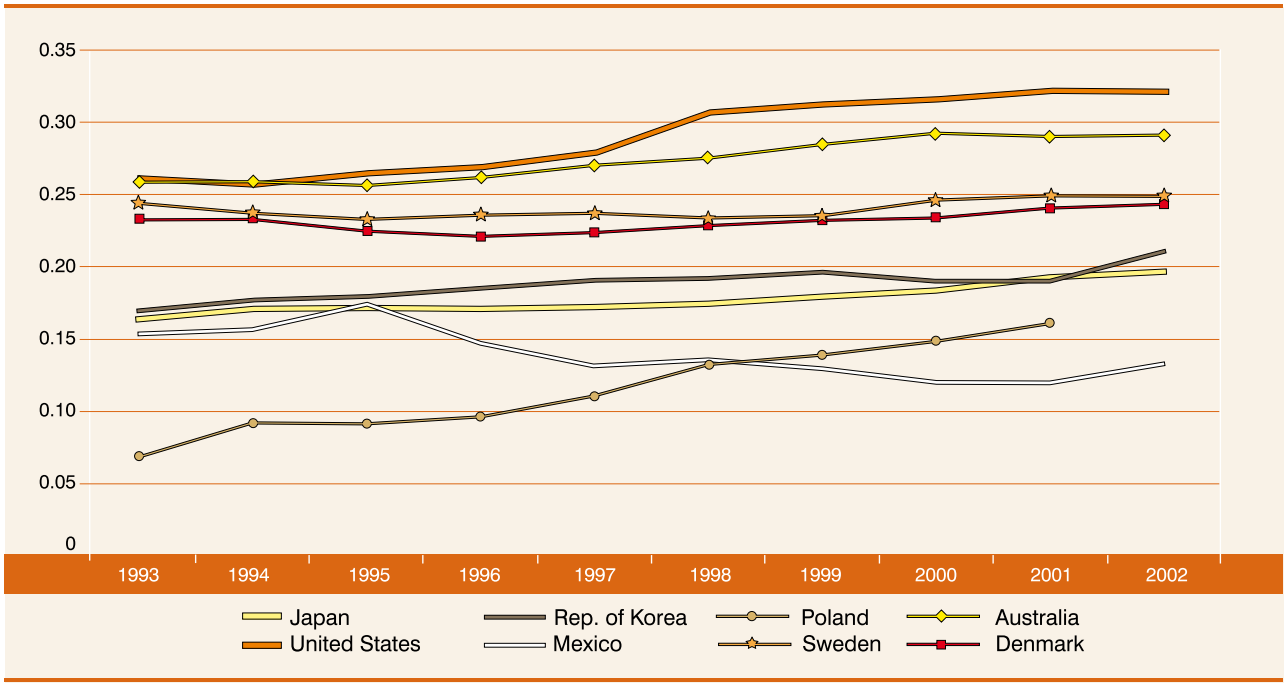


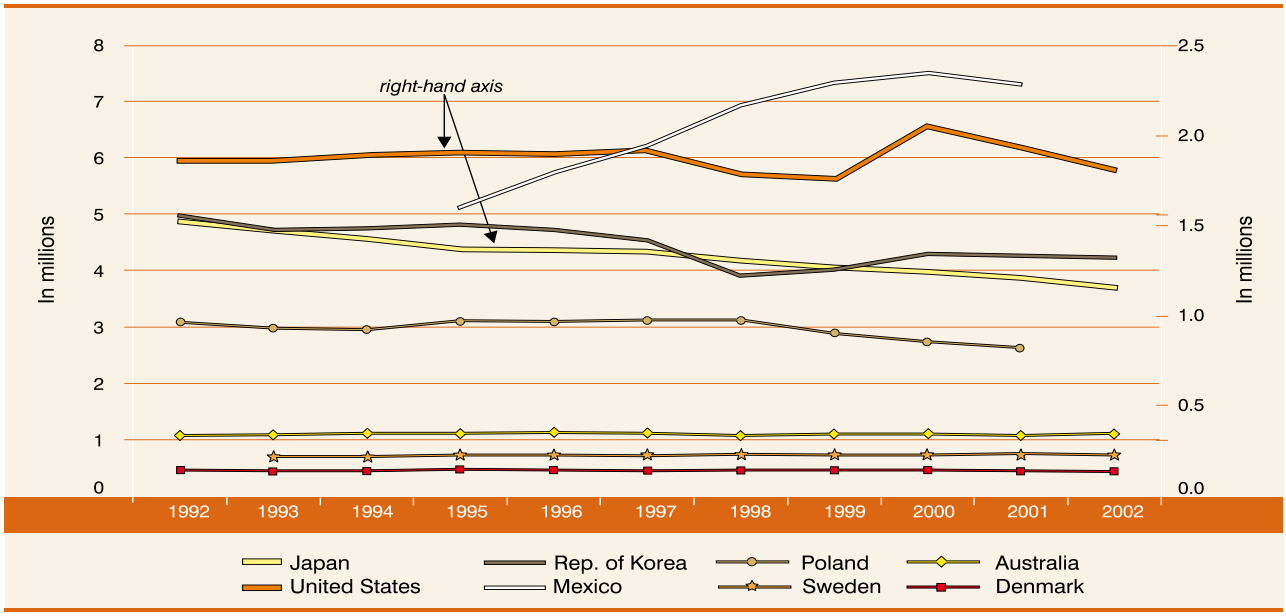
Chart 5.1b – Ratio of business services to total output at PPP



Source: ILO, based on UNSO and World Bank (World Development Indicators).

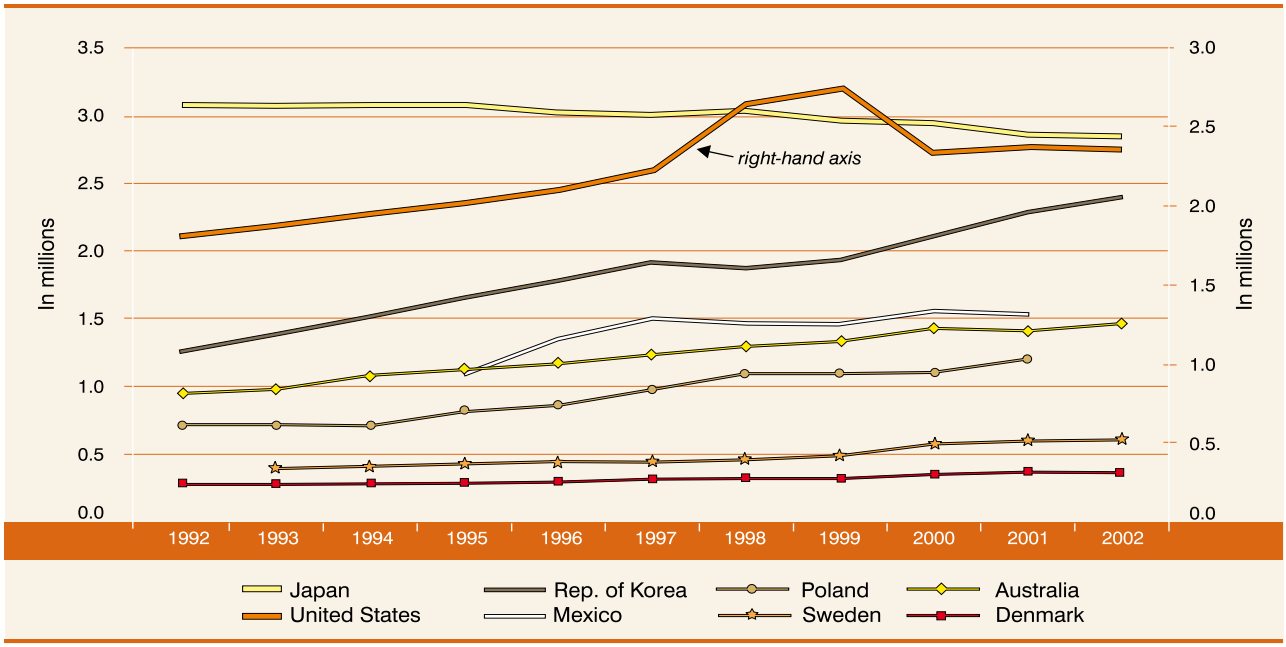
Chart 5.2 – Employment levels

Chart 5.2a – Manufacturing



Source: ILO, based on UNSO and World Bank (WDI).

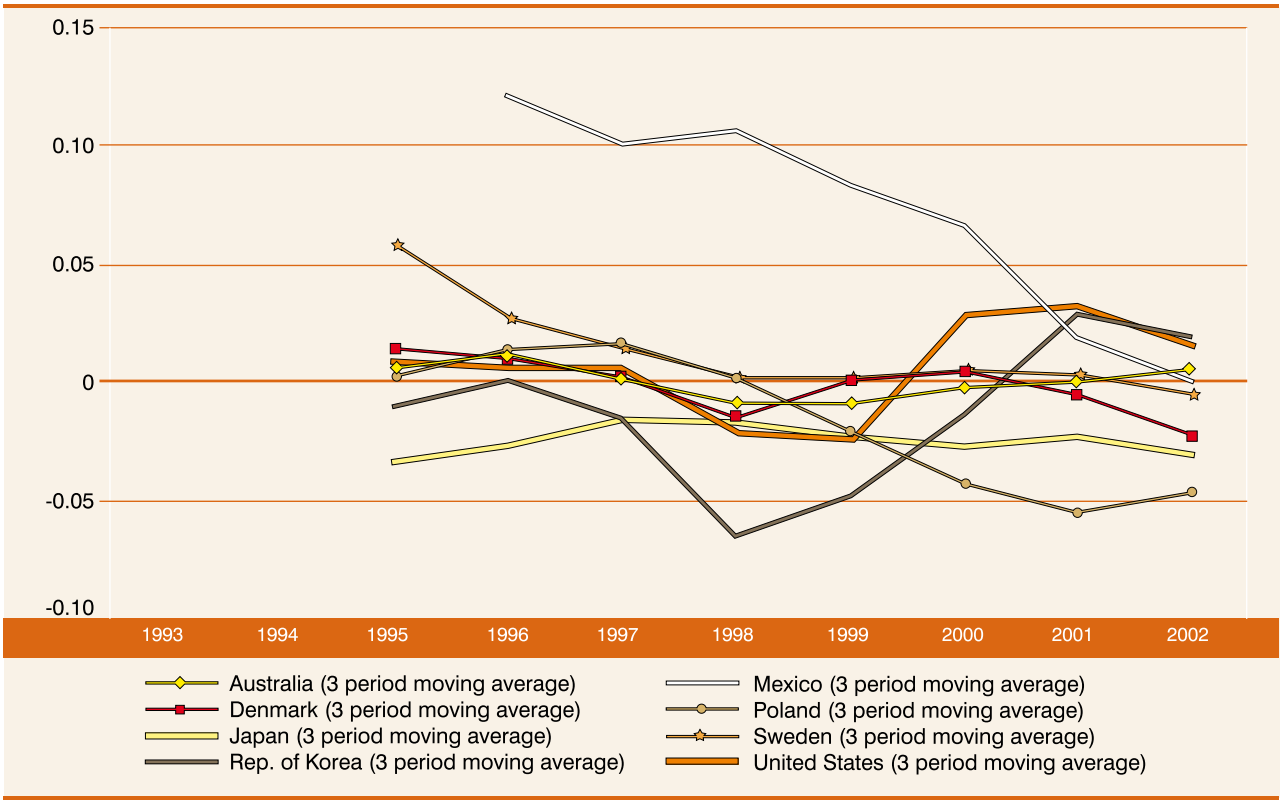
Chart 5.2b – Business services



Source: ILO, based on UNSO and World Bank (WDI).

Chart 5.3 – Smoothed average changes in employment levels

Chart 5.3a – Changes in manufacturing employment



Source: ILO, based on UNSO and World Bank (WDI).

As chart 5.1[2] shows, the output of business services as a proportion of total output (figure on the right) has grown significantly in most countries for which comparable data are available. On the other hand, manufacturing output as a proportion of total output shows a decreasing trend. Since total output at purchasing parity has grown in all the countries selected, it can be concluded that the business services sector's output has grown significantly. (Figures on total output and total employment are presented in annex 1.)

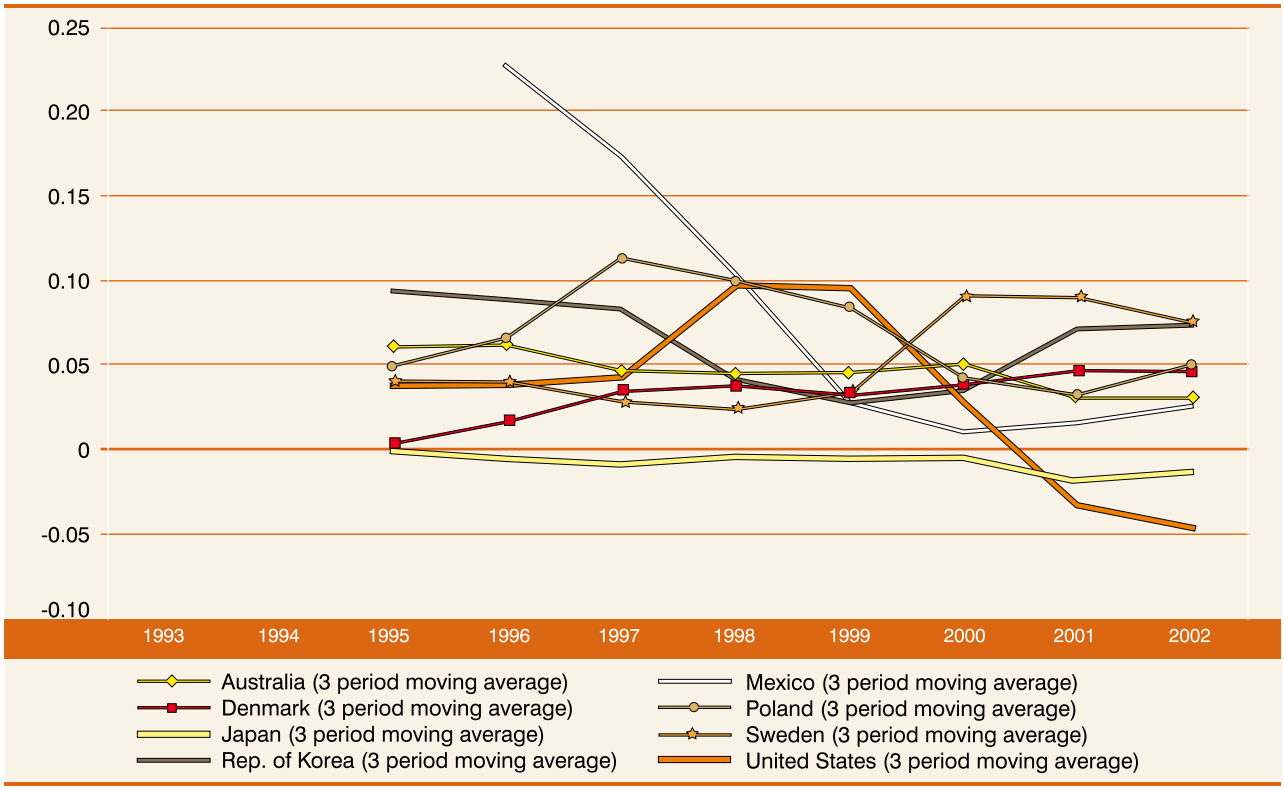
Chart 5.2 describes employment in the business services sector and the manufacturing sector. There is a clear upward trend in the business services sector, and stability or a very limited fall in the manufacturing sector. When three-year moving averages of percentage variations are plotted, they show that the changes in manufacturing employment cluster near the zero axis or are under it, while they tend to concentrate around the 5 to 10 per cent ranges in business services – describing a level of stability in employment for the manufacturing sector and growth for the business services sector. Both Japan and the United States show negative smoothed employment growth rates in the business services sector, but this could probably be partly due to (or is a result of) the output employee ratios described below.

Chart 5.4 illustrates the output per worker in the manufacturing and business services sectors. (This can be considered a proxy for productivity in those sectors, but since it does not take into account hours worked, it can be a biased estimate.) There are noticeable increases in both the manufacturing and business services. Output per worker in the business services sector is significantly higher than in the manufacturing sector: there is some evidence that wages in the former are also higher than in the latter.

The shifts of both output and employment from manufacturing to business services are not the only changes in the employment structure. There is considerable evidence that within industries there has also been a significant increase in the number of non-production workers in the manufacturing sector (Berman, Bound and Machin, 1998). The shift towards other services and, in third world countries, to work in the informal economy is also accelerating.

In conclusion, it could be said that technology has brought stability in the employment levels for the manufacturing sector and growth in the business services industries. Output per worker in both these sectors is growing, but growth in manufacturing is lower than in the business services sector. Unfortunately,

Chart 5.3b – Changes in employment in business services



Source: ILO, based on UNSO and World Bank (World Development Indicators).

Chart 5.4 – Output per worker (USD)

Chart 5.4a – Manufacturing

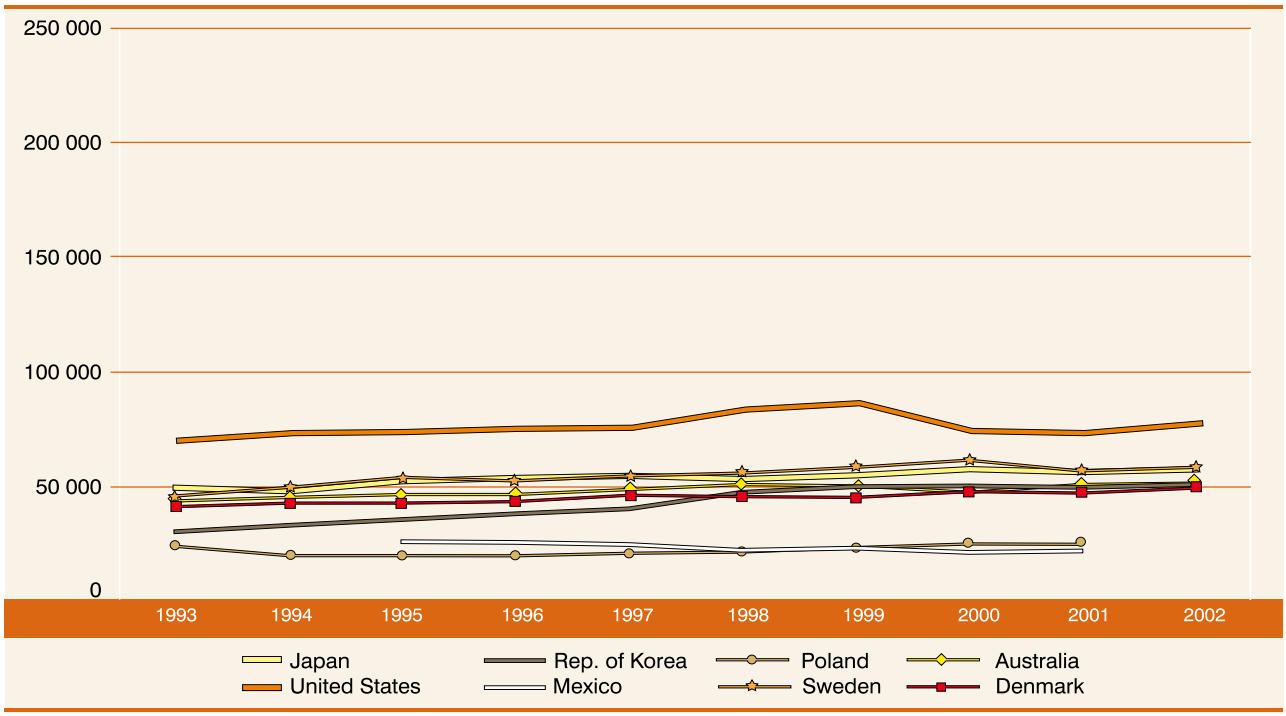
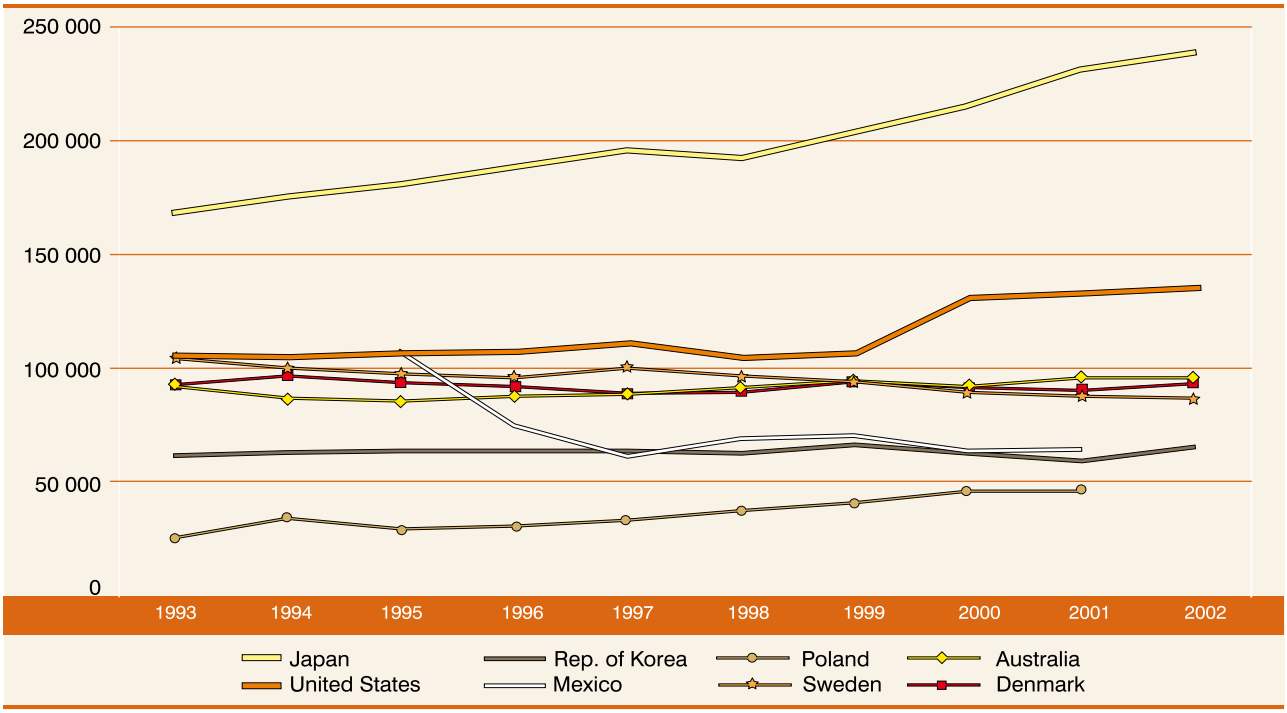


Chart 5.4b – Business services



Source: ILO, based on UNSO and World Bank (World Development Indicators).

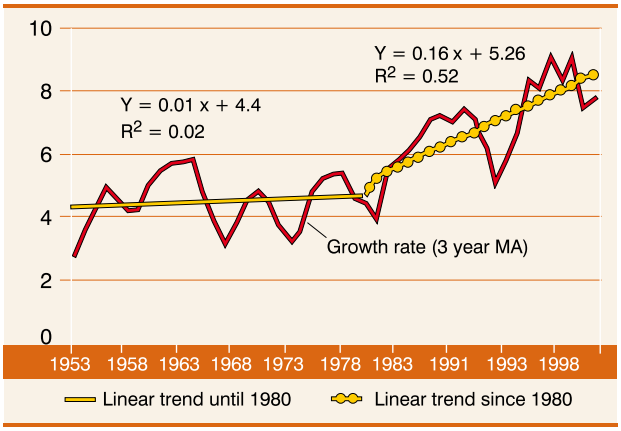
the picture is not complete since India and China, major beneficiaries of current economic trends that have showed significant export and output growth, do not have compatible statistics allowing further comparisons. It may be noted, however, that economic activity in these two countries has expanded and that employment must have increased too.

India, in particular, has demonstrated the impact of ICTs in employment and economic growth. In reality, economic growth started rapidly in the 1980s (Rodrik and Subramanian, 2005), and the creation of employment in the software and business process outsourcing industries picked up in the early 1990s. Software exports grew from $225 million in 1992–1993 to $3,010 six years later (Kambhampati, 2002). Employment in the software industry was estimated to have grown from 242,000 persons during the period 1999–2000 to 568,000 four years later – an average yearly growth rate of 18 per cent. Employment in business process outsourcing grew from 70,000 workers in 1999–2000 to 245,500, a growth rate of 42 per cent average per year (Kumar and Joseph, 2005).

Chart 5.5 shows the significant growth of the services sector in India (which includes the business sector) starting around 1983. This break roughly corresponds to the changes resulting from policy transformations as described by Rodrik and Arvind (2005). Business and communications were the largest contributors to this growth (an average growth rate of 13 per cent in the 1980s and of 19.8 per cent in the 1990s and of 6.1 per cent and 13.6 per cent respectively). A short comment on data sources and problems therein can be found in box 5.1

Chart 5.5[3]

Growth rate of services sector, India



Source: Gordon and Gupta (2003).

D. The geographical movement of jobs and workers

It was previously noted that low search and transaction costs associated with ICTs facilitated the development

Box 5.1

A note on data

Understanding the evolution of the economy and creating appropriate social and economic policy require information. Assessing the results of past policies to determine how to respond and design new interventions also requires statistics. In paraphrasing Solow, you can see the computer age everywhere except in social and economic statistics, particularly in the developing world. It is curious to note that the introduction of cheap data acquisition and processing machinery has not led to visible improvements in social and economic information there.

In common with others, labour markets can be influenced by greater availability of information. Enterprises can advertise job openings and workers can submit their candidatures for openings. Search and transaction costs could also fall with the introduction of ICTs. Here again, it must be noted that there are important divides: low-skilled workers tend to have less access to ICTs and, therefore, less access to employment information. Clearly, active labour market policies that capture available opportunities and allow unskilled workers to identify postings would reduce frictional unemployment.

In terms of policy, information on enterprises (particularly SMEs), their demography (births, growth and deaths) and their human resources needs substantial improvements. This requires a fairly comprehensive classification of occupations both to permit workers to assess demand for jobs and to determine individual career paths through training and retraining. Such data are also useful for programme education and professional training services. At the same time, a more fine grain classification of industries and an improved description of formality or informality would permit policymakers to define industrial and trade policies that play on relative competitive advantages. Indeed, a closer view of the dynamics of sectors helps in identifying key actors that can promote economic growth.

of global supply chains through the expansion of offshoring and foreign direct investment. This is, clearly, not a new phenomenon. In the manufacturing sector numerous industries have transferred activities to low-labour-cost economies over the last few decades. This has been done either through the establishment of wholly owned subsidiaries or, through outsourcing to external manufacturers within or outside national borders. Labour cost differentials can (sometimes) justify such outsourcing to external economies (which will be identified here as offshoring). Chart 5.6 presents estimates for the amount of services offshored in 2003.

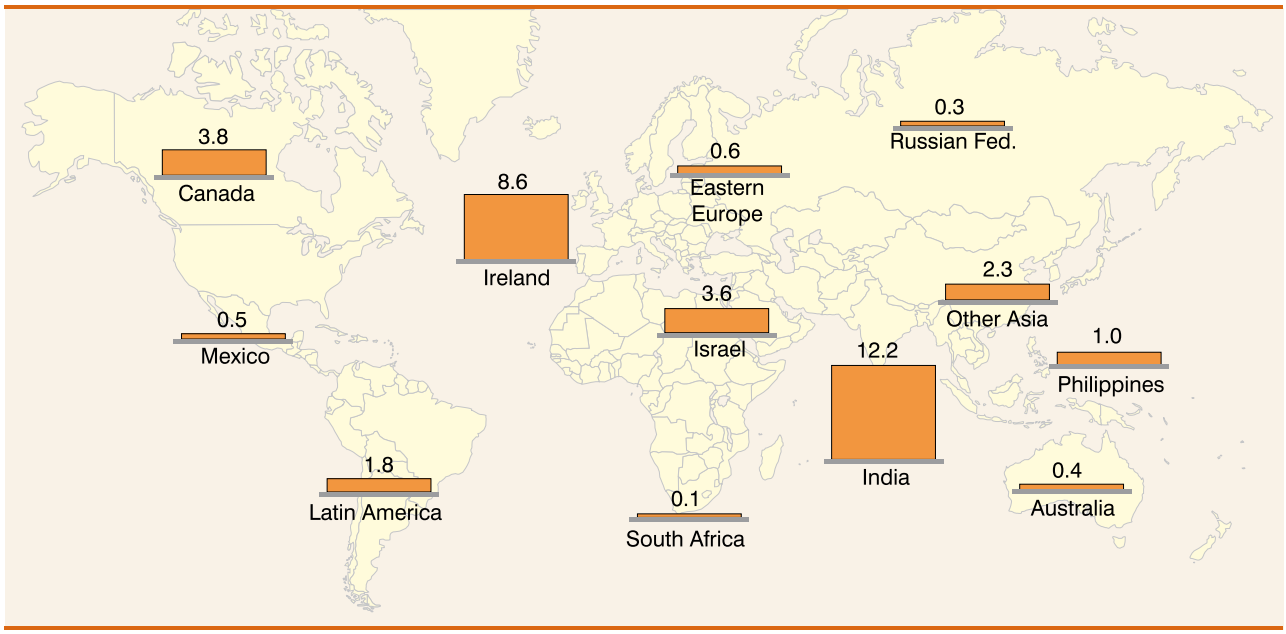
Unfortunately, estimating the net employment effects of offshoring is not an easy task. In the first place, it is difficult to identify the net number of jobs lost due to subcontracting. The United States Department of Labor has carried out research to estimate the total employment affected by offshoring. This is described in table 5.1 (Brown, 2004), which analyses the nature of the separations of staff when enterprises with more than 50 or more workers lay off staff. In summary, only 26 per cent of closures and layoffs led to offshoring, but only 7 per cent were transferred outside the enterprise.

Some precautions must be taken in interpreting these data. They do not include employment *created* by foreign companies that outsource *to* the United States. They do not examine the growth in market share that can result from increased competitiveness, leading to rises in employment, and they do not take into account the rise in exports to low-income countries that are frequently the ones that benefit from the offshored jobs. (US exports to India, for example, doubled in five years (US Census Bureau, 2006).) Finally, they do not take into account employment changes in small and medium-sized entreprises (SMEs), which represent a large volume of total employment. Here again a review of production and labour statistics would be welcome (see box 5.1).

Preliminary data indicate that only 2 per cent of firms in Japan offshore. Tomiura - Marin (2004) estimates that 0.26 per cent of German jobs were lost to offshoring between 1990 and 2001 to the Central and Eastern European Countries. Kirkegaard (2005) estimates that in 2004 offshoring represented 0.14 per cent of the labour force in the European Union. Again, it is, unfortunately, not possible to identify the employment gains resulting from offshoring in developing countries. International trade figures, however, can provide an idea of the consequences of offshoring in the developing world. Exports from India increased by 12 per cent per year over the period 1993–2003 and those from China grew, on average, 17 per cent per year between 1997 and 2004. The ratio of commercial service exports to

Chart 5.6

Outsourcing volumes[4], 2003 (billion USD)



Source: Farrell D. et al. (2005).

Table 5.1

Employment and outsourcing (United States)

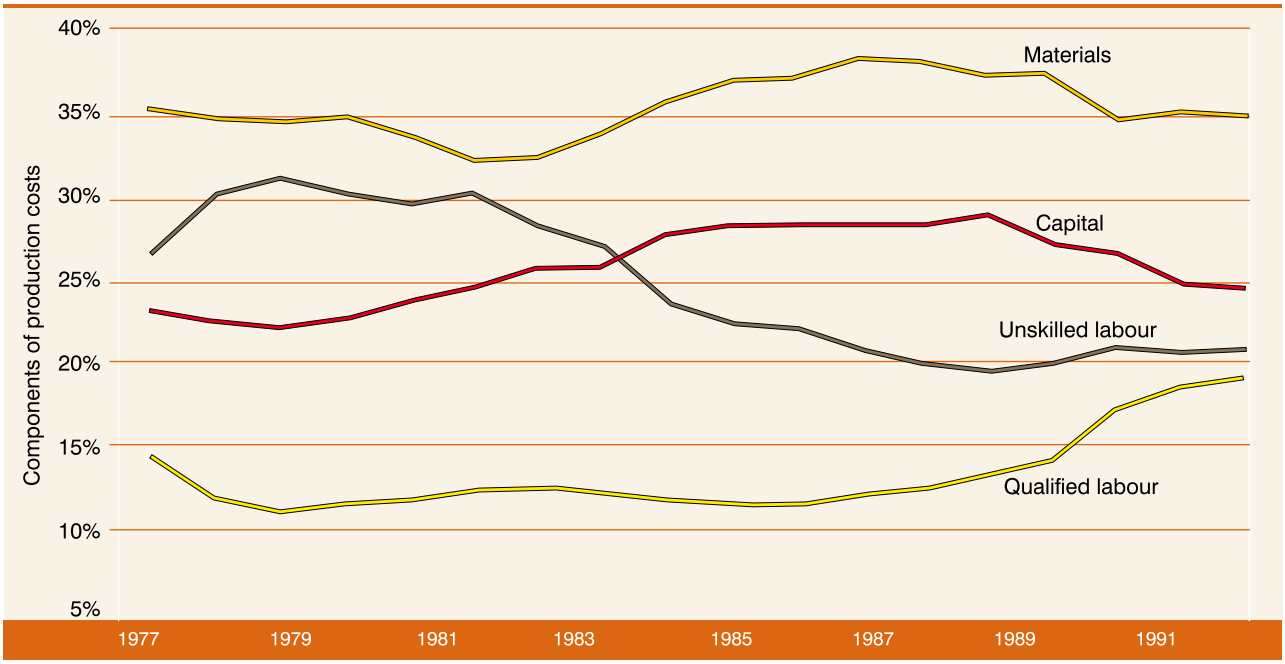
	Layoff actions	Separations
Total private non-farm sector (*)	279	40 727
By location		
Out of country	70	10 722
Within company	46	7 863
Different company	24	2 859
Domestic relocations	200	27 326
Within company	167	22 697
Different company	33	4 629
Unable to assign	9	2 679
By company		
Within company	221	32 586
Domestic	167	22 697
Out of country	46	7 863
Unable to assign	8	2 026
Different company	58	8 141
Domestic	33	4 629
Out of country	24	2 859
Unable to assign	1	653

(*) excluding seasonal and vacation events with movement of work

Source: US Census Bureau (2006).

Chart 5.7

Colombia production costs



Source: Ramírez and Núñez (2000).

merchandise exports grew in the former from 23 per cent to 40 per cent, while it has remained fairly stable for the latter.

E. ICTs and the segmentation of the labour force

Chart 5.7[5] describes the evolution over time of the different cost components of manufacturing in Colombia. The fall in the participation of unskilled workers and the rise of skilled workers are noticeable: there is clearly an evolution in the composition of the labour market. Investment in technology and higher productivity led to a fall in total employment levels where the unskilled where the major losers. In fact, in decomposing the different components explaining the changes in employment, CEPAL (Gutiérrez, 2004) finds that technological change contributes positively – and sometimes significantly – in employment in the business services sector in Brazil, Colombia and Chile. The same effect is seen in the manufacturing sector in the latter two countries, while there is a negative impact in Brazil.

Turning to developed countries, in summarising research on the effects of technical change on the structure of salaries and jobs, Chennells and Van Reenen (1999) have concluded that there is considerable evidence that the introduction of technology tends to favour skilled labour in the United States, Canada and the United Kingdom through increased wage differentials (Handel, 2003). Unemployment of unskilled male workers was three and a half times larger than that of university graduates and five times greater for uneducated women (Maurin et al., 2001). In many instances, the technological factor behind these changes was the nature of computer use. In other developed countries where wage structures are more rigid, the increased reliance on technology tends to raise unemployment levels – predominantly among the unskilled segments of the population (Werner and Wijkander, 2000). There is also considerable evidence that the wage differentials of employed workers tend to increase in exporting countries and particularly developing ones (Marjit and Chakrabarti, 2004).

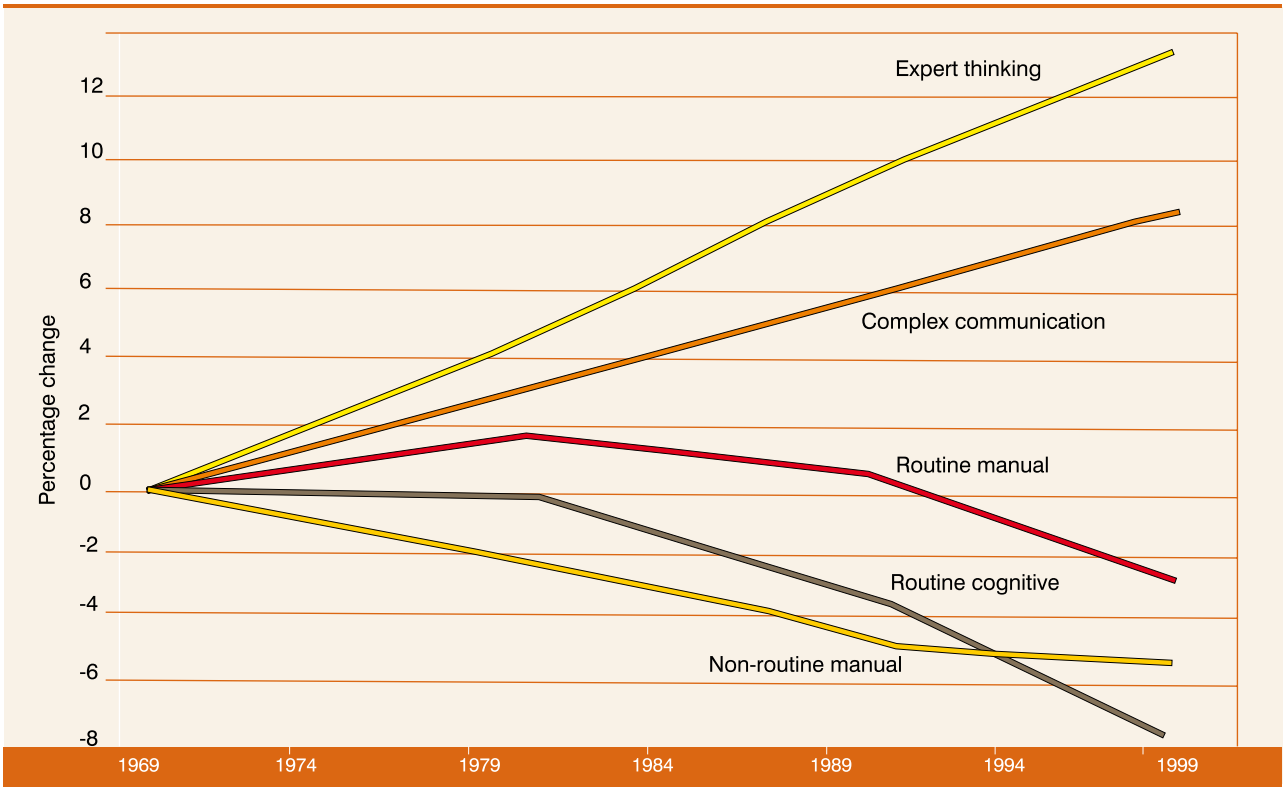
In effect, there is an increasing body of evidence indicating that both technology (in particular ICTs) and trade *increase* inequality. It might be worthwhile to see which of the two factors plays the more important role. To stave off the competition from enterprises in the developing world seeking to leapfrog those in the industrialized economies, Thoenig and Verdier (2003) argue, enterprises in the latter will emphasize tacit know-how. In doing so, firms will find it much harder to acquire the knowledge needed to compete with their more innovative and productive rivals in the developed economies. The immediate effect of emphasizing implicit knowledge is an increase in skill requirements within enterprises. Competition (or potential competition) resulting from globalization will thus generate skill-biased employment, increasing the demand for qualified personnel. Firms in the developing countries face a similar situation. Here also the need to catch up with the competition will lead to the engagement of skilled staff, thus increasing the wage differentials between skilled and unskilled workers (Epifanit and Gancia, 2004).

An explanation at a microeconomic level of the relationships between the restructuring of the labour force and the diffusion of ICTs merits a detailed review because it can provide some pointers for human resources development policies. Occupations could be classified as communications-based, manual or analytical, on the one hand, and – roughly – routine or non-routine, on the other. Repetitive communications could be those carried out by telephonists; non-routine communication tasks include those performed by sales clerks, for example. Manual routine occupations could include car body painting or lathe operators. Medical assistants or janitors perform manual non-routine operations. Bank teller occupations are repetitive intellectual tasks while web page design or customer service personnel perform non-routine intellectual activities.

The classification has been made in order to identify whether tasks can be formally described as a finite set of predefined rules or actions or not. The more the rules or actions are defined, the more easily the task can be performed by digitally controlled machinery. On the basis of such a classification, Autor et al. (2003) conclude that *"Computer technology substitutes for workers in performing routine tasks that can be readily described with programmed rules, while complementing workers in executing nonroutine tasks demanding flexibility, creativity, generalized problem-solving capabilities, and complex communications".*[6] On the basis of this work, Levy and Murnane (2004) analysed the evolution of employment in the United States using the task classification described here. The results are presented in chart 5.8.[7] This clearly shows how the evolution of ICTs is segmenting the labour force and is leading to the replacement of workers doing tasks that can easily be programmed. This substitution

Chart 5.8

Evolution of employment in the United States



Source: Levy and Murnane (2004).

operates because the competitive advantage of workers lies in problem solving and communications rather than in performing repetitive tasks.

F. Enterprises and ICT strategies

Those enterprises that fail to adapt to the structural changes associated with globalization and ICTs might be marginalized if they fail to recognize the competitive advantage offered by technology and the economies of scale that are associated with larger markets. Moreover, it is increasingly clear that economic activity will increasingly be network-driven. Subcontracting and supply management will be one source of competitive advantage. ICTs provide the backbone for these networks and here again, investing in – and understanding the value of – ICTs is crucial.

Several paths can be taken to achieve social and economic progress through ICTs. In the first, enterprises must be able to fully exploit the benefits of ICTs. This implies ensuring that firms achieve productivity increases through their investments in these technologies. Much must be done in this domain. Accessibility (in terms of both infrastructure and affordability) must be achieved; security and trust must be established to ensure transaction trustworthiness; and, finally, managers and entrepreneurs must be able to develop the processes and create the organizations that will make efficient use of investments in ICTs. Development of appropriate local IT solutions and helping managers use these tools are a fundamental activity in this regard.

Efforts to identify competitive advantages should concentrate on both processing and manufacturing industries and should also revolve around business services. The enhancement of local supply chains that seek to increase local value added should be emphasized. Indeed, the increased reliance on outsourcing leads to the strengthening of productive networks. This seems to point to the need to revive industrial policies. This not only helps create local value added, but can also help disseminate new technologies when suppliers or customers request technologically advanced management support systems. For example, the identification of vertically integrated sectors and ways

of increasing the value added at the local and national levels should become an industrial policy priority.

Because product life cycles shorten significantly in a highly competitive world, innovation becomes a critical component in the development and survival of firms. While innovation is frequently associated with product development, it can also be achieved in production processes, marketing and enterprise organisation. These do not depend, necessarily, on expensive research and development facilities. There are numerous opportunities to create competitive firms relying on abundant local know-how provided that adequate policies are put in place to foster innovation. Experience has shown that "social capital" at the local level can promote innovation (Foray and Perez, 2000). It could therefore be useful to consider the implementation of local initiatives that strengthen local economic links, that enhance trust and cooperation among members of the community and that define practical action plans which promote decent employment within communities: actions to increase cooperation and trust amongst economic, scientific, social and public actors must be undertaken to strengthen social capital, thereby enhancing innovation and productivity.

Human resource development is a fundamental prerequisite for adopting and using technology, and firm-level initiatives can make an important contribution. Uninformed people fear change. Taking the time and effort to explain to workers the work-related implication of investments in technology helps to enlist their assistance and allay their fears. Indeed, it has been standard practice for some time in the development of any IT application to ensure the users' full participation in the process (Martin, 1990). This can be achieved through dialogue, through social security and through training. Freedom of association and the possibility of initiating dialogue between employers and workers are central to this aim. Inevitably, there are workers who can lose their jobs in the adjustment process. Mechanisms to reduce the traumas of unemployment and aid in the transition to other employment would also limit resistance to change and can reduce the negative consequences of investments in ICTs. This is the role of social security benefits.

Dialogue, training and reinforcing workers' adaptability will be of practical use only when associated with best practice in entrepreneurship. If efforts are deployed to train workers, there must be a similar endeavour to train managers. Employers must be able to understand the value of investing in new technologies and in human resources. They must organize their enterprises to be able to compete in an increasingly open environment where survival depends on productivity and innovation. It is therefore indispensable to ensure that public authorities and entrepreneurs engage in extensive campaigns to emphasize the importance of modern management practices in ensuring an adequate return on investments in human resources and equipment.

G. Conclusions

The growing use of ICTs creates, at the same time, a basis for a further widening of the development gap and global and local income inequality, and empowers developing countries, and their workers, firms and employees, to overcome such disparities. ICTs are a challenge and a solution for the developing world. They are depriving many developing countries of their main competitive advantage: cheap labour. To counter this trend, those countries must not only continue to adopt the use of ICTs, but also find ways to lead and innovate. For that to happen, an important thrust of any ICT policy must be directed to human resource development, especially that related to the labour force.

Special efforts must be made to strengthen SMEs. They are the enterprises that have the greatest difficulties in investing in ICTs, and they are the largest employers. By improving the effectiveness of SMEs it will be possible to generate better employment. Business development services that provide assistance in standard business practices but that can also furnish access to data processing and telecommunication equipment and technical assistance in ICTs would probably be a desirable practice provided that those services are economically sustainable. Efforts to integrate them into supply chains and the industrial policies already mentioned clearly play an important role here.

A further policy conclusion would be that ICT adoption in the business services sector can be more efficient and effective from the viewpoint of overall economic policy and international competitiveness. Therefore, the developing world should carefully assess its industrial and employment policies to emphasize growth in business services rather than emphasizing the role of the manufacturing sector as a driver of growth and exports. Moreover, productivity improvements achieved in the developed world have given the latter (and some countries in transition) competitive advantages over developing economies that can be compensated for

only in very limited circumstances by low production costs. Competition in globalized markets will force the developing economies to adopt increasingly technology based production processes, resulting in labour market changes described in this chapter.

Policymakers should concentrate their efforts on identifying the most significant factors enabling ICT adoption among employees, firms and households, while devising strategies to address the multitude of difficulties encountered in this process. However, on their own, ICT policies and strategies are insufficient and countries must strive to achieve a number of general enabling circumstances:

- Low inflation and low-debt monetary and fiscal policies;
- Enhanced economic integration;
- Property rights and contract enforcement systems that enhance trust; and
- Social cohesion, solidarity and political stability (Rodrik, 2004).

The differential competitive status of economies — associated with the adoption of new technologies and other managerial and logistics factors — would clearly be one such critical barrier to economic development. The adoption of ICTs requires actions in a number of fields: training workers to handle new technologies will be effective only if enterprises invest in them and succeed in generating favourable returns on investments in ICTs.

Product quality requirements and just-in-time inventory management throughout supply chains might be undermining the competitive advantage resulting from low-labour costs. In any case, a race towards the bottom based on low labour costs and increased reliance on non-formal forms of employment would end up being detrimental to economic growth and development. There is no alternative to a "high road" (WCSDG, 2004) development strategy where business and labour collaborate to achieve efficiency through innovative and efficient enterprises and concomitant decent employment. Indeed, enterprises will be able to compete in a networked economy by finding niche marketing, exploiting economies of scale, innovating and achieving greater productivity. Public policy must help enterprises achieve these aims without unduly exacerbating social or economic divides.

The growth of informal economies is a significant barrier to the effective dissemination of ICTs. Informality frequently limits enterprises' ability to manage trust factors. They frequently have difficulty in accessing network-based financial transactions and contract enforcement or arbitration mechanisms. Their ability to manage and retain skilled personnel is limited, and so their productivity and quality control procedures are frequently found wanting. Since the informal economy is an important component in many economies, actions to "formalize" SMEs are a critical component of any ICT dissemination strategy. Actions to redress the cost benefit ratio of informality should be undertaken by increasing the benefits of formality rather than attempting to reduce costs: educating workers, and providing them with social security and appropriate wages, lead to social development and economic expansion.

Unless the workforce has the necessary skills to adapt and be creative, enterprises will not be able to enhance their productivity and innovation. Throughout this chapter it has been noted that ICTs are changing the nature of many tasks that have little to do directly with computers. Thus, the emphasis should not be placed exclusively on an elusive "computer literacy". New production processes and enterprises require five fundamental skills: literacy, numeracy, the capacity to learn, the capacity to communicate clearly and the capacity to work in teams.[8] These are not task specific, and they are skills rarely taught in professional training schools. These five critical competencies must be developed throughout life and particularly in the education system. In any event, workers would need to acquire these skills through the professional training institutions. Industry or task-specific skills would complete the competency profiles of workers. All social actors should review current education and training systems to empower workers in a new technological environment. Experience and formal knowledge will need to be certified to ensure greater mobility in the labour market. This implies changes in the techniques to deliver education and training (ICTs for education and training) but, more importantly, it requires changes in the content and methods of education and training (education and training for ICTs).

Annex I

Chart 5.9

Total output (USD)

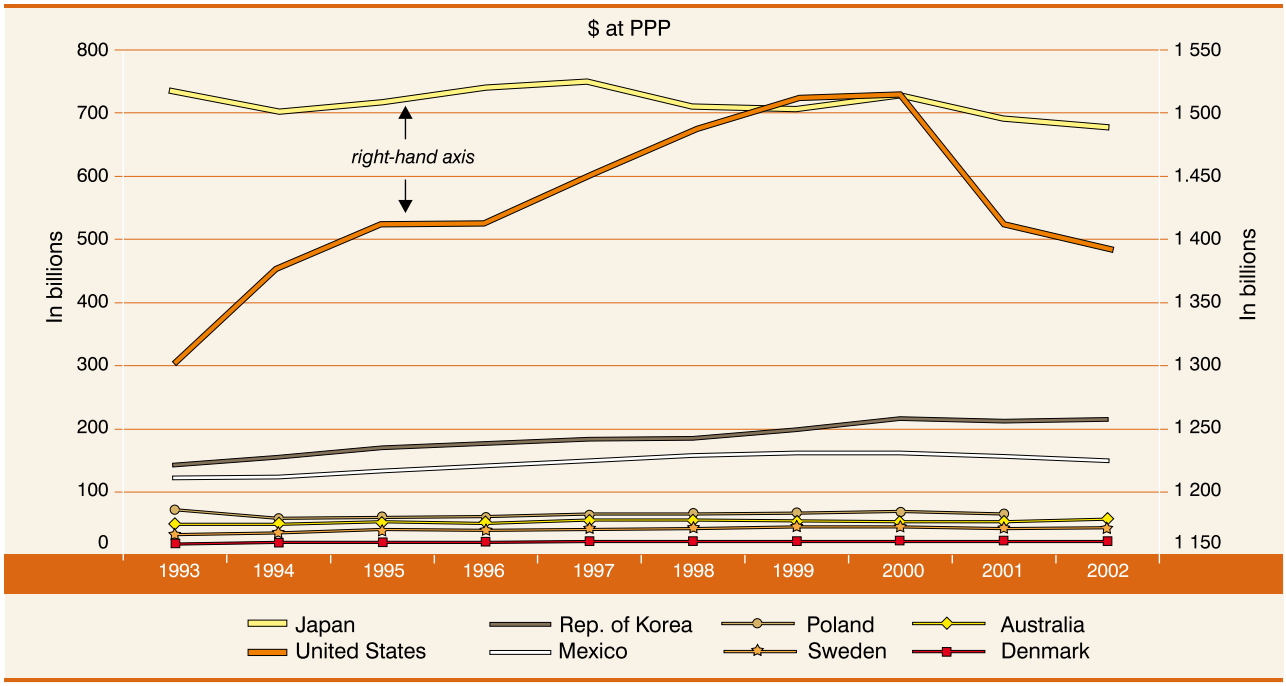
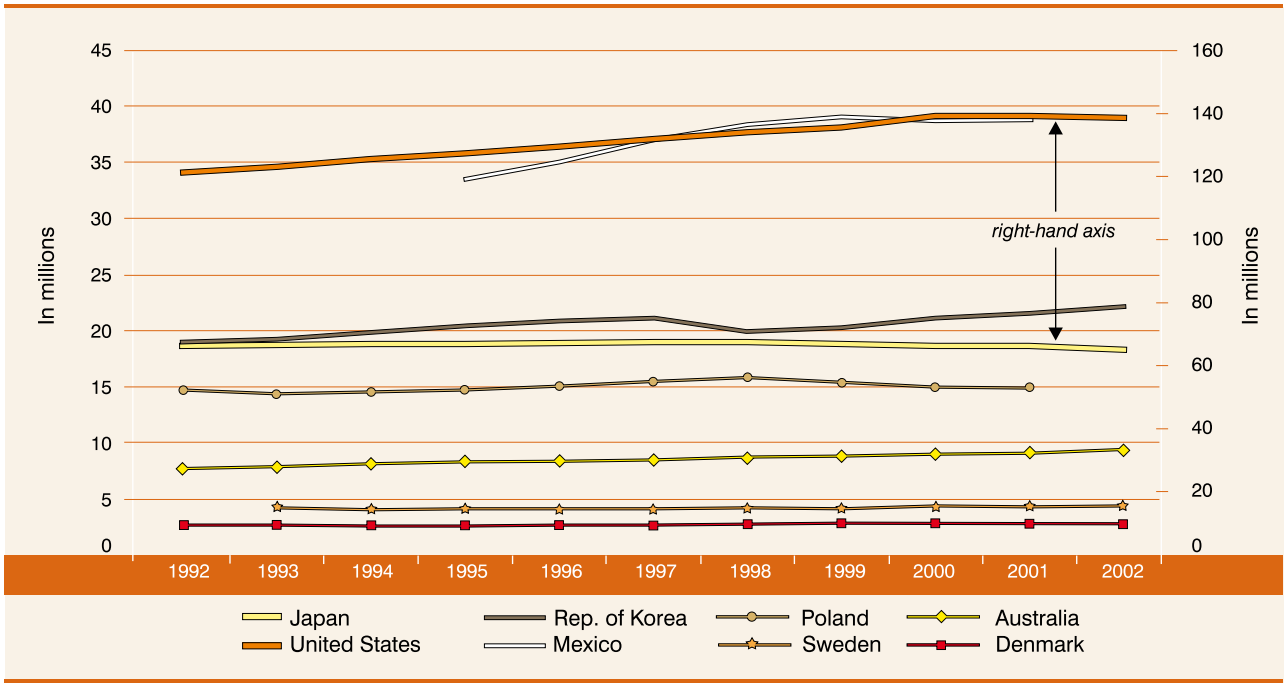


Chart 5.10

Total employment



Source: ILO, based on UNSO and World Bank (World Development Indicators).

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Notes

1. Building the Information Society: A Global Challenge in the New Millennium (WSIS Geneva Declaration of Principles).

2. Data for charts 5.1, 5.2, 5.3 and 5.4 were received from the UN Statistical Office. The sectoral classification corresponds to sub-group D (Manufacturing) and sub-groups J (Financial intermediation) and K (Real estate, renting and business activities) of the United Nations' International Standard Industrial Classification of All Economic Activities (ISIC), Third Revision. Series M, No. 4, Rev. 3. Output in those tables is presented in local currencies. Conversion factors for constant local currency and PPP are obtained from the implicit factors (from current to constant prices and from constant at local to constant at purchasing parity indices in the World Bank's World Development Indicators (WDI). The countries listed in the graphs correspond to series for which all data were available; unfortunately, employment and output statistics are either not available or do not exist under the required classification for most developing economies. It should be noted that no effort has been made to identify ICT-related industries on their own: investment in data processing and communication technologies shape many industries. The attempt made here is to describe the changes in two sectors widely believed to be influenced by both technology and globalization.

3. Gordon and Gupta (2003).

4. Farrel et al. (2005).

5. Ramírez and Núñez (2000).

6. Autor, Levy, and Murnane (2003).

7. Levy and Murnane (2004).

8. In an extensive follow-up of a plant restructuring, Roberto M. Fernandez (2001) notes that "the firm has moved from a situation where most jobs required only basic arithmetic ... to one where many (if not most) jobs ... require workers to be able to compute using decimals and to read a graph (e.g., a statistical process control graph). Language-related changes also seem modest, but in the direction of greater complexity." Fernandez RM (2001). Skill-biased technological change and wage inequality: Evidence from a plant retooling, *American Journal of Sociology,* vol. 107, pp. 273–320.