BENEFITS OF THE NEW ECONOMY

KEY POINTS

- The 'new economy' refers to the strong gains in performance many developed and some developing economies achieved in the last decade; reinforcing advances in new technologies, business practices and economic policies produced rapid productivity growth, rising incomes, low unemployment and moderate inflation.

- The information and communications technology, ICT, industry and electronic commerce, commonly known as e-commerce contributed strongly to this rapid output and productivity growth.

- During the 1990s and 2000s, due in part to its rapid adoption of ICTs, Australia enjoyed strong economic performance, including output and productivity growth exceeding the United States'.

- East Asian economies generally spend a lower share of gross domestic product, GDP, on ICT goods and services than do Europe, North America or Australia, implying the region could boost its growth considerably over the next decade from employing ICT and e-commerce more widely; this should create significant opportunities for Australian businesses to sell ICT goods and services to the region.

- To speed the take up of new technologies and benefit fully from the ICT revolution, economies need appropriate policies to support innovation including strong economic and social fundamentals, sound infrastructure especially in telecommunications and a favourable environment for business and public sector innovation.

Over the last decade, the global economic impacts of ICTs and e-commerce have become comparable to those of the steam engine, railways, electricity and the telegraph in past centuries. As with the earlier technological revolutions, ICTs and e-commerce are enabling technologies that enhance labour and capital productivity in most other industries. While ICT equipment production clearly has become a major growth industry, applying these technologies widely throughout an economy arguably creates greater long term benefits.

SCOPE OF THE 'NEW ECONOMY'

In the 1990s, after two decades of disappointing performance, the US economy experienced strong, unexpected and sustained growth, to the extent that many commentators believed a 'new economy' was emerging. Across the globe, many economies, including Australia, experienced a similar phenomenon. Australia achieved strong economic and productivity growth with low inflation and falling unemployment. As well as adopting new technologies, economic, trade, fiscal and deregulation reforms in the 1980s and 1990s contributed significantly to Australia's improved performance, however, these developments fall beyond the scope of this report.[1]

Not only have industrialised economies benefited. While diffusion of ICT and e-commerce is still relatively low in developing economies, ICTs' low cost and high benefits are encouraging more rapid take up than occurred in previous technological revolutions and already is producing benefits.

What is the 'New Economy'?

The new economy refers to the extraordinary gains in economic performance achieved in the mid to late 1990s due to three inter-related factors; technological innovation, organisational change and improved public policies (Council of Economic Advisers, 2001).[2] The combination of structural economic reform and networked ICTs increased the value of information available to individuals, firms, markets and governments, raising the return to knowledge skills and raising overall productivity and economic well being (Asia-Pacific Economic Cooperation, 2001). ICTs have reduced the costs of coordination, communications and information processing, fundamentally changing what businesses do and how they do it (Parham, 2002).

1 Several other analyses assess the impact of microeconomic reform, such as reductions in barriers to trade and foreign direct investment, deregulation of access to finance and commercialisation of government business enterprises, on Australian growth and productivity (Productivity Commission, 1999).

2 New economy enthusiasts, such as the Council of Economic Advisers, believe that ICT has a dramatic impact on economic performance, whereas skeptics, such as Gordon, 2000 find little evidence of this.

VARIOUS USES OF THE TERM 'NEW ECONOMY'

Commentators have used many alternative meanings for the term 'new economy' but few have attempted to define it. It has been used to include:

- the economic gains of new technologies, economic policies and business processes since the 1990s
- the growing importance of the Internet, e-commerce and advanced communications and data processing technology
- the growth of the knowledge based economy, with knowledge processed by ICTs
- the reduced importance of the traditional business cycle and workplace.

As a global phenomenon, the 'new economy' is characterised by:

- increasing economic integration across national boundaries
- competitive pressures of expanding global markets
- increasing pace of technological and social change, with innovation raising economic productivity
- increasing speed of information and knowledge flows.

Sources: Organisation for Economic Co-operation and Development, 2000c; Department of Industry, Tourism and Resources, 2002.

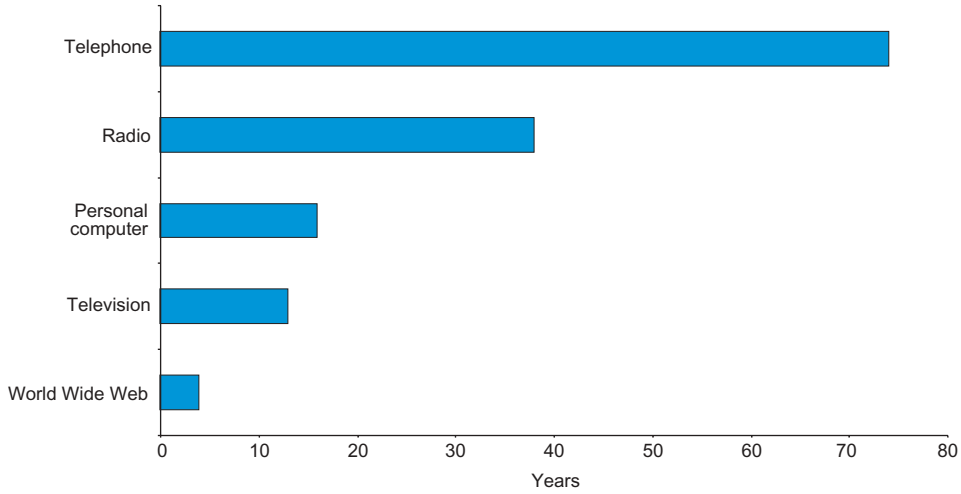
The rapid diffusion of ICTs is much faster than for previous key technologies (Figure 1.1) (OECD, 2001c).[3] Sharply falling prices for ICT equipment, falling call charges resulting from telecommunication deregulation, rising incomes and the ability to use pre-existing telephone networks drive the more rapid adoption of personal computers and the Internet.

[3] Diffusion of new technologies generally follows an 'S' shape over time, with low take up in the early years, then an increase in the rate of take up, when network effects start to become significant. As the technology becomes entrenched, take up slows but efficiency gains from business restructuring and new ways of doing business start to increase. Network effects, or network externalities, arise where each new participant in the network increases the value of the network to all participants; examples are telephony and email. 'Indirect network effects' arise where increased sales of a product result in greater availability of applications to use that product, for example personal computers and software (Varian, 2001).

Figure 1.1

ICT Diffusion Much Faster than Previous Technologies

Diffusion Rates of New Technologies, Years to Reach 50 Million Users World Wide



Source: Mann et al., 2000, from International Telecommunication Union.

How the New Economy Impacts on Economic Performance

The main drivers of the ICT revolution are strong technological progress in ICT production which generates ongoing declines in ICT equipment and software prices and rapid quality improvements, the convergence in communication and computing technologies, the widespread digitisation of information and the fast growth in computer networks. One of the major benefits of the ICT revolution is higher economic growth rates achieved through a complex interaction with stronger market competition, more efficient institutions and stronger regulatory regimes, which together directly boost productivity (Table 1.1).[4]

[4] Productivity growth is achieved by using given levels of labour and capital inputs more efficiently, due to factors including better organisation of production, economies of scale, technological change and managerial innovation.

Table 1.1

Economic Growth and Its Causes

Framework for Analysing Impact of Policies on ICT and Growth

Markets, institutions and policies	Determinants	Proximate sources			
		Quantity	Quality		
Labour market regimes; regulatory environment; entrepreneurship; monetary and fiscal policies; financial markets and corporate governance; science and technology policy; education policy; infrastructure coverage and efficiency	Investment in education and science; firm level training; mobility of human capital; immigration	Hours worked	Skill composition	Labour	Economic Growth
	Investment in fixed capital, including ICT; innovation and its financing; diffusion of technology; costs of and access to technology; capacity for networking and collaboration; links to the science base	Machine hours	Asset composition; embodied technology	Capital	
		Efficiency; disembodied technology; organisational innovation		Productivity	

Source: OECD, 2000a.

The new economy is characterised by stronger economic growth underpinned by higher productivity, resulting in employment growth in an environment of low inflation. It is accompanied by high investment in and diffusion of ICT and its applications (OECD, 2000a). The main economic benefits of the new economy are:

- higher trend growth, largely due to higher productivity growth, generated in part by more efficient business practices linked to ICT capital deepening
- lower inflation, as ICT induced productivity growth and greater domestic and global competition raise the long run sustainable rate of growth, the rate of unemployment at which inflation takes off is lower; this potentially will allow the economy to expand for longer before inflationary pressures emerge
- new sources of growth, as certain economic sectors benefit from increasing returns to scale, network effects and externalities; in particular, the value of communications networks and Internet applications increase as more people become connected, fuelling higher productivity and output growth.

Although businesses and households benefited from ICT since the 1960s, since the early 1990s, advances in computer hardware, software and telecommunications and rapid price falls have combined to increase its economic potential.[5] ICT is a general application 'enabling' technology that stimulates innovation with benefits for long term growth. Networked ICT helps to reduce the cost of storing, accessing and exchanging information and increase the quantity and value of information available to individuals, firms, markets and governments, allowing each to operate more efficiently and raising the return to capital, knowledge and skills (Asia-Pacific Economic Cooperation, 2001). Partly in response to ICT and e-commerce availability, organisations are changing, adopting new more efficient production techniques, better human resource management practices, closer business relationships with suppliers and customers, more aggressive business strategies regarding mergers and outsourcing, more efficient financing and compensation methods, rapid global transfers of capital, goods and services and better global risk spreading. All these reforms boost growth in the long run.

In the late 1990s, over reacting to perceived benefits of the new economy, markets pushed up the value of ICT and e-commerce companies. After April 2000, the values of these companies began falling and many high profile bankruptcies occurred. Although this has created major short term restructuring costs, the share market collapse is likely to have limited long term effects on new technologies' economic and productivity gains.

DOT-COM TO DOT-BOMB – TECHNOLOGICAL REVOLUTIONS AND MARKET EXCESSES

Analysts identify ICTs as the latest in only about a dozen 'general purpose technologies' developed in the history of modern humans, including the domestication of crops and animals, bronze, iron, the water wheel and windmill, the three-masted sailing ship, the printing press, automated textile machinery, the steam engine, electricity, the internal combustion engine, the telephone and computing. General purpose technologies have great economic significance as they can be applied to a broad range of sectors within the economy and have complementarities with other, existing technologies. They fall within a class described as 'radical technologies' as they do not evolve through incremental, steady improvements. The first industrial revolution, or period of acceleration of output and productivity growth, partly arose from the diffusion of the steam engine and automated textile machinery; the diffusion of electricity and the internal combustion engine led to the second industrial revolution. Computing has been the twentieth century's only general purpose technology, with its foundations laid in the 1950s.

[5] Until the mid 1990s, ICTs' impact failed to show up in productivity statistics and many economists were sceptical of the impact of computing on productivity and economic growth. This became known as the Solow Paradox, after the economist, Robert Solow, who commented that the computer age was everywhere except in the productivity statistics.

Harnessing the full benefits of general purpose technologies can take a considerable time, due to the need for 'learning by doing' and trial and error. New business processes require new work practices, corporate structures and designs. For example, benefiting fully from the electrification of factories required new factory layouts, job design and training in relevant skills; productivity pay offs accrued into the middle of the last century. Diffusing ICT and developing large networks that link businesses and households also is taking time and requires low cost, high powered computers, low cost telecommunications, the Internet and World Wide Web and software enabling ordinary people to use computers, promoting network benefits.

The ICT revolution generally followed the pattern of past technological revolutions, including an initial boom and bust in the stock prices of innovating firms and in spending on ICT goods. Technological revolutions generally produce market excesses, or stock market bubbles, including rapid increases in equity values unrelated to earnings potential, followed by a sudden collapse. New products or technologies frequently cause bubbles as fundamentals and hence expected profits can become difficult to assess. The more potentially pervasive a new technology, the more difficult to foresee which firms will profit, when or by how much, as firms which exploit new technologies cannot be benchmarked by historical records or standard equity market analysis.

ICT and e-commerce are no different to railways and electricity, which also experienced initial booms in stock prices and investment. In the railway age of the nineteenth century, investors raised vast sums on the stock market to finance new lines, but many companies failed as over investment produced excess capacity. As a result, share prices crashed and the number of railway firms fell dramatically. The collapse of the railway bubble did not lead to an economy wide recession; and the railways continued to bring huge economic benefits. However, the crash did produce significant industry consolidation.

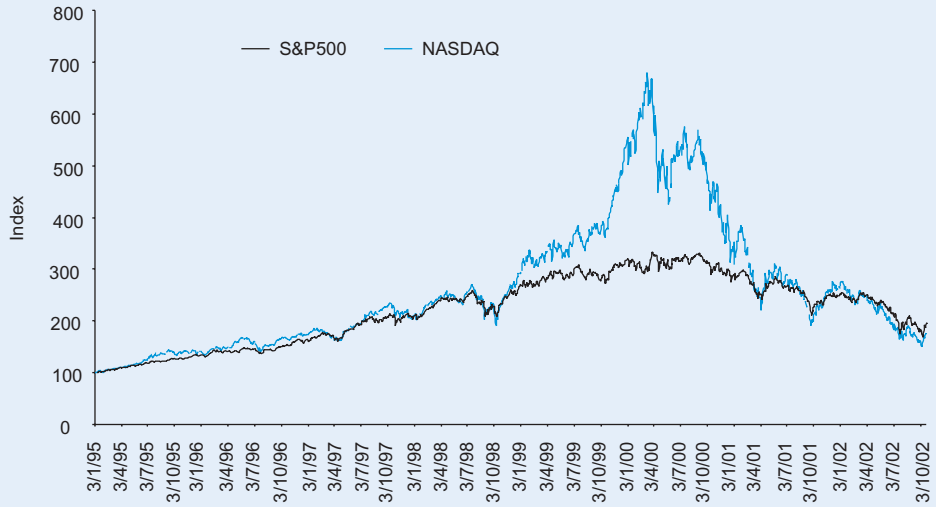
Similarly, the NASDAQ's collapse since April 2000 is producing considerable consolidation in the ICT sector, particularly in the telecommunications industry (Figure 1.2).[6] Historical evidence suggests the recent slowdown in productivity growth in the United States will not inhibit ICT driven productivity growth, as significant scope exists for further ICT efficiencies, particularly in the area of e-commerce.

6 The NASDAQ, or National Association of Securities Dealers Automated Quotation System, is the main market in the United States for innovation, with 25 per cent of the companies listed on the NASDAQ active in the technology sector; it has been the key to capital formation in the United States in this sector (www.nasdaq.com). The S&P 500 is a market-value weighted index, widely used to benchmark US equity performance; it consists of 500 stocks chosen for market size, liquidity, and industry group representation (www.spglobal.com).

Figure 1.2

Technology Markets Crash After April 2000

S&P 500 and NASDAQ, 1995 to 2002, Indexed



Sources: Yahoo!® Finance (finance.yahoo.com) and S&P 500 (www.spglobal.com)
Commonwealth of Australia, 2001; International Monetary Fund, 2001.

KEY SECTORS OF THE NEW ECONOMY

ICTs and e-commerce are the key sectors driving the new economy's improved economic performance. ICT includes investment in and use of networked information technologies and related activities while e-commerce involves networked monetary transactions. Many economies are making great strides in adopting ICTs but much less progress in developing e-commerce.

What is ICT?

Due to the rapid emergence of new ICT goods and services, classifying and measuring the ICT industry is an ongoing challenge for statistical agencies and industry analysts. The Australian Bureau of Statistics gathers statistics on industries that comply with the common international definition of the ICT industry agreed to by the OECD in 1998.[7] ICT industry statistics cover computers and

7 The Australian Bureau of Statistics terms the industry the information technology and telecommunications, IT&T, industry. The OECD ICT sector definition can be found in OECD, 2000c.

communications equipment and the services which facilitate the use of this equipment (Australian Bureau of Statistics, 2002).[8] (See Chapter 2 – *Australian ICT and E-Commerce* for details of Australia's ICT industry.)

OECD DEFINITION OF ICT PRODUCING INDUSTRIES

Using the latest 4 digit International Standard Industry Classification, ISIC, codes the OECD considers the ICT industry includes:

Manufacturing of:

3000 office, accounting and computing machinery

3130 insulated wire and cable

3210 electronic valves and tubes and other electronic components

3220 television and radio transmitters and apparatus for line telephony and line telegraphy

3230 television and radio receivers, sound or video recording or reproducing apparatus and associated goods

3312 instruments and appliances for measuring, checking, testing, navigating and other purposes

3313 industrial process control equipment

ICT goods related services include:

5150 wholesaling machinery, equipment and supplies

7123 renting office machinery and equipment (including computers)

Intangible services include:

6420 telecommunications and

7200 computer and computer related services.

[8] The definition excludes process control computers and other equipment in which the presence of microprocessors is predominantly for the control or setting of functions, simple calculating devices, television and radio broadcasting goods and services and television and radio receivers. Examples of ICT goods and services embodied in non-ICT capital goods include computer technology in medical imaging equipment and motor vehicles and semiconductors used to control an assembly line. The recorded media manufacturing and publishing industry is not part of the international definition of the ICT industry (Australian Bureau of Statistics, 2002).

Hence, the main segments the ICT sector covers are:

- ICT hardware industries, including production of computers and equipment, magnetic and optical recording media, electron tubes, printed circuit boards, semiconductors, passive electronic components, industrial instruments for measurement, instruments for measuring electricity, laboratory analytical instruments and calculating and office machines, as well as wholesale and retail trade in computers and equipment.
- Communications equipment production, including production of household audio and video equipment, telephone and telegraph equipment, and radio and TV communications equipment.
- Software and other services industries, including software development and engineering, pre-packaged software, wholesale and retail software trade, computer-integrated system design, computer processing, data preparation, information retrieval services, computer services management, computer sales, rental and leasing, computer maintenance and repair and other computer related services.
- Communication services industries including networks and security, system administration and support, database development and administration, user support and help desk, graphics and multimedia, instruction and training, hardware engineering, smart cards, telephone and telegraph communications.

Source: OECD, 2001b.

E-Commerce

E-commerce can be defined as every type of transaction or interaction prepared or conducted electronically, with its scope covering all forms of electronic processes (National Office of the Information Economy, 2001).[9] E-commerce simplifies, makes more efficient, reduces the cost of or otherwise alters the process by which a transaction takes place. It relies on a mix of technologies, infrastructure, processes and products to bring buyers and sellers together into a global marketplace on the Internet (Mann et al., 2000).[10]

The Internet and e-commerce create new markets and business models by allowing firms to generate innovative new products and processes (Mann et al., 2000; OECD, 1998). In the globalising economic environment, an important incentive towards e-commerce is the opportunity to create whole new

9 E-commerce has been defined as transactions occurring over networks which use non-proprietary protocols established through an open standard setting process such as the Internet and also more broadly as transactions occurring by any electronic means, including telephone, fax and electronic data exchange through 'closed' networks.

10 The Internet developed as a result of significant initial US Government investment, ICT equipment standardisation, enhanced applications availability and increasing scope and ease of connectivity through telecommunication networks.

markets for information and knowledge based 'intangible' products (OECD, 1997). Such new businesses include spot markets for previously untraded products and new intermediation businesses, such as those specialising in logistics, warehousing and order fulfilment (Dunt and Harper, 2002).

E-commerce has two components:

- assisting sales of non-digitalised goods and services through purely on line shopfronts or 'clicks and mortar' firms which have an on line as well as a physical presence
- enabling sales and delivery of digitised products whose purchase and delivery is made electronically.

E-commerce also can be categorised by participants to transactions:

- business to business, B2B, e-commerce is the exchange of products, services or information between businesses using electronic means such as the Internet
- business to consumer, B2C, e-commerce refers to business to consumer transactions
- business to government, B2G, e-commerce covers transactions between businesses and governments
- government to citizen, G2C, e-commerce encompasses transactions between government and its citizens (National Office of the Information Economy, 2001 and Dunt and Harper, 2002).

To date, of the four types of e-commerce, B2B e-commerce has achieved the greatest economic impact and has the best growth prospects. E-commerce not only enables new firms and business lines to emerge; it also boosts the efficiency of the 'old economy' sectors. B2B e-commerce transforms the back office functions of firms to make them more efficient and impacts on the entire value chain of an industry (National Office of the Information Economy, 2001). Firms engage in e-commerce to manage their commercial transactions and transaction generated information better, thereby increasing business efficiency. By enabling firms to communicate more easily and manage their supply chains more effectively, e-commerce can reduce the transactions costs linked to goods and services production and distribution (OECD, 2001d). For example, e-commerce has improved significantly automotive industry product development, procurement and supply (OECD, 2001a). Many large corporations sell complex equipment to other companies over the Internet using e-procurement. For example, Cisco Systems, a company providing Internet networking solutions, has realised over $2 billion of sales over the Internet and Dell, a computer system supplier, uses Internet transactions for supply chain management. In 1999, B2B shipments accounted for 12 per cent of all manufacturing shipments in the United States, and this share is growing rapidly. Internet e-commerce also is a superior sales channel for services, particularly information intensive ones such as financial services and travel bookings (Dunt and Harper, 2002).

B2C e-commerce also is growing but remains much smaller and is likely to make less inroads than B2B transactions. At the beginning of the 1990s, less than 3 million people in the world used the Internet and its commercial application did not exist (Lawton, 2001). By the end of the decade, more

than 300 million people had access to the Internet and around a quarter of users had made purchases on line (OECD, 2000b). In 2000, B2C e-commerce in the United States amounted to only 1 per cent of business sales. B2G and G2C e-commerce is important for reducing the costs of dealing with government and to help support e-commerce development and also should have good prospects, with B2G possibly rivalling B2B e-commerce.

The growth of e-commerce depends on reliable and secure electronic payment systems. As well as being a heavy user of ICT and e-commerce for its business, the financial sector has a key role to play in enabling safe B2B and B2C transactions, thereby promoting its growth.

USE OF ICT AND E-COMMERCE BY FINANCIAL INSTITUTIONS

An efficient and sound financial system is critical for developing e-commerce and the financial sector also is a leader in embracing ICT. Between 1993/94 and 1999/2000, the Australian finance and insurance industry sector achieved productivity growth of 3.7 per cent per annum, second only to that of wholesaling at 5.6 per cent. The financial sector has invested more in ICT than any other sector, 11.3 per cent of its capital stock in 1999/2000; its rapid take up of ICT may explain much of its strong productivity growth over the decade.

Many 'bricks and mortar', or traditional, banks have developed e-banking activities and become 'clicks and mortar' banks; some institutions also are establishing purely Internet banks. Industry analysts estimate while developed economies' banking industries will grow 3 per cent per year until 2003, their Internet banking segment will grow by 25 per cent annually. One projection expects half of developed economy banking will be on line by 2006.

On line financial services transactions significantly reduce industry costs, benefiting the sector and the overall economy. For example, the cost of an Internet banking transaction is only $0.12 compared to around $3 for over the counter transactions. Electronic financial services also allow financial institutions to tailor services to particular clients' needs.

Beyond e-banking, the financial sector has a major role in e-commerce by enabling on line payments. This requires financial intermediaries to offer user friendly payment tools, allowing rapid electronic funds transfer in an environment with a high degree of client verification, payment authorisation, security and authentication of funds transferred, often across borders.

Sources: National Office of the Information Economy, 2001; United Nations Conference on Trade and Development, 2001; Mann et al., 2000.

ECONOMIC PERFORMANCE IN THE 'NEW ECONOMY'

While the new economy does not change basic economic principles, the rapid growth of the ICT and e-commerce sectors and ICT investment and economic reforms helped spur exceptional US and Australian economic performance in the 1990s.

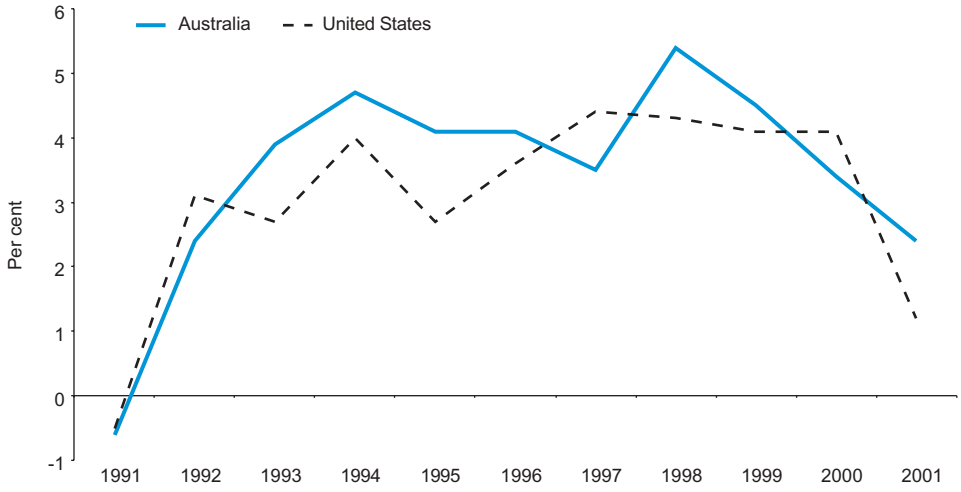
Economic Growth

Over the 1990s, the United States and Australia experienced high and sustained growth in real GDP and real GDP per capita. Between 1992 and 2001, Australia's growth performance was exceptional, with ten years of real average annual growth of over 3.5 per cent, outpacing US growth in most years (Figure 1.3). In part due to the new economy, the United States also enjoys one of the highest incomes per capita and growth rates of the major industrialised economies (Council of Economic Advisers, 2001).

Figure 1.3

Rapid Growth Spurred by ICT and Microeconomic Reform

Real GDP Growth in the United States and Australia, 1991/2001, Per cent



Source: DXData from OECD Economic Outlook, 2002.

Although the ICT sector itself represents a small share of most economies, it still can make a significant contribution to growth and productivity performance (OECD, 2001b). For example, although accounting for only 8.3 per cent of US GDP in 2000, between 1995 and 2000, the ICT sector generated around 30 per cent of GDP growth (Council of Economic Advisers, 2001). Large and sustained growth in business investment, especially in the second half of the 1990s, led US GDP expansion. The rate of capital accumulation in the US business sector almost doubled in the second half of the decade, mainly because of strong investment in ICT capital equipment (Colecchia and Schreyer, 2001).

Australia's ICT industry is much smaller than the United States' and its growth directly contributes much less to GDP growth, but most studies conclude Australia's rapid ICT capital accumulation generated significant indirect output and productivity growth throughout the economy (International Monetary Fund, 2001a).[11] The contribution to growth from Australia's ICT capital investment also increased dramatically in the 1990s; ICT capital now accounts for about two thirds of the total growth from capital deepening (International Monetary Fund, 2001a). Furthermore, as a large net ICT importer, Australia's terms of trade improved significantly as world ICT prices fell dramatically over the last few years (Commonwealth Department of the Treasury, 2002).

GROWTH IMPACT OF THE ICT REVOLUTION COMPARED TO PREVIOUS TECHNOLOGICAL REVOLUTIONS

The ICT revolution has many similarities with previous technological revolutions, particularly those exhibiting network effects, such as railroads and electricity. In the short term, gains from these new technologies initially arose from capital deepening resulting from a fall in relative prices. However, in the long run, large efficiency gains came from using new technologies like electricity and rail services and the resulting production reorganisation. As with many other technological revolutions, ICT gains go largely to users rather than producers, mainly through the fall in the relative price of goods embodying the new technology. The classic historical example was textiles production during Britain's industrial revolution, where around half of the benefits from the new textile technologies were exported to foreign consumers in the form of falling prices. For ICT, the fall in the relative price of goods was exceptionally sharp, resulting in consumer benefits arriving faster than for most previous technological revolutions. Finally, technological revolutions generally led to financial market excesses.

Another important similarity with past technological revolutions is that direct gains from new technologies initially are focused on developed economies. For example, almost a century elapsed between the opening of the first railway in England in 1830 and the global adoption of railways by 1920. However, the social savings are often largest in developing economies. As the diffusion of ICT is occurring more quickly in developing economies than previous technologies, benefits there should accrue sooner.

Source: International Monetary Fund, 2001b.

[11] As relatively little ICT goods production occurs in Australia, some analysts questioned whether or not Australia was a 'new economy.'

Productivity

In the second half of the 1990s, rapid productivity growth drove the United States' strong economic growth. During the business cycle from 1992 to 2000, on average US output per unit of labour, or labour productivity, grew over 4 per cent per year, compared to 3 per cent for the previous cycle between 1986 and 1992 (US Bureau of Labor Statistics, 2002a). Australian labour productivity grew even more strongly than the United States' in most years (Figure 1.4).

ICT and e-commerce can boost economic growth through:

- increasing productivity in the ICT producing sector itself through large scale manufacture of more powerful ICT equipment with little increase in inputs
- increasing productivity from ICT through growing investment in ICT capital goods
- increasing productivity in ICT using industries due to increasing returns from ICT use, spillovers from network economies, availability of timely information to manage complex production chains, more efficient distribution systems, effective management of risks and lower search and transactions costs (Parham, 2002).[12]

Arguably, the last is the most important benefit of the new economy, as adopting ICT may accelerate long term output and productivity growth rates throughout the economy, rather than merely facilitating a one-off movement of resources to higher productivity sectors.[13]

Australia's labour productivity performance compares favourably with that of the United States (Figure 1.4). Thus, although Australia is a significant user rather than a major producer of ICT, its productivity growth has been higher than the United States' in most years.

Since the 1990s, Australia has been at the forefront of ICT take up, achieving rapid productivity growth as a result, following low levels in the 1980s (Figure 1.5). Australia's surge in productivity, which began before the United States' also can be attributed to sound macroeconomic policy settings, rising education levels in the workforce and microeconomic policy reforms which strengthened competitive forces and opened the economy to foreign goods and technologies (Parham, 2002).

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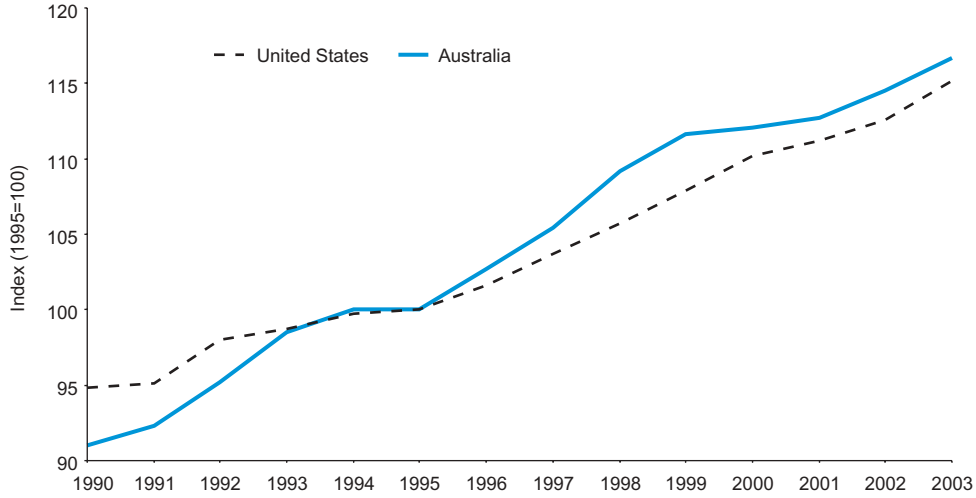
12 Throughout this chapter, unless otherwise specified, productivity growth refers to multifactor productivity growth, the growth in output not due to increased capital, labour or other inputs. Many factors drive multifactor productivity growth including technological advances, improvements in human capital, economies of scale, managerial skill and changes in the organisation of production (Bureau of Labor Studies, 2002b).

13 In the 1990s, several US growth accounting studies measured the contribution of ICT induced productivity growth to overall economic growth, with the main studies arriving at different conclusions. Gordon finds no acceleration of productivity growth outside ICT production, thus that ICT use had no impact on overall productivity growth (Gordon, 2001). Oliner and Sichel and Jorgensen and Stiroh find evidence of accelerated productivity growth outside ICT production of 0.64 and 0.44 per cent respectively, although they could not definitively attributed this to ICT use (Oliner and Sichel, 2000, Jorgensen and Stiroh, 2000 and Dunt and Harper, 2002). Parham et al., (2001) assesses the various studies.

Figure 1.4

Australian Labour Productivity Performance Exceeds the United States

Australian and United States' Labour Productivity Index, 1990/2001

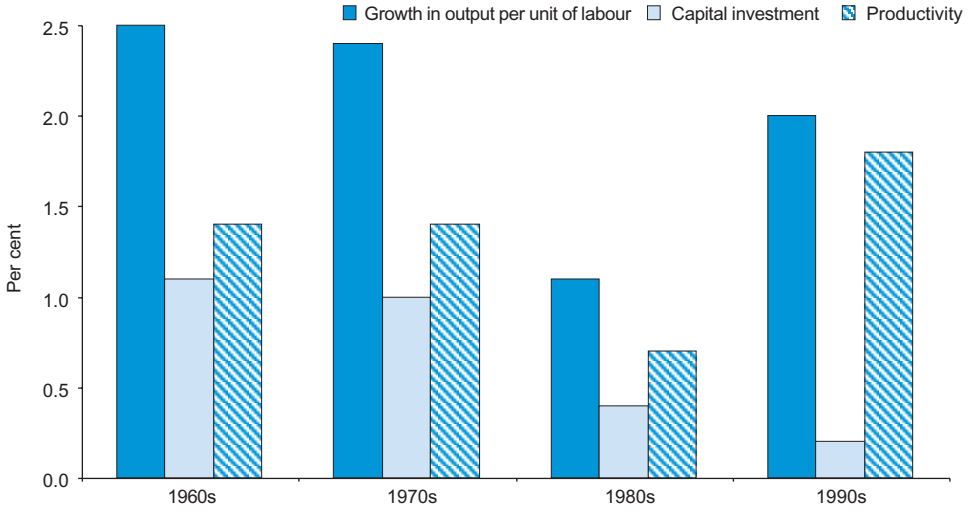


Source: DX Data from OECD Economic Outlook, 2002.

Figure 1.5

Australian Productivity Rose Significantly in the 1990s

Australia's Average Annual Growth in Output per Unit of Labour, Capital Investment and Productivity, 1960s to 1990s, Per cent



Notes: Output growth per unit of labour is due to growth of capital investment and productivity growth. The analysis in this figure does not control for cyclical effects.

Source: Henry, 2001.

Analysing the sources of Australia's productivity growth, increased ICT use appears to explain a significant part of the productivity surge in the second half of the 1990s. Australia achieved both high levels of productivity growth and significant gains from capital deepening due to ICT investment. Productivity and employment growth were the main causes of the accelerated output growth.[14]

Over the 1990s business cycle, Australia's multifactor productivity growth accelerated significantly more than in the United States, by 1.1 per cent per year compared to 0.3 per cent per year, though ICT take up was only one factor contributing to this strong performance (Parham, 2002 and Parham et al., 2001).[15] The Australian experience demonstrates that ICT production is not necessary to achieve strong productivity gains; accelerating productivity also is associated with ICT use.

In both the United States and Australia a positive relationship exists between industries' ICT investment and productivity growth, providing some evidence of a link between these two factors (International Monetary Fund, 2001a).[16] From 1993/94, Australia's fastest growing sectors were wholesale trade and finance and insurance, both relatively intensive users of ICT; these sectors also benefit other industries (Parham, 2002). Communications, transport and storage also are relatively intensive ICT users and also experienced higher growth per worker (Figure 1.6). However, other common factors could be driving such growth, such as structural reforms which have led to organisational changes, improved management techniques and a more business friendly institutional environment (International Monetary Fund, 2001a). These developments also could have encouraged technological upgrading in production processes and more active interest in product and process innovation, strongly encouraging ICT investment. Hence, policy reforms could have acted as underlying drivers and facilitators of productivity gains, with ICT as one component of change (Parham, 2002).

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14 Enhanced productivity performance in the late 1990s compared to the first part of the decade partly reflects the recession of the early 1990s, which increased unemployment and lowered productivity, and from the mid 1990s, the ongoing effects of microeconomic reform and high ICT investment due to the lower prices and rising efficiency of ICTs.

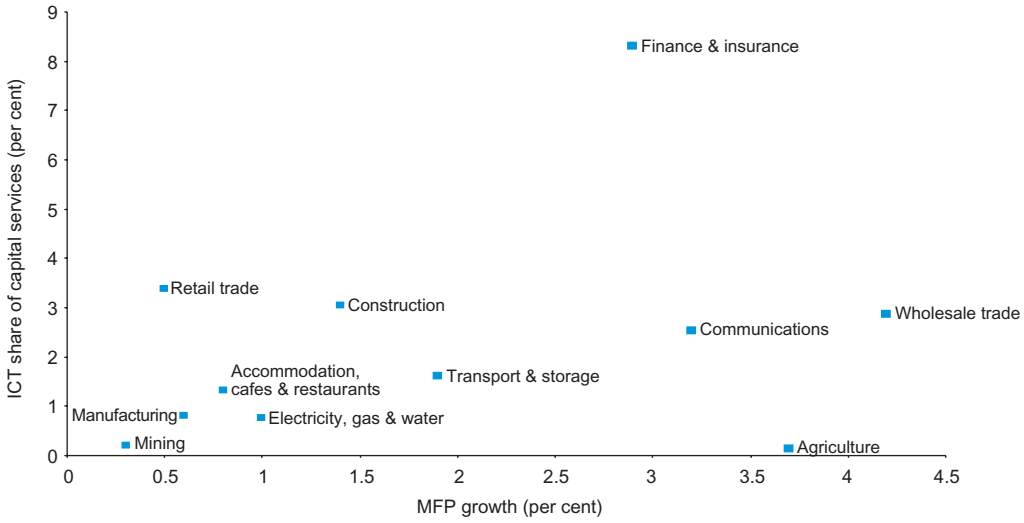
15 From 1993/94 to 1999/2000, Australia grew on average 4.5 per cent per year; 1.7 percentage points of this growth was due to productivity growth arising in part from technological change, 1.1 percentage points was due to ICT capital investment, 0.6 per cent to other capital investment and a further 1.1 percentage points to increased labour hours worked (Simon and Wardrop, 2002).

16 While the existence of this relationship is not definitive proof Australia is benefiting from the positive network externalities from the uptake of new technologies, it is possible the recent productivity upsurge marks the beginning of a new phase of growth for Australia (International Monetary Fund, 2001a). It is worth noting that community and recreational services has above average ICT use but is well below average on productivity measures. However, measuring productivity growth in the services sector is notoriously difficult.

Figure 1.6

Productivity Growth and ICT Capital Intensity Closely Linked

Australia's Productivity Growth and ICT Share of Capital Services, 1995/2000, Per cent



Note: Productivity growth measured is multifactor productivity, the growth in output not due to growth in inputs.

Source: International Monetary Fund, 2001a.

To date, e-commerce does not appear to have driven productivity gains. However, as the Internet and e-commerce are more widely used, Australia could experience a second wave of Internet driven growth later in the 2000s (Dunt and Harper, 2002). The main sectors expected to benefit are those offering products and services amendable to e-commerce, including media and entertainment, banking and finance (National Office of the Information Economy, 2000).

HARNESSING NEW ECONOMY BENEFITS IN EAST ASIA

Australia's excellent economic performance over the 1990s implies ICT use and other economic reforms are at least as important, if not more important, drivers of growth than ICT production. A range of factors drive ICT take up, including competition and complementary product and process innovations. Particularly important is telecommunications reform.

Aggressive policies aimed at subsidising ICT investment are likely to distort economic outcomes and depress long term growth; rather, governments should strive to promote an market based environment supporting appropriate levels of ICT investment and production. For example, governments should seek to support ICT and e-commerce related innovation by investing in education and training, supporting regulatory reform and exposing state monopolies to competition.

Many East Asian economies do not yet have appropriate public policy settings in place to support ICT and e-commerce innovation and its rapid diffusion to the wider economy, so as yet have not reaped much benefit through improvements to 'old economy' performance (OECD, 2001a and International Monetary Fund, 2001b). (See Chapter 3 – *East Asian ICT Markets*.) For Australia and East Asian economies to gain the full benefits of ICT governments must implement many of the same policies required for broader economic growth and strong social fundamentals. These include implementing sound macroeconomic policies, liberalising international trade and investment, investing effectively in education and infrastructure and establishing a favourable economic and legal environment for business, including flexible labour markets, a functioning legal system and effective capital markets. As well, governments need policies to encourage business to innovate and generate new knowledge, including making effective public investment in innovation and improving the interaction between major players in the innovation system (OECD, 2001a).

Strong Economic Fundamentals

A strong macroeconomy, with high per capita GDP and productivity growth is fundamental to promoting the diffusion of new technologies. Macroeconomic stability helps ensure sound policies relating to human capital development, innovation and productive investment succeed.

Broad Macroeconomic Policy

Fiscal discipline and low and stable inflation rates boost national savings, reduce uncertainty and enhance the efficiency of the price mechanism in allocating resources. This provides a stable environment for decision making and encourages private investment (OECD, 2001a). The successful macroeconomic and structural policy reforms Australia and several other OECD economies initiated in the 1980s contributed significantly to achieving higher GDP growth rates in 1990s. Prior to the Asian crisis, many East Asian economies also enjoyed a stable macroeconomic environment, which encouraged high investment and growth rates. As a result of public bailouts of bankrupt banking systems, many now are encumbered with high levels of public debt and high interest rates, discouraging new investment, including in ICT. A speedy return to macroeconomic stability, including by privatising state held assets, is fundamental to boosting investment in innovation, ICT and old economy sectors.

Public Expenditure

The direction of public expenditure can encourage the take up of new technologies, thereby influencing economic growth rates. Public investment in high quality and high return research and development, R&D, education, transport, telecommunications, the power sector and other infrastructure is important in creating an environment that supports entrepreneurship, innovation and private sector activity (OECD, 2001a). Public spending should be balanced against the level of taxation available to finance it, as excessive taxation levels can undermine incentives for investment and growth. Furthermore, as major economic players, governments can lead the way in adopting new technologies (APEC Economic Committee, 2001). By adopting early electronic tendering, information provision, tax collection and goods and services procurement, governments can encourage the private sector to take up electronic B2B and B2C interactions more rapidly and also increase government efficiency.

Openness to International Trade and Investment

Increasing integration of world markets also helps drive technological innovation and productivity growth. By pursuing trade and investment liberalisation and other public policy reforms in the 1980s and 1990s, many industrialised economies set the basis for rapid ICT take up. This was certainly the case in Australia. (See Attachment 4.1 – *Global Markets.*)

The new economy itself is driving the internationalisation of production; ICT has allowed the efficient separation of many production steps across the globe. Similarly, trade liberalisation increased ICT sector productivity and growth by allowing firms to access the new technologies and trade ICT equipment readily. Microeconomic reform and competition policy also supported new technologies being adopted, as firms sought to be more efficient to reduce costs. The interplay between these factors created a virtuous circle.

Through reducing tariffs, removing non tariff barriers and liberalising capital markets, trade and investment liberalisation increases international trade and investment flows. Economies like the United States, Canada, Australia, Hong Kong, Singapore and Ireland, which experienced strong output and productivity growth over the 1990s, are at the forefront of trade and investment liberalisation. Economic openness supports growth and technology diffusion by expanding markets available to innovators and consumers, facilitating the spread of advanced knowledge, technologies and business practices, cutting costs of imported ICT goods and services and encouraging firms to adopt international standards. Open trade and capital flow policies also can remove uncertainty over e-commerce and support its development (OECD, 2001a).

Business Environment

Pro-competitive market policies, sound banking and financial systems and a fair and transparent legal environment also are needed for new economy growth (APEC Economic Committee, 2001). These result in well functioning markets which are conducive to entrepreneurship. Such reforms also stimulate organisational change which, with increased competition, enhance demand for new technologies and boost growth.

Competitive Markets

The rapid growth of new business areas in the last decade owes much to governments more vigorously pursuing competition policies and market deregulation. Removing barriers to new firms entering and inefficient old ones exiting industries increases competitive pressures on all firms, boosting incentives to innovate and adopt new technologies. Excessive red tape and corrupt, unfair or anti-competitive practices which support inefficient incumbents discourage innovation and new technology adoption (APEC Economic Committee, 2001). For example, the United States may have benefited from early ICT investment because of its high levels of competition and low ICT goods tariffs and taxes. Hence, in the 1990s, US firms paid less for ICT investment goods than firms in other OECD economies, stimulating US investment in these goods over the decade.

Maintaining competitive costs of associated telecommunication services and hardware also is important. Competition in the telecommunications sector drives down telephone and Internet service charges and improves service quality, encouraging more rapid technological diffusion and innovation (OECD, 2001a). For this reason, most governments have opened telecommunications sectors to competition, breaking up and privatising former state owned integrated monopolies. Privatising integrated public telecommunications suppliers, who control both the fixed lines and poles network and supply services, is not international best practice, as such companies have an incentive to overcharge new telecommunications service suppliers for access to the monopoly network. Ideally, prior to privatisation integrated state owned telecommunications companies should be unbundled into service providers and regional fixed line owners, so new entrants can access the monopoly fixed line network at fair rates (East Asia Analytical Unit, 1998).

Whilst ICT take up can generate pro-competitive benefits by reducing search costs and improving market transparency, increased information also can assist firms colluding and innovation can give monopoly power, if only for a time. Hence, competition policy authorities need to ensure dominant ICT suppliers do not emerge, reducing competition and harming consumers (OECD, 2001a).

Strong Financial Systems

An efficient and innovative financial market also is essential for strong ICT innovation. Financing new, potentially productive activities and firms withdrawing funds from inefficient activities are key to efficient technological transformation (Asia-Pacific Economic Cooperation, 2001). In recent years financial markets have developed new financing approaches to foster ICT R&D, innovation, start ups and diffusion, by catering for more risky, innovative businesses (OECD, 2001a). These include second tier stock markets and venture capital markets, which are designed to fund innovative new firms with limited cash flows, few tangible assets and high risks but potentially high profitability (OECD, 2000c). Governments should ensure regulations do not inhibit the development of venture capital markets, for example by prohibiting pension funds from investing a proportion of their assets in venture capital markets as institutional investors are an important source of funding, particularly in the United States. To continue to attract investors, these financing mechanisms depend on credible and timely disclosure of information on firm performance so investors can assess firms' prospects (Asia-Pacific Economic Cooperation, 2001). Regulation to ensure transparency and investor protection is needed to foster innovative investment and enterprise (Economic Analytical Unit, 2002).

Vigorous Entrepreneurship

High administrative barriers to start ups can reduce innovation. Excessive regulations for registering new businesses can discourage new start ups. Also, high costs in exiting a business, such as bankruptcy and insolvency costs can limit incentives for entrepreneurs to undertake risky projects and hence may reduce innovation.

Effective Legal and Regulatory Environment

An efficient regulatory and legal environment is necessary to increase ICT diffusion and e-commerce use, particularly in areas such as intellectual property protection, privacy, security, contract enforcement and consumer protection (OECD, 2001a).

Legal systems must protect intellectual property and ensure contracts are enforceable, and laws must be quickly amended to recognise new business types and ways of doing business. Intellectual property protection is important for new technologies and thus is a key issue in the decision to innovate. Intellectual property laws need to balance the need to protect intellectual property that is expensive to produce but easy and cheap to replicate and distribute using the new technologies with the desire to promote competition and further innovation through diffusion of new knowledge and technologies (Mann et al., 2000). Additional complexity arises because legal issues increasingly are cross-jurisdictional as goods are traded more easily across borders. Intellectual property rights enforcement in East Asia is weak, even for older technologies, hence this needs to be strengthened significantly. Even if legislation could be strengthened, enforcement would be difficult given the large number of users on the Internet. The best solution may be for the market to develop technologies which are difficult to copy.

To encourage consumers to make greater use of e-commerce, transactions must be secure, safe and reliable. This requires developing secure servers for e-commerce transactions. Also, many economies are promoting authentication and certification mechanisms to identify users and safeguard transactions to secure sensitive private information and financial transactions. For example, the Australian Government has developed Gatekeeper so certification authorities can verify parties to a transaction. (See Chapter 2 – *Australian ICT and E-Commerce.*)

Consumer protection and privacy also is important for B2C transactions. Privacy, specifically managing personal information, is essential as much transaction information can be tracked, collected and compiled, providing vast amounts of information about people's personal lives (Mann et al., 2000). Consumers need to be educated on sophisticated means used to collect data, such as cookies, and how to guard against associated invasions of privacy. In 1980, the OECD promulgated the Guidelines on the Protection of Privacy and Transborder Flows of Personal Data, which lays down established principles for fair information gathering practices and provides a basis for data protection to ensure a free flow of information (Mann et al., 2000). Australia recently enacted legislation to protect individuals' privacy. As well, while the Internet provides massive choice, transacting purchases across national borders provides more opportunity for fraud and deception. Raising an action in another jurisdiction can be prohibitively costly compared to the amount of the transaction, so cost effective dispute settlement procedures should be considered. Governments may need to update consumer protection laws to meet these challenges.

Flexible Labour Markets

Another important factor enabling economies to benefit from ICT is a well-functioning labour market. Particularly in periods of major technological change, labour market regulations should assist workers

to move between jobs smoothly and at low cost. Government supported education, retraining, counselling, short term wage subsidies, unemployment benefits, pro-work tax policies and other measures targeting groups disadvantaged by new economy developments can assist in spreading the benefits of the new economy equitably throughout the population, increasing productivity and expanding the trained labour force available for new sectors.

Innovation and Knowledge Creation

Innovation is an important driver of economic growth and is the key to technological advances in ICT. A key component in innovation is R&D, a major driver of productivity growth. Although many smaller economies rely heavily on foreign ICT R&D, domestic R&D also can be important to increase knowledge and skills to build new businesses and to access and adapt foreign ICT knowledge. The major role of R&D in productivity growth suggests that in many economies unexploited potential may exist for improved growth performance through increased R&D spending (OECD, 2001a).

Effective Public Support of Innovation

Government has an important role in funding basic and high risk research in which the private sector may under-invest, due to the difficulty of individual firms capturing the benefits. This can be done through funding specific research, fostering international cooperation and research capacity building via 'centres of excellence' for specific fields. Governments should aim to provide funding to areas with high potential benefits with funding allocated competitively, on the basis of scientific excellence and intellectual merit (OECD, 2001a).

Apart from funding basic and high risk research, governments can encourage R&D and innovation in the private sector through grants, subsidies, loans and tax concessions (OECD, 2001a). However, government support of business R&D can be expensive and the costs must be compared to the potential benefits. Government support should be focussed where large benefits exist which cannot easily be captured by individual firms, but should not duplicate or crowd out private sources of innovation funding. A basic principle is that governments should only be involved where the spillovers are significant and the private sector would not undertake sufficient R&D on its own. Public-private partnerships can share costs and increase the leverage of government funding.

An essential complement to R&D is education and training in ICT and providing the population with high quality general education; this will ensure skilled employees are available for the ICT sector and other industries using ICT intensively.

Interaction between Innovation Players

Over the last decade, successful ICT economies, including the United States, Denmark and Finland fostered interaction between public research institutions and industry, creating strong links between science and industrial innovation. Policies assisting this interaction include strong patent protection for publicly funded research and regulations encouraging mobility of researchers between public research institutions and industry and within industry. Due to the huge costs of major innovations and lack of skilled staff, collaboration between industry players is increasing.

CONCLUSIONS

Throughout the 1990s and early 2000s, several developed economies including the United States and Australia have experienced an extended period of high economic growth in part due to productivity gains from rapidly adopting ICTs. A sound macroeconomic climate for investment, competitive and flexible markets and open, outward looking trade and investment policies also contributed significantly (Commonwealth Department of the Treasury, 2001). Australia, a major ICT user but small ICT producer, showed gains from ICTs do not accrue only to ICT producers; it is gaining measurably from the new economy and is well placed to achieve major further benefits.

Developed and developing East Asian economies also embraced the new economy in the 1990s. To obtain maximum output and productively growth benefits from the new technologies, regional governments increasingly recognise they must adopt appropriate public policies.

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ICT AND E-COMMERCE IN AUSTRALIA

KEY POINTS

- In 2000/01, Australia's information and communication technology, ICT, industry contributed A$31 billion, or 4.6 per cent, to gross domestic product. Telecommunication and computer services accounted for almost three quarters of this value added.
- Between 1995/96 and 2000/01, income from domestic computer and telecommunication services expanded strongly while income from ICT manufacturing was roughly constant. Production data suggests Australia's strengths lie mainly in the ICT services sector and some advanced ICT equipment manufacturing.
- Very small firms dominated Australia's ICT industry with most operating in computer services, particularly computer consultancies; ICT employment reflects this pattern. Due to the large number of small firms, increasing ICT exports will require a clear focus and strategy.
- Multinational corporations dominate Australia's ICT equipment and software sectors and do most of the exporting.
- Between June 1993 and June 2001, the number of firms in the ICT industry grew rapidly, with most growth occurring in the computer and telecommunication services segments; the number of ICT equipment manufacturing firms also increased, after experiencing a sharp decline in 1999.
- Australia's spending on ICT goods and services grew a strong 10 per cent per year over the second half of the 1990s to reach A$61.5 billion in 2000/01; growth was highest in the computer services and telecommunication services segments.
- In 2001, Australia had a trade deficit in ICT goods and services of A$10 billion; this has grown by 10 per cent per year since 1997. While Australia is a significant net importer of ICT goods, trade in ICT services is balanced, indicating greater competitiveness in this area. Advanced technology equipment and computer services represent promising export possibilities; trade in computer services has generated a surplus in each of the five years to 2001.
- The use of e-commerce is growing strongly; it should facilitate international trade for small and medium enterprises.

Australia's ICT and e-commerce industry's strengths lie in specialised manufacturing and services, generally areas requiring high value adding and specialised skills. The ICT equipment manufacturing sector has several competitive, world class players but is small compared to those of the United States, Japan, Finland and Ireland and some regional developing economies. Australia's ICT service sector is strong and growing well, reflecting Australia's early adoption of ICT technologies. The local ICT market is very competitive and open to international competition and exports of electronic products and ICT services are growing.

ICT SECTOR STRUCTURE AND CHARACTERISTICS

Australia's ICT industry accounts for a relatively small share of the Australian economy and consists mainly of ICT service sector firms, responding to the market created by a rapid growth in ICT expenditure since the early 1990s.[1]

Market Size and Description

In 2000/01, 73 per cent of total ICT spending went on telecommunication and computer services, which from 1995/96 to 2000/01 grew much faster than ICT equipment spending (Table 2.1).[2]

In 2000/01, Australia's ICT expenditure increased to over 9 per cent of gross domestic product, making it the fifth highest spender in the OECD and higher than the United States (Banks, 2001). Penetration of ICT is very high; for instance, from 1993 to 2001, the numbers of personal computers grew on average by almost 12 per cent per year; home personal computers grew the fastest, increasing on average by around 20 per cent per year (International Data Corporation, 2002).

1 Statistics cited are from Australian Bureau of Statistics surveys of the ICT industry; they cover the information technology and telecommunications industry which the Bureau defines as the services and technologies that enable information to be accessed, stored, processed, transformed, manipulated and disseminated, including the transmission or communication of voice and/or data over a variety of transmission media (Australian Bureau of Statistics, 2002). The Australian Bureau of Statistics released these surveys in September 2002, 2000 and 1997; previously collecting ICT industry statistics every three years, it now does biennial surveys.

2 Australia's ICT expenditure is calculated as total revenue from domestic production of ICT products and services plus the value of imports less the value of exports.

Table 2.1

ICT Services Market Growing Strongly

Australian ICT Expenditure, by Segment, Value and Growth, 1992/93 to 2000/01, A$ million and per cent

Market segment	1992/93	1995/96	1998/99	2000/01	Average annual growth 1995/96 to 2000/01
ICT Equipment	**6 807**	**11 166**	**12 134**	**15 575**	**6.9**
Computer hardware	*3 888*	*5 966*	*7 389*	*8 847*	*8.2*
Mainframe and mid range	-	np	392	661	29.9 [d]
Portable	-	np	504	954	37.6 [d]
Desktop	-	1 610	1 784	1 493	-1.5
Printers	-	410	368	396	-0.7
Input output devices	-	575	674	834	7.7
Consumables	-	126	108	125	-0.1
Other equipment [a]	-	3 246	3 560	4 384	6.2
Communication hardware	*2 919*	*3 244*	*3 859*	*5 353*	*10.5*
Telephone and telegraph	-	741	662	1 044	7.1
Mobile	-	783	987	1 884	19.2
Telecommunication and transceiving	-	1 215	1 789	2 154	12.1
Cables	-	506	420	272	-11.7
Other hardware (unspecified)	-	*np*	*886*	*1 141*	*13.5* [d]
Software	**765**	**1 148**	**1 104**	**1 129**	**-0.3**
Software and licensing	765	1 148	1 104	1 129	-0.3
Computer services	**4 061**	**7 674**	**10 588**	**14 528**	**13.6**
Customised software services	-	2 310	2 835	3 489	8.6
Software maintenance	-	677	956	1 566	18.3
Hardware and other computer consultancy	-	1 322	1 526	2 233	11.1
Hardware installation and maintenance [b]		1 467	402	919	-8.9
Other computer services [b]	-	1 899	4 919	3 961	15.8
Unspecified services	-	na	253	2 361	205.5 [d]
Communication services	**12 564**	**17 937**	**25 403**	**30 279**	**11.0**
Telecommunication services [c]	12 564	17 937	25 403	30 279	11.0
TOTAL	24 197	37 925	49 229	61 511	10.2

Notes: a Includes some communication hardware.

b Due to ABS changes to categories in 2000/01, some data have been aggregated, with the aim of maintaining reasonable comparability. Hardware installation and maintenance has been added to hardware maintenance; other computer services, information storage and retrieval, data processing and provision of whole IT&T business functions have been aggregated into 'Other computer services.'

c Exports and imports of telecommunications services include postal services data as telecommunications services data are not separately available. Exports and imports are not available for individual items within 'Computer services,' hence have been included under 'Other computer services.'

d Denotes annual average growth between 1998/99 and 2000/01.

Source: Australian Bureau of Statistics, 2002a, 2000 and 1997.

Australia's ICT Investment

As ICT equipment prices fell and their operating capacity improved, the volume of ICT investment grew rapidly after the mid 1980s (Table 2.2).

Table 2.2

ICT Investment Share Growing Strongly

Australia's Investment in ICT, 1986-2000, Average Annual Growth, Per cent

	1986-1990	1990-1995	1995-2000
Volume			
All capital	4.8	2.0	6.3
Computer hardware	45.5	33.2	33.5
Computer software	35.6	20.3	23.4
Prices			
All capital	6.3	1.2	0.1
Computer hardware	-13.4	-10.3	-20.6
Computer software	-5.6	-5.7	-5.7

Source: International Monetary Fund, 2001.

By 2000, investment in ICT hardware and software was more than 20 per cent of total non-building investment, up from under 10 per cent in the late 1980s (International Monetary Fund, 2001). Sectors like finance and insurance, construction, wholesale and retail trade and cultural and recreational services are the most intensive ICT hardware and services users (International Monetary Fund, 2001). (See Chapter 1 – *New Economy Benefits* for discussion of the relationships between this investment and these sectors' productivity.)

ICT Goods and Services Production

In 2000/01, ICT industry value added totalled almost A$31 billion or 4.6 per cent of GDP which is higher than the contribution of agriculture, forestry and fishing combined.[3] Telecommunication services produced half this total (Figure 2.1). Computer consultancy services generate 91 per cent of computer services value added while manufacturing, telecommunication, broadcasting and transceiving equipment account for over a third of ICT manufacturing value added.[4] Australia's ICT manufacturing's share of GDP is the lowest of any OECD country for which data is available (Organisation for Economic Co-operation and Development, OECD, 2000).

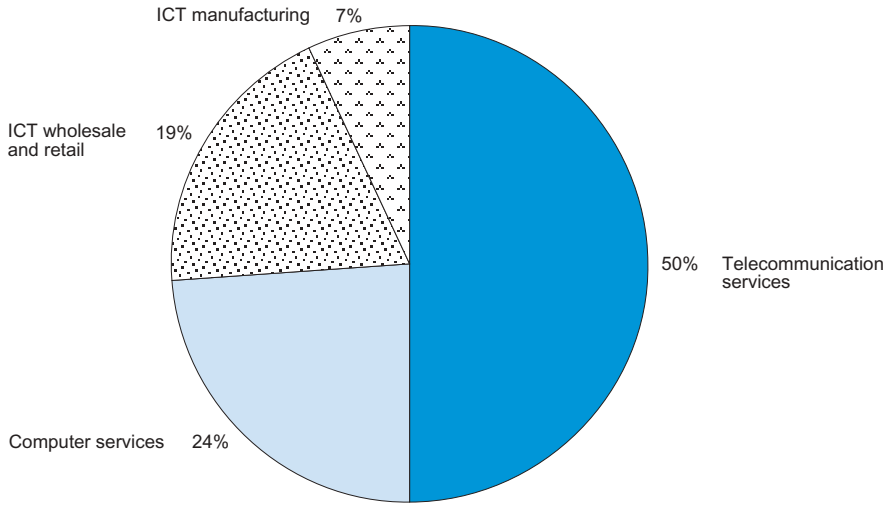
[3] Industry value added is a measure of gross product at basic prices and is defined as the sales of goods and services plus the change in stocks less purchases of inputs and other selected expenses, excluding wages and salaries, capital costs, indirect taxes such as payroll tax, fringe benefits tax, land tax and land rates (Australian Bureau of Statistics, 2002a). Data on ICT industry value added are not available for earlier years. All industry value added excludes agriculture, forestry and fishing. The OECD average for ICT's share of industry value added is 7.4 per cent (Department of Communications, Information Technology and the Arts, 2002).

[4] Electronic equipment represented a further 25 per cent and computers and other business machines 22 per cent of manufacturing value added.

Figure 2.1

Services Dominate Australia's ICT Value Added

Sectoral Contribution of ICT Industry Value Added, 2000/01, A$ billion and per cent



Source: Australian Bureau of Statistics, 2002a.

The ICT sector's income is growing strongly, expanding by around 10 per cent per year between 1995/96 and 2000/01 to reach A$50.2 billion.[5] Income from ICT services production expanded a rapid 12 per cent per year over the period, increasing from around 82 to 89 per cent of total income from domestic ICT production (Figure 2.2). After slumping in 1998/99, income from ICT equipment production grew by over 14 per cent per year in the next two years but, by 2000/01, only had returned to 1995/96 levels.[6]

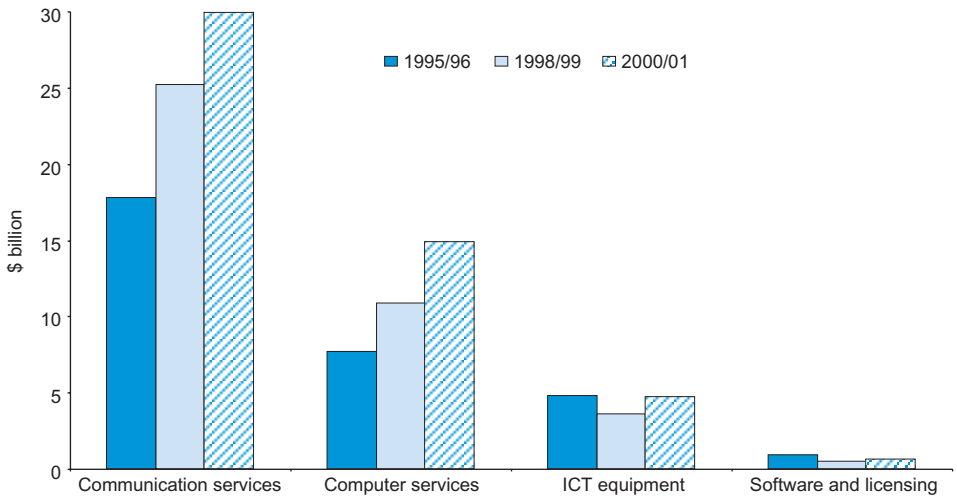
5 Income from domestic production includes total domestic income derived from sale of computer and communication hardware manufactured in Australia, packaged software developed in Australia and provision of computer and communication services (Australian Bureau of Statistics, 2002a).

6 ICT manufacturing income remained reasonably constant largely due to the global industry downturn and global ICT production increasingly moving to East Asia to take advantage of lower labour costs. Hence, between 1995/96 and 2000/01, ICT manufacturing industries' income from domestic production fell slightly from A$4.8 billion to A$4.7 billion.

Figure 2.2

Services Also Dominate ICT Revenue

Income from Domestic Production of ICT Goods and Services, 1995/96 to 2000/01, A$ billion



Source: Australian Bureau of Statistics, 2002 and 2000.

Business Structure

While most ICT sector businesses are small computer consultancy firms, communications firms and equipment producers are mainly multinational corporations. More than 400 international ICT companies have established regional headquarters or operation centres in Australia, including IBM, NEC, Ericsson, Fujitsu, Motorola and Canon, investing almost A$7 billion (Department of Foreign Affairs and Trade, 2002d).

Number of ICT Businesses

The number of ICT firms is growing strongly, reaching 24 739 in 2000/01, an increase of over 150 per cent from 1995/96. Over 91 per cent of these firms were ICT specialists.[7] By June 2001, around 82 per cent of ICT specialist businesses were in the computer services industries, with 95 per cent of these being computer consultancy businesses.

[7] ICT specialist businesses derive over 50 per cent of their income from ICT activities (Australian Bureau of Statistics, 2002a). The number of ICT specialist businesses in the communication services industries grew particularly rapidly, from 189 in 1992-93 to 814 in 2000-01, or 20 per cent per year.

Businesses contracting out or outsourcing non-core activities are contributing to this growth. Telecommunications deregulation and the rapid growth of the Internet drove increases in communication services businesses (Table 2.3). In contrast, the number of equipment manufacturing and wholesale firms grew only slowly.

Table 2.3

ICT Services Businesses Growing Strongly, Manufacturing Businesses Pick Up

Number of Specialist ICT Businesses, Share of Total and Average Annual Growth, June 1993 to June 2001, Number and per cent

Segment	June 1993	June 1996	June 1999	June 2001	Share June 2001 (per cent)	Average annual growth (per cent)
Equipment manufacturing	**248**	**473**	**304**	**497**	**2.2**	**9.1**
Computer and business	120	237	156	282	1.3	11.3
Telecommunications and broadcast	69	134	121	188	0.8	13.3
Electronic equipment	31	57	-	-	-	-
Cable and wire	28	46	27	28	0.1	0.0
Equipment wholesale	**1 882**	**2 979**	**2 100**	**2 803**	**12.5**	**5.1**
Computer	1 488	2 326	1 545	2 320	10.3	5.7
Business machine and equipment	394	653	555	483	2.1	2.6
Computer services	**4 886**	**9 673**	**14 716**	**18 361**	81.7	**18.0**
Data processing	262	387	244	485	2.2	8.0
Data storage and retrieval	67	31	102	33	0.1	-8.5
Computer maintenance	242	418	335	457	2.0	8.3
Computer consultancy	4 315	8 837	14 036	17 386	77.4	19.0
Communication services	**189**	**410**	**868**	**814**	**3.6**	**20.0**
Telecommunication services	189	410	868	814	3.6	20.0
TOTAL	**7 243**	**13 535**	**17 988**	**22 475**		**15.2**

Source: Australian Bureau of Statistics, 2002a, 2000 and 1997.

New South Wales and Victoria undertake the great bulk of Australia's ICT production. In June 2001, 44 per cent of all ICT specialist businesses were located in New South Wales, providing 42 per cent of ICT employment and 44 per cent of wages and salaries; Victoria had 32 per cent of ICT specialist businesses and 31 per cent of employment (Australian Bureau of Statistics, 2002a).

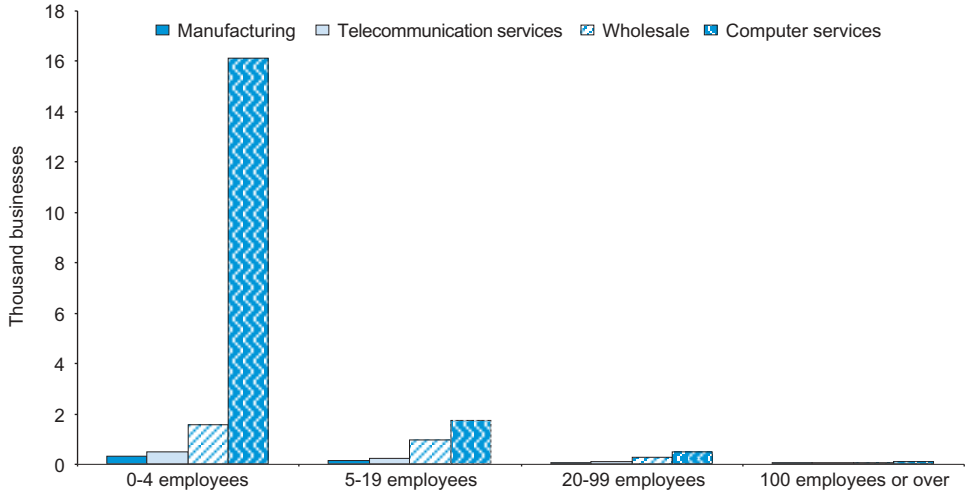
Business Size

Little consolidation is occurring in Australia's ICT sector. In June 2001, over 95 per cent of all specialist ICT businesses employed less than 20 people, 83 per cent of which were computer services firms, and less than 1 per cent of all businesses in the industry employed 100 or more people (Figure 2.3). Between 1996 and 2001, the share of small firms increased and the share of medium and large firms fell slightly.

Figure 2.3

Small Firms Dominate ICT Specialist Businesses

Size of ICT Specialist Businesses by Employment, June 2001, Number of Businesses, Thousand



Source: Australian Bureau of Statistics, 2002a.

Given small firms' dominance, particularly in computer services, increasing ICT exports will require a clear industry and government focus and strategies. Smaller ICT businesses may find accessing overseas markets more feasible by linking together or forming partnerships with other small firms or with larger firms, including multinationals, which already have a presence in overseas markets.

A large number of ICT multinationals have operations in Australia, many as Asia Pacific headquarters and several undertake research and development, including Lucent and Nortel.

Innovation

Innovation is a major driver of ICT industry productivity growth and research and development, R&D, expenditure is one measure of innovation effort.[8] Australia's ICT R&D expenditure grew a strong 13 per cent per year on average over the last half of the 1990s to reach A$2.4 billion in 2001; this represents 24 per cent of total R&D.[9] Business ICT R&D accounts for 83 per cent of total ICT R&D expenditure and rose by almost 14 per cent per year (Department of Communications, Information Technology and the Arts, 2002).[10] Australian ICT R&D is focussed on several core research disciplines, suggesting Australia is building competitive advantage in these areas.[11] Computer software and communications technologies received 64 per cent of business ICT R&D, or A$1.2 billion. Small and medium enterprises concentrated on computer software and information systems.

Many foreign ICT companies see Australia as a good place for R&D due to the availability of high quality, relatively low cost skilled computer and IT graduates. However, multinational corporations account for around 70 per cent of Australia's total business ICT R&D expenditure, they perform much less R&D in Australia relative to their output than their world average, contributing to Australia's low ICT business expenditure on R&D of 0.72 per cent of GDP in 2000/01.[12]

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8 The ICT industry is more likely to undertake R&D than other industries; the share of ICT R&D to GDP often is five times higher than the overall ratio of R&D to GDP (OECD, 2000). On average, Australian firms spend around 5 per cent of value added on R&D, significantly under the OECD average of 10 per cent. World ICT R&D is concentrated in the United States, with 52 per cent of total R&D, and in Japan.

9 The amount of ICT R&D varies from that cited in the Australian Bureau of Statistics publication; the Department of Communications, Information Technology and the Arts received further data to clarify re-classification of ICT science and technologies in the 2000/01 data between ICT sciences and general technologies and to include some engineering disciplines that have a very large ICT component.

10 Government paid for 10 per cent of R&D expenditure and higher education for 7 per cent. Only the 1995/96 ABS survey of the information technology industries included details of ICT R&D activities. In that year, ICT specialist businesses spent A$782 million on R&D; 36 per cent by the computer services segment, 25 per cent by wholesale trade, 22 per cent by manufacturing and 17 per cent by communications services. Over 52 per cent of total R&D expenditure by ICT specialist businesses was in ICT goods and services and 43 per cent was spent on software R&D (Australian Bureau of Statistics, 1997).

11 These core research disciplines are information systems, artificial intelligence and signal and image processing, computer software, computation theory and mathematics, data format, other information computing and communications, computer hardware and communications technologies. In addition to the core fields of research, related fields are important for supporting innovation in ICT and the application of ICT across the economy; these include manufacturing (manufacturing engineering, robotics and mechatronics, flexible manufacturing systems, CAD/CAM Systems and control engineering), electrical (electrical and electronic engineering, integrated circuits, other electronic engineering, spatial information systems and engineering/technology instrumentation) and materials (material engineering, composites and polymers). Business R&D expenditure is not available for these related fields.

12 This compares to 2.35 per cent for Finland, 2.08 per cent for the United States and 1.10 per cent for Canada.

PHOTONICS PUTTING LIGHT ON R&D

Photonics is an example of a successful area of Australian ICT R&D generating innovative ICT products, including for export. After 25 years of investment in R&D on photonics based technologies, Australia has built internationally recognised research skills in this technology; a solid intellectual property base and strong linkages with multinational corporations provide access to overseas markets and new R&D centres.

Photonics involves the control, manipulation, transfer and storage of energy and information using photons, or the fundamental particles of light. Light's waveform and its ability to be transmitted at a range of frequencies provides the means of carrying multiple packages of information simultaneously. Photons can carry more information much faster than electrons and information can be transmitted across a huge bandwidth of wavelength frequencies simultaneously; this is dense wavelength division multiplexing. Photonics underpins the communications revolution with a myriad of applications in areas such as broadband telecommunications, high performance computing, industrial measurement and control, remote sensing and surveillance and medical imaging, diagnosis and surgery.

Australia has well developed resources in the photonics sector providing specialised photonics technologies and components and supplying advanced value added photonics products and systems for the ICT market. In 2000/01, the sector generated revenue of around A$164 million; 29 per cent of surveyed businesses reported more than half their income came from exports with 21 per cent reporting more than 90 per cent of income came from exports. Opportunities are expected to expand as the Internet becomes more popular and demand for broadband applications grows. Market trends suggest applications in trunk networks, metropolitan area networks and fibre to the curb networks; also, capacity upgrades could result in growth of high speed optical interconnects. Local and remote sensing, measurement and spectral analysis applications also could become important. Second generation photonics technologies being developed in Australia and overseas should produce a range of new product and systems opportunities for Australian industry. Developing second generation photonics capabilities requires R&D and commercialisation of successful R&D.

The Australian Photonics Cooperative Research Centre, established in 1992, is a collaborative joint venture between universities, government and industry. It undertakes R&D, education and training and commercial activities to underpin Australia's photonics industry growth. Research and education groups are located in Sydney, Canberra, Melbourne and Adelaide. Over 100 full time equivalent researchers are developing new technologies to release the latent capacity of optical fibre networks. The research program progresses from basic research to commercially driven applied research and product development. Research is supported by state of the art test beds and facilities. The Centre has been successful in transferring research outcomes to industry and has established 10 start up companies.

Sources: Invest Australia and Australian Photonics Forum, 2002 and Department of Industry, Tourism and Resources, 2002.

HUMAN RESOURCES IN ICT AND E-COMMERCE

While the ICT sector is still a relatively small employer, from the mid 1990s, ICT sector employment rose twice as rapidly as overall employment in Australia.

Employment

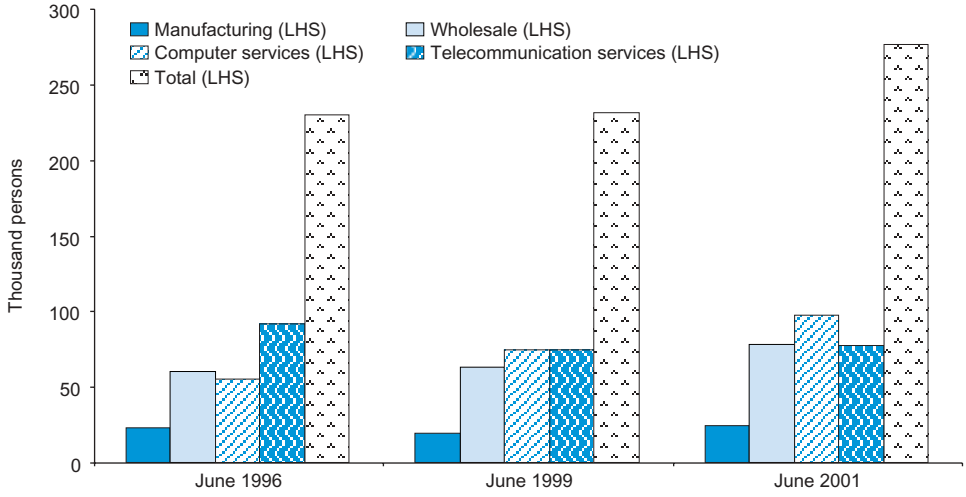
Between June 1996 and June 2001, total ICT sector employment increased by almost 4 per cent per year, from around 230 000 to 277 000, double the rate of overall employment growth (Figure 2.4).[13] Hence, the ICT industries' share of total employment rose from 2.7 to 3 per cent and increased ICT employment accounted for 6 per cent of total employment growth.

Employment fluctuates within the ICT industry. Between June 1996 and June 2001, computer services' employment increased strongly, by 12 per cent per year. However, while growing strongly in the early part of the 1990s due to deregulation and rebounding by almost 2 per cent per year in the 2 years to June 2001, telecommunication services' employment fell by over 3 per cent per year between June 1996 and 2001. Over the same period, ICT equipment manufacturing employment grew only 1 per cent per year, but this was still slightly stronger than total manufacturing employment growth of 0.2 per cent per year.

Figure 2.4

ICT Services Jobs Rising

ICT Industry Employment, June 1996 to June 2001, Thousand persons and per cent



Source: Australian Bureau of Statistics, 2002a, 2000 and 1997.

[13] In 2001/02, ICT employment across all sectors of the economy totalled about 340 000 people (Department of Communications, Information Technology and the Arts, 2002).

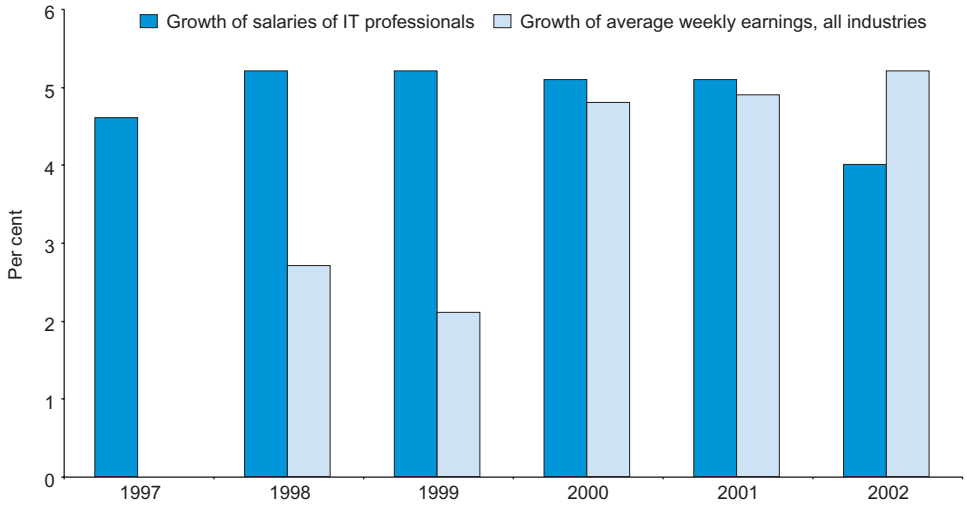
Wages and Salaries

For all years since 1997, except 2002, average salaries of ICT professionals grew considerably faster than average weekly earnings; the recent slowdown in growth reflects the cyclical slowdown in the industry (Figure 2.5). In 2002, pressure exists for further slowing in wages and salaries growth in some segments as a result of the downturn in the ICT sector.

Figure 2.5

ICT Professionals' Salaries Growing Faster

Growth of ICT Professionals' Salaries and Average Weekly Earnings, 1997-2002, Per cent



Source: Department of Communications, Information Technology and the Arts calculations from Association of Professional Engineers, Scientists and Managers, Australia, and Australian Bureau of Statistics data.

At A$56 737 per year in 2000/01, average wages and salaries in the ICT industry are considerably higher than average weekly adult earnings of around A$45 000.

ICT Skills

Most ICT workers are skilled and the share of highly skilled workers has increased; in 2000/01, 99 per cent were skilled, with over 60 per cent of these being highly skilled, up from 50 per cent in 1996/97. This trend reflects growth in ICT occupations requiring higher skills; between 1996/97 and 2000/01, the fastest growing ICT occupations were information technology managers and computing professionals.[14]

[14] ICT occupations are information technology managers, electrical and electronics engineers, engineering technologists, computing professionals, electrical engineering associate professionals, electronic engineering associate professionals, computing support technicians, electronic instrument tradespersons, electronic and office equipment tradespersons, communications tradespersons, technical sales representatives and electrical and telecommunications trades assistants.

To meet the industry's demand for professionals, large numbers of students are undertaking ICT related courses. In 2001, 87 259 students were enrolled in ICT courses; of these, 40 per cent were studying electrical engineering and related technologies and the remainder information technology. In 2001, the Government announced the allocation of 2 000 new places each year in mathematics, science and information technology from 2002 (Kemp, 2001).[15] The Commonwealth Government further aims to enhance skills, along with state and territory programs in this area, through the IT Skills Hub, an initiative bringing together large and small ICT businesses with education and training providers to ensure current and future employees in the sector are offered the most up to date and industry relevant training (www.noie.gov.au accessed 12 September 2002).

The Government reacted to the current softening market for ICT professionals by reducing the number of ICT specialisations listed on the Migration Occupations in Demand List.[16] The Government also suspended ICT visa priority processing for ICT workers and increased the number of points required to meet the migration passmark; this should slow the entry of ICT qualified migrants and ease current pressures in the ICT labour market (Ruddock, 2002).

AUSTRALIA'S E-COMMERCE SECTOR

Reflecting Australia's rapid ICT adoption and well developed ICT services sector, e-commerce is growing rapidly from a low base. Australia ranks highly against other developed economies on most indicators of Internet access and cost, key indicators of economies' e-commerce potential (Table 2.4).

Table 2.4

Australia Ranks Well in E-Commerce Readiness

Indicators of ICT Diffusion, Selected Developed Economies, 2001

Economy	Personal computers (per 100 inhabitants)	Internet hosts (per 10 000 inhabitants)	Internet users (per 10 000 inhabitants)	Internet cost (OECD = 100)
Australia	51.7	1 183.4	3 723.1	73.3
United States	62.3	3 714.0	4 995.1	77.1
Japan	34.9	559.0	4 547.1	81.8
Finland	42.4	1 707.3	4 302.8	61.3
Canada	39.0	931.9	4 352.7	83.6

Source: International Telecommunication Union, 2002, Australian Bureau of Statistics, 2002d, International Monetary Fund, 2001.

15 This is part of the Government's innovation action plan, Backing Australia's Ability. The Government committed A$151 million over five years to provide 2 000 additional higher education places for Australian universities each year, equating to 21 000 new full time equivalent undergraduate university places over the five years, in the fields of ICT, mathematics and science.

16 Over the last two years, Australia experienced a 70 per cent fall in reported areas of ICT skills shortages, with officially reported shortages only in Progress, Java (security and e-commerce), PeopleSoft, Siebel and Certification for Information System Security Professional classifications. In spite of the downturn in new vacancies, ICT employment grew by 16 per cent for computing professionals and IT managers between August 2000 and August 2002 (National Office of the Information Economy, personal communication).

Between December 2000 and mid 2002, Australian businesses almost doubled their on line revenues to A$43 billion, up from A$28 billion; on line income appears to be growing at an annualised rate of around 33 per cent, faster than businesses expected (Cisco Systems, 2002). Starting from a low base in 1999, Internet e-commerce sales per capita increased 585 per cent to US$8.6 billion by 2001, while the number of Internet buyers almost doubled to reach 2.7 million (International Data Corporation, 2002). Over 70 per cent of Internet e-commerce is business to business, B2B, which grew by 522 per cent over this period. However, business to consumer, B2C, e-commerce also grew strongly from a small base, increasing 878 per cent since 1999 (International Data Corporation, 2002).

Australian business still has some way to go in engaging electronically. While around 95 per cent of Australian businesses have Internet access and 72 per cent have a website, only 21 per cent allow customers and suppliers to place secure orders and make e-payments, 17 per cent provide account information and order status and 11 per cent provide electronic bill payment (Cisco Systems, 2002). The communications industry earns the largest percentage of revenues on line, around 19 per cent, followed by property and business services and tourism (Cisco Systems, 2002).

Due to industry consolidation, the number of Internet service providers has fallen over the last two years. By March 2002, Internet service provider numbers had fallen to 571, from 718 in September 2000 (Australian Bureau of Statistics, 2002d). Over the same period, the number of subscribers increased to 4.2 million from 3.8 million.

Australia lags several other developed economies in the take up of broadband, which provides faster Internet connections and in the introduction of third generation, 3G, wireless networks, which can provide always on real time mobile connection to the Internet. However, new services include a 3G service, through m.Net, launched in early 2002, and Telstra and Vodafone general packet radio service networks; Hutchison Telecoms currently is building a 3G network.[17]

Commonwealth, State and Territory Governments are in the process of creating an environment where electronic commerce is supported by near identical legislation Australia wide. The Commonwealth *Electronic Transactions Act 1999* creates a non-intrusive regulatory regime for using electronic communications in transactions.[18] The Act facilitates electronic commerce development by removing existing legal impediments to electronic communications and is technology neutral, meaning it does not specify what types of technology are required for a transaction to be recognised legally.[19] The basic principle is a transaction is not invalid if it takes place by means of an electronic communication.[20]

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17 General packet radio service, GPRS, is one of the competing technologies for 3G wireless networks. It is a packet based wireless communication service that provides data rates from 56 up to 114 Kbps and continuous connection to the Internet for mobile phone and computer users. Third generation wireless, 3G, is a wireless standard that allows users to access the Internet, speed up Internet access and download video and audio clips.

18 The Act is based on the United Nations Commission on International Trade Law's Model Law on Electronic Commerce.

19 For example, the Act does not expressly mention digital signatures, hence, until a court decides otherwise, 'signature' for the purposes of the Act, would include digital signatures (National Office of the Information Economy, 2000d).

20 The Act states that, subject to satisfying certain minimum criteria, to satisfy a requirement or permission under Commonwealth law for a person to provide information in writing, sign a document, produce a document or retain information, this requirement can be satisfied by an electronic communication. It also establishes rules to apply in the absence of any contrary agreement, to determine the time and place of dispatch and receipt of electronic communications and the attribution of electronic communications.

GATEKEEPER – PUBLIC KEY INFRASTRUCTURE

As a key on line user, the Commonwealth Government recognises it has an important role to play in developing and supporting e-commerce infrastructure. To promote confidence in the on line economy and trust between on line transactors, the Government's Gatekeeper strategy aims to encourage development of a national public key technology framework for authenticating electronic on line service users. Through the accreditation of organisations for the issue and management of digital certificates, Gatekeeper helps government agencies ensure integrity, security and authenticity when transmitting information and transacting business.

The Australian Business Number Digital Signature Certificate, ABN-DSC, is a digital certificate linked to an entity's ABN, for use in business to business, B2B, and business to government, B2G, transactions. It aims to facilitate on line service delivery, foster the use of digital certificates and hence encourage e-commerce among Australian businesses. It will be the primary certificate to deal on line with Commonwealth agencies; state and territory governments also have indicated that they will use ABN-DSCs where appropriate.

The ABN-DSC will help reduce the 'red tape' for businesses dealing with government. A certificate issued for use with one Commonwealth agency can be used with other government agencies, reducing the need to maintain multiple digital certificates to communicate with government. The Government has accredited Gatekeeper providers to issue ABN-DSCs.

To enhance the Australian business community's take up of ABN-DSCs, the Commonwealth agreed to regard digital certificates that Australia's four major banks issue under joint Project Angus as ABN-DSCs, so long as they conform to ABN-DSC specifications.[21] Recognising Angus digital certificates is consistent with National Office of the Information Economy cross-recognition policy which was developed to facilitate public key infrastructure interoperability both domestically and internationally. The NOIE paper was developed from the APEC paper *Achieving Interoperability in PKI*.

Sources: National Office of the Information Economy, 2000a, 2000b and 2000c.

E-commerce already is achieving many benefits for Australian firms. Business use of the Internet has generated cost savings, estimated to be 2 per cent of total costs, and three times the revenue per employee (Cisco Systems, 2002). Case studies of small business e-commerce ventures show they expand existing customer bases locally and internationally, source more competitive suppliers and gain more direct access to customers. E-commerce is an increasingly important means of conducting trade and creating export opportunities, enabling exporters, particularly small and medium enterprises to lower costs and expand markets (Department of Foreign Affairs and Trade, 2002c). For this reason, the Government's strategy of 'doubling the number of exporters by 2006' aims to encourage firms to make greater use of the Internet and e-commerce.

[21] The Project Angus working group currently involves the Australia and New Zealand Banking Group, Commonwealth Bank of Australia, National Australia Bank and Westpac Banking Corporation. The group is part of the Identrus Trust hierarchy; membership to the Project Angus working group is open to any Australian financial institution meeting Identrus requirements.

VENTURE CAPITAL AND THE ICT AND E-COMMERCE INDUSTRY

An efficient venture capital and mezzanine financing market is essential for ICT industry competitiveness and growth; the ICT and e-commerce revolution has driven growth of Australia's venture capital industry (Priestley, 2002). By June 2001, venture capital investors had committed A$5.7 billion, up by 14 per cent on June 2000, of which 29 per cent went to information technology, media, electronics and communications activities (Australian Bureau of Statistics, 2002e).[22]

Despite recent growth in the venture capital industry, Australia's venture capital market is not large by international standards and small ICT start ups report difficulty sourcing finance. To overcome this, the Commonwealth Government provides funding to assist with commercialising new ideas and accessing equity markets (Appendix Table A2.9). In several states, organisations, some partly funded under Commonwealth programs, assist with ICT industry funding and management advice.

TRADE IN ICT GOODS AND SERVICES

Although Australia is a significant net ICT equipment importer, it has strengths in exporting some specialised equipment, software and ICT services. High technology industries are expected to have strong export growth opportunities.

In the last decade, as the price of imported ICT equipment fell sharply, Australia reaped considerable terms of trade benefits from its ICT trade.[23] While ICT goods and services exports grew by an average 6.4 per cent per year, imports grew more rapidly by 8.5 per cent. Despite the massive quality improvements in ICT hardware and software, with many economies investing in ICT goods production and a very competitive global market, prices fell significantly; between 1995 and 2001, falling ICT prices improved Australia's terms of trade by an average of 0.75 per cent per year (Commonwealth Department of the Treasury, 2002).

ICT Goods Export Strengths

ICT goods are an increasingly important share of Australian exports and imports. In 2001, ICT goods were almost 7 per cent of total merchandise trade; just under 3 per cent of exports and over 10 per cent of imports compared to 2 per cent and 6 per cent respectively in 1991. Despite being a net importer of ICT goods, Australia has recorded strong export growth in several ICT sectors (Figure 2.6). Between 1991 and 2001, gross ICT goods exports grew from A$1.1 to A$3.5 billion, or by an average annual rate of 12 per cent, while Australian produced ICT goods exports grew at 10 per cent per year to reach

22 Of the total funds committed, resident funds and domestic corporations committed A$5.1 billion with superannuation funds providing 47 per cent of all residents' commitments; A$3.7 billion of committed funds have been drawn down. Foreign investors in Australian IT start ups include ABN Amro, Advent International, Citicorp Equity Capital, Deutsche Bank, GE Equity, Intel Capital, JP Morgan, Rothschild, Tallwood Venture Capital, Telecom Venture Group, Temasek Holdings and UBS Capital (Department of Foreign Affairs and Trade, 2002d).

23 The terms of trade is the ratio of the index of export prices to the index of import prices and measures the amount of imports a dollar of export earnings can purchase.

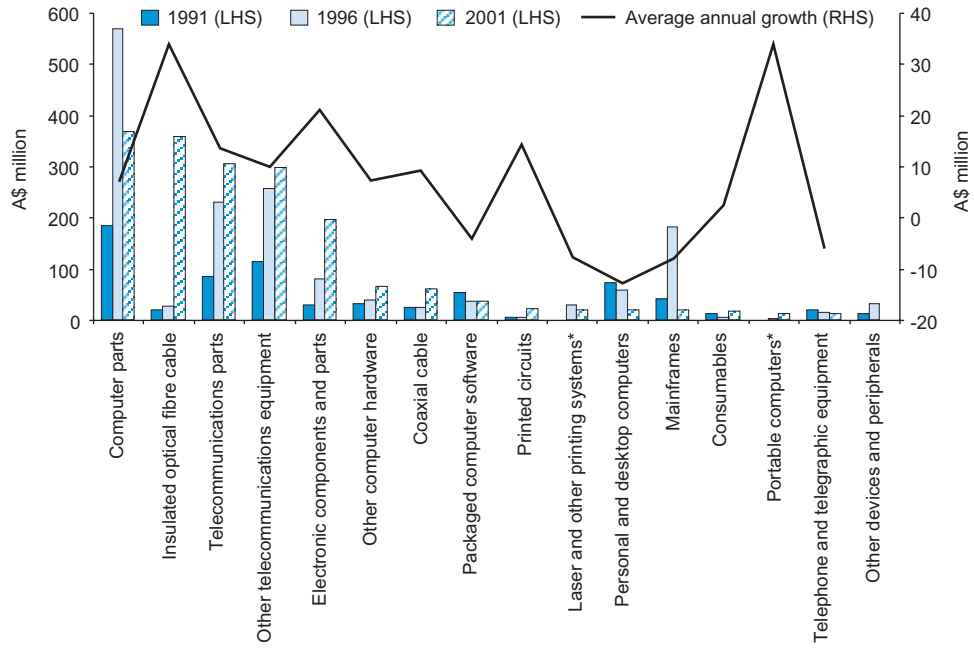
A$1.8 billion. Overall merchandise exports grew less than 9 per cent per year. Top Australian produced ICT goods exports include computer parts, insulated optical fibre cable and telecommunications equipment; exports with highest growth were insulated optical fibre cable, portable computers and electronic components and parts (Figure 2.6).[24]

In 2001, around 48 per cent of ICT goods exports were re-exports, goods imported into Australia and then re-exported without significant value adding.[25] Anecdotal evidence suggests this reflects Australia's growing role as a warehousing and distribution point for telecommunication and computer parts destined for manufacturing production in the region and as an ICT service and support provider in the South Pacific (Department of Foreign Affairs and Trade, 2002b).[26]

Figure 2.6

Some Australian Produced ICT Exports Grow Strongly

Australian Produced ICT Goods Exports, Total and Average Annual Growth, A$ million and per cent



Note: Australian produced exports are gross exports minus re-exports for each item.

Source: Department of Foreign Affairs and Trade, 2002a.

24 Future exports of cable could be impacted negatively by recent shutdowns of manufacturing facilities; for example Alcatel announced its Port Botany undersea cable production site would move to standby mode by mid 2002.

25 In 2001, almost 60 per cent of all ICT goods re-exported were telecommunication and computer parts.

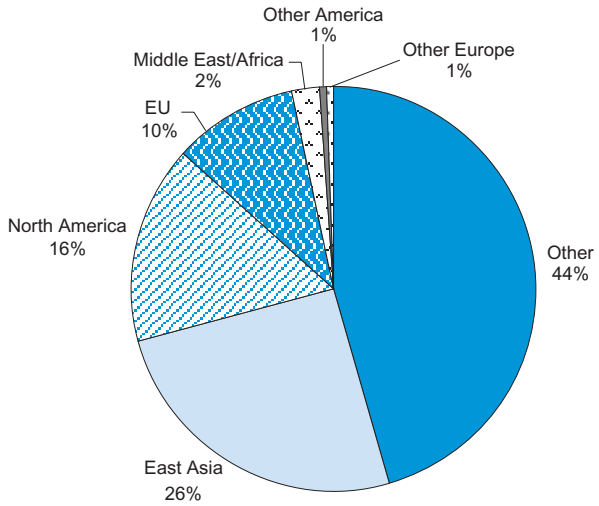
26 Also, it is likely that ICT goods repaired or configured in Australia and some sent overseas for repair or replacement are misclassified as re-exports. Re-exports are highest to New Zealand and the United States, totalling A$410.6 million and A$314.5 million, respectively, and mainly consist of computer parts.

Australia's ICT goods export destinations are very diverse; only 26 per cent of Australia's ICT exports go to East Asia compared to nearly 60 per cent of overall merchandise trade (Figure 2.7).[27]

Figure 2.7

ICT Goods' Export Markets More Diversified than General Trade

ICT Goods Export Destinations, 1999/2000



Note: Excludes royalties on computer software.

Source: Department of Foreign Affairs and Trade, 2002a.

ICT Services Trade

Exports of ICT services closely match ICT services imports, indicating greater Australian competitiveness in this area and promising future export possibilities. In 2001, Australia exported ICT services worth A$2.2 billion (Figure 2.8). However, between 1997 and 2001, ICT service exports grew more slowly than ICT goods exports, at about 6.5 per cent per year.

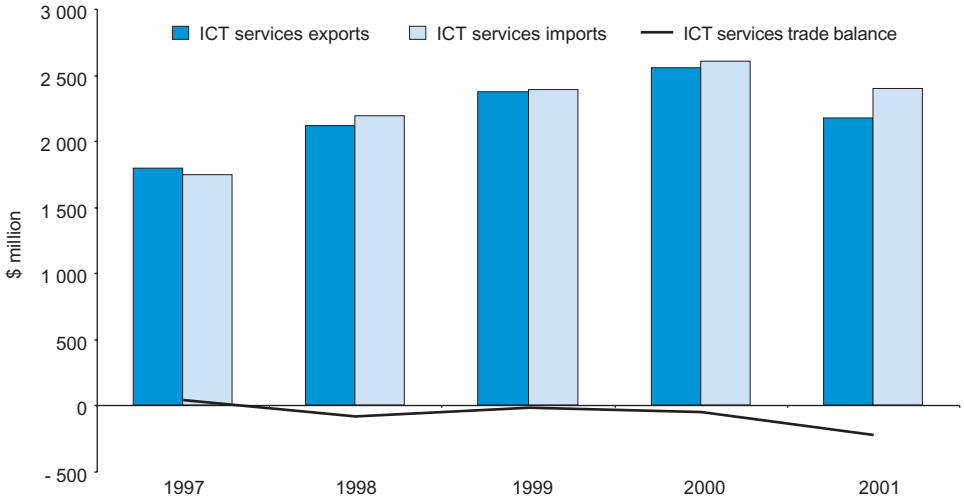
Australia's fastest growing ICT service exports are computer services, with growth of 30 per cent per year over the decade to reach A$842 million in 2001 (Figure 2.9). Trade in computer services generated a surplus in each of the five years to 2001. Royalties and licence fees on computer software fell in line with declines in software exports.

27 In 2000/01, the main ICT export destination countries were New Zealand (A$460.7 million), United States (A$355.6 million), Singapore (A$154.0 million), Hong Kong (A$138.9 million) and Japan (A$93.0 million). Significant overall exports also go to International Waters (A$458.1 million) and unclassified to country (A$144.1 million).

Figure 2.8

Australia's ICT Services Trade Growing Steadily

ICT Services Exports, Imports and Trade Balance, 1997-2001, A$ million

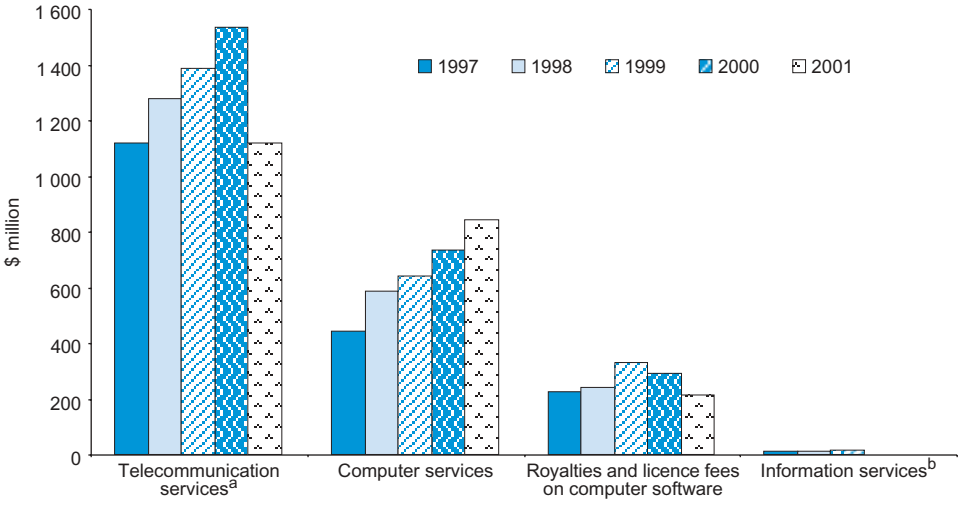


Source: Department of Foreign Affairs and Trade, 2002a.

Figure 2.9

Computer Services Grow Strongly

ICT Services Exports by Major Component, 1997-2001, A$ million



Notes: a Includes postal services, which are not separately published by the ABS.

b Statistics are not published for information services exports for 2000 and 2001.

Source: DFAT STARS Database and ABS Cat. No. 8153.0.

GOVERNMENT ICT AND E-COMMERCE INITIATIVES

Australia's federal and state governments play an active role in promoting the ICT industry and developing e-commerce. Over recent years, the Federal Government commissioned several major reports on the ICT industry and how to promote it, including the Goldsworthy Report and Mortimer Report in 1997. Most recently, *Backing Australia's Ability*, launched on 29 January 2001, provides A$2.9 billion over 5 years to support innovation, including in the ICT industry. A recent major initiative is the Centre of Excellence which will focus on R&D and commercialisation of new technologies (Alston and Nelson, 2002).

These initiatives add to many other ICT support programs the Government announced in recent years (Appendix Table A2.1). These range from support for R&D, to assistance with commercialisation and improving ICT skills. All state and territory governments also provide assistance to ICT firms to innovate and export.[28] A wide range of programs aim to help the industry develop and enhance skills in particular areas. For example, the A$50 million National Communications Fund assisting the rollout of infrastructure and applications to enable high speed telecommunications networks to deliver education and health services in regional Australia should increase Australia's skills in telemedicine and on line education.[29] The Federal and state governments also have a range of initiatives to enhance schooling in science, mathematics and technology, to enhance ICT teaching and promote ICT partnerships between schools, universities and industry. The Federal Government undertakes IT research through the Commonwealth Scientific and Industrial Research Organisation and the Defence Science and Technology Organisation and provides funding for computing research in areas such as biotechnology, molecular chemistry and environmental science. The Government also is working with industry on several projects to assist large-scale deployment of e-business solutions, especially among small and medium sized end user enterprises. These projects are focused on interoperability, which for end user enterprises is about transferring mission critical information, such as those associated with invoice and purchase cycles, across multiple information technology systems.[30] The projects include piloting an ebXML registry, developing a specification for a low cost B2B integration toolkit for the small business community, establishing a best practice e-catalogue management methodology for suppliers, and integrating electronic payment and reconciliation processes.[31]

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28 For details of state and territory programs, see Department of Industry, Science and Resources, 2001.

29 On 5 October 2001, the Government released final National Communications Fund program guidelines and called for applications. Priority was given to projects improving telecommunications services in regional communities and education and health service delivery.

30 A high level of interoperability enables firms to cost effectively participate within and across supply chains by facilitating process automation and reducing integration costs. A low level of interoperability inhibits e-commerce through high switching costs and technical incompatibility.

31 ebXML, electronic business extensible markup language, is a project to use extensible markup language, XML, to standardise the secure exchange of business data. ebXML is designed to enable a global electronic marketplace in which enterprises of any size and in any location safely and securely can transact business through the exchange of XML based messages. XML is a flexible way to create common information formats and share both the format and the data on the World Wide Web, intranets and elsewhere (searchcio.techtarget.com).

The Department of Communications, Information Technology and the Arts has major policy responsibility for the ICT industry and the National Office of the Information Economy is the lead Commonwealth agency for information economy issues (National Office of the Information Economy, 2001).[32]

Intellectual Property

Protection of Australian innovation is achieved through intellectual property legislation, in particular, the *Copyright Act 1968* and the *Patents Act 1990*. Recent amendments to the Copyright Act recognise the key role telecommunications carriers and carriage service providers including Internet service providers play in the on line delivery of content and the operation of the information economy. These amendments aim to provide greater certainty about the responsibilities of carriers and Internet service providers to copyright owners and the steps they need to take to avoid infringing copyright to encourage continued investment in new on line businesses (Commonwealth of Australia, 1999). The amendments aim to ensure the *Copyright Act* continues to promote creative endeavour while allowing reasonable access to copyright material on the Internet and through new communications technologies; they also introduce new enforcement measures to provide effective remedies against abuses.[33]

E-Government/Government Online

In 1997, the Commonwealth Government committed to deliver all appropriate government services electronically by 2001, in part to support the burgeoning e-commerce sector (Commonwealth of Australia, 1997). About 1 665 government agencies and departments now comply with this promise with almost 25 per cent providing interactive and dynamic services (Alston, 2002).[34]

Government on line services are becoming more sophisticated, with many sites now allowing transactions rather than just static information. In future, 55 per cent of government on line services are expected to be transactional or integrated services.[35] Nearly two thirds of agencies anticipated full implementation of simple e-procurement systems by the end of 2001, with the majority of remaining agencies complying in 2002. Agencies cited a lack of supplier readiness as the major impediment to implementing e-procurement.

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32 Another Commonwealth agency involved in assisting the ICT and e-commerce industries is the Department of Industry, Tourism and Resources.

33 IP Australia, part of the Department of Industry, Tourism and Resources, is the federal government agency granting rights in patents, trade marks and designs.

34 The Round 4 Survey on on line service delivery revealed that, by October 2001, 48 per cent of agencies had met the Government's commitment to provide all appropriate services on line. Subsequent follow up in January 2002 confirmed that all agencies met the 2001 target.

35 Between March and October 2001, the proportion of agencies paying more than 90 per cent of their suppliers electronically increased from 20 per cent to 30 per cent and, by October 2001, over 75 per cent of agencies by value paid more than 50 per cent of their payments electronically (National Office of the Information Economy, 2002).

Australia has expertise in integrating government services on line. One example is the Business Entry Point, an on line government resource for the Australian business community. The Business Entry Point provides a wide range of services and information on topics such as starting a business, taxation, licensing and legislation, as well as access to significant transactions such as taxation compliance and licence applications. The Business Entry Point aggregates information from all tiers of government so a business can obtain the information they need from the Commonwealth, state/territory and local government levels from the one location (www.business.gov.au, accessed 12 September 2002).[36]

The *Electronic Transactions Act 1999*, from 1 July 2001, provides a framework encouraging and empowering the Australian community to use electronic transactions when dealing with the government as well as increasing business and community confidence in the use of electronic transactions with government.

OUTLOOK

In the last decade, Australia's rapid adoption of new technology, excellent ICT and regulatory infrastructure and strong business environment delivered major output and employment benefits for Australia. They also are positioning Australian business well to embrace e-commerce allowing it to grow rapidly in recent years (Department of Foreign Affairs and Trade, 2002c). E-commerce growth also provides businesses with the opportunity to efficiently promote their goods and services in overseas markets and to transact business easily over long distances.

Australia's ICT industry has competitive strengths in specialised technology equipment and computer and information services. These strengths should provide the Australian ICT industry with new areas of complementarity and export opportunity in Asia. However, as most computer and information services sector firms are small, achieving higher levels of exports in this segment will require a clear focus and strong strategy. Continued competitiveness in advanced equipment exports also will require high ongoing levels of R&D and strong government support for education and research and development.

[36] The Business Entry Point arose from the commitment to reduce the burden of red tape on small business through a single on line entry point that provided a quick and easy way for business to get information from all levels of government. It was announced by the Federal Government in the 1997 More Time for Business report.

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Appendix Table A2.1

Extensive Government Assistance Available to ICT and E-Commerce Industries

Major Commonwealth Government Industry Support Programs for ICT and E-Commerce

Program	Aim	Target and reach	Commonwealth funding
R&D Start, Grants and Loans Competitive, merit based grants and loans program that supports businesses to undertake research and development and its commercialisation.	To increase the number of R&D projects with high commercial potential undertaken by companies. To foster greater commercialisation of R&D. ** due to unprecedented demand for grant funds, the IR&D Board will not be assessing or approving applications until further notice.*	Australian businesses undertaking research and development and its commercialisation. Funding decisions made by the Industry, Research and Development Board. Estimated total customer base 2002/2003: 550.	Commenced in 1996. A$1.7 billion over ten years. Estimated value (revenue foregone) for 2002/2003: A$159 million.
R&D Tax Concession Broad-based, market driven tax concession which allows companies to deduct up to 125% of qualifying expenditure incurred on R&D activities when lodging their corporate tax return. **175% Premium R&D Tax Concession** Provides a 175% Premium R&D Tax Concession for additional investment in R&D. **R&D Tax Offset** Provides a Tax Offset to small companies that undertake R&D. The Offset is of particular benefit to companies in tax loss.	To increase the amount of R&D being conducted within Australia.	Australian businesses undertaking eligible R&D activities registered annually with the IR&D Board. Australian businesses with a three consecutive year history of registering for and claiming the R&D Tax Concession, or of receiving grants for R&D projects under the IR&D Board's R&D Start program. Australian businesses with turnover of less than A$5 million per annum and with R&D expenditure of up to A$1 million per annum are eligible to receive a cash rebate equivalent to 37.5 cents per dollar of eligible R&D expenditure; the company must elect in its tax return to receive the rebate. Estimated total customer base 2002/2003: 4 000.	Estimated value (revenue foregone) for 2002/2003: A$426 million.

Program	Aim	Target and reach	Commonwealth funding
Innovation Access Program - Industry Discretionary competitive grants program. Other elements of the Innovation Access Program delivered Include the Technology Advisory Service and Technology Roadmapping.	To promote innovation and competitiveness by improving Australian access to global, leading edge research and technologies and their uptake by Australian firms and researchers, particularly by small and medium enterprises.	Private sector companies and industry organisations or consortia which can include additional organisations such as Cooperative Research Centres and training institutions. Estimated total customer base 2002/2003: 100	Commenced June 2001. A$100 million over 5 years (2001/02 to 2005/06).
National Australian Technology Showcase A national and international campaign designed to promote leading-edge Australian technology and the skills of the companies that produce them.	To increase international competitiveness; raise awareness amongst local industry of the range of domestic know-how available; support and encourage innovation, commercialisation and technology diffusion.	Australian businesses who have developed leading edge technology. Estimated total customer base (ATS members) 2002/2003: 400.	Commenced in NSW in April 1997. Launched as a national initiative in April 2001. Participating jurisdictions include NSW, Victoria, ACT, Qld, SA and the Commonwealth. Value for 2002/2003 (Commonwealth contribution) A$150,000.
Innovation Investment Fund Venture capital program that invests in nine private sector venture capital funds.	To provide venture capital (equity) to assist small companies in the early stages of development to commercialise the outcomes of Australia's strong research and development capability.	New technology companies seeking commercialisation funding from licensed private sector venture capital providers. Estimated total customer base 2002/2003: 63.	Commenced in 1998. A$221 million in government funding matched by private sector investors on an up to 2:1 basis over a 10 years; total funding (Commonwealth and private) A$358 million. Value for 2002/2003: A$51.9 million
Commercialising Emerging Technologies Competitive, merit based grants program delivered by private sector Consultant Business Advisers which supports businesses and individuals to increase the commercialisation of innovative products, processes and services.	To increase the commercialisation of innovative products, processes and services, by providing individuals, early growth firms, and spin-off companies with support to improve their potential for successful commercialisation.	Early growth companies, individuals and spin off companies. Estimated total customer base 2002/2003: 470.	Commenced in 1999. Provides funding of A$30 million over 3 years. Extended as part of the *Backing Australia's Ability* statement which has provided an additional A$40 million from July 2001 until June 2005. Value for 2002/2003: A$11.7 million.

Program	Aim	Target and reach	Commonwealth funding
Pooled Development Funds Venture capital program designed to support small to medium sized enterprises	To increase the supply of equity capital for growing Australian small and medium-sized enterprises.	Venture capital fund managers who invest in Australian small and medium sized businesses. Estimated total customer base 2002/2003: 130.	Commenced in July 1992. Since its inception, registered PDF's have invested over A$550 million in Australian companies. During 2001-02, PDF's provided over A$81m to assist Australian companies to grow. Value for 2002/2003: A$5 million (projected).
Pre-Seed Fund Competitive pre-seed fund for universities and public sector research agencies.	To address the gap between promising scientific discoveries and commercialisation.	Universities and public sector research agencies (for example CSIRO and DSTO). Estimated total customer base 2002/2003: 15.	Commenced August 2001 with funding of A$72.7 million over ten years. Value for 2002/2003: A$14.7 million.
Cooperative Research Centres	To promote high-quality cooperative research and education programs through centres of research concentration. It supports long-term collaborative ventures linking researchers from universities and government research organisations with business enterprises and public sector research users, thereby strengthening the links between research and its commercial and other applications.	64 CRCs – 8 ICT specific, several others involving ICT applications and research	A$145 million per year plus an additional A$227 million over 3 years (2003/04 to 2005/06). A$2.5 million average funding per CRC per year
Major National Research Facilities	MNRFs are expensive, large equipment items or highly specialised laboratories that are vital for conducting leading-edge research in science, engineering and technology. The program provides access to such facilities, aimed at increasing opportunities for R&D, the pursuit of commercial opportunities and the development of new Australian enterprises.		A$155 million over 5 years (2001/02 to 2005/06). Maximum of 50 per cent of total project costs.

Program	Aim	Target and reach	Commonwealth funding
Export Market Development Grants	Provide assistance to small and medium Australian exporters committed to, and capable of, seeking out and developing export business by repaying up to 50 per cent of eligible export promotional expenses.	Over 3 000 companies.	A$150 million per year. Up to A$200 000 per year per company - Average A$45 000
Export Access	Assists small and medium enterprises to become involved in exporting on a sustainable basis. A Commonwealth Government funded program administered by Austrade through a network of private and public sector export advisers. It provides a comprehensive package of training and practical assistance for a one-off fee of up to A$550.	Over 500	A$3.5 million per year. Around A$6 000 per enterprise.
E-Commerce for Exporters Workshops	Half-day workshops for businesses wishing to understand the elementary aspects of using e-commerce in their export business. Trained Austrade presenters manage small groups for a fee of A$55.	Not applicable.	A$100 000 per year
TradeStart	Partnerships between Austrade and a range of public and private sector service providers enhance access for businesses in regional and rural Australia to the export assistance services of Austrade. TradeStart advisers represent Austrade and work to promote export awareness within their local regions.		A$350 000 per year

Program	Aim	Target and reach	Commonwealth funding
Information Technology On line Program	This is a competitive grant program that accelerates the national adoption of business to business e-commerce solutions, especially by communities of small and medium enterprises. ITOL provides funding for collaborative projects that demonstrate new and innovative on line solutions that have real business benefits.	81 projects funded to date.	A$13 million over 5 years (2001/02 to 2005/06) A$200 000 max per project, up to 50 per cent of project value.
Building on IT Strengths	The program aims to strengthen the competitiveness of the Australian information industries sector. It fosters the development and commercialisation of innovative ideas and R&D in the information technology and communications industries and facilitates the availability and use of leading-edge network	10 Incubators established.	A$158 million over 5 years (1999/2000 to 2003/04) Comprises: IT Incubator program - A$78 million over 5 years Advanced Networks Program - A$40 million over 4 years Tasmanian Intelligent Island Program - A$40 million over 5 years
Software Engineering Quality Centres Program	Provides support for the activities of Software Engineering Australia, SEA. SEA is a national organisation that delivers products, services and information to assist Australian software developers and users of software-intensive systems to progressively build up their technical and business capabilities. SEA provides information on, and access to, the latest software engineering technologies, such as software productivity improvement methodologies, measurement tools and quality control techniques.	Not applicable.	A$17 million over 4 years (1998/99 to 2001/02).

Program	Aim	Target and reach	Commonwealth funding
Testing and Conformance Infrastructure Program, Test-IT	Provides grants to encourage appropriate Australian organisations in the information technology and communications industries to invest in trialing, demonstration and conformance testing infrastructure. Test-IT grants accelerate the provision of the testing capabilities these industries need in anticipation of an emerging market for such services.	A$10 000 to A$300 000 per grant.	A$3.7 million over 4 years (1998/99 to 2001/02).
Information and Communications Technology Centre of Excellence	Grant to develop and support a Centre of Excellence in ICT whose work will focus on R&D and the commercialisation of new technologies. The Centre will be established as a stand-alone research institute to facilitate the creation of critical mass necessary to strengthen Australia's ability to generate breakthrough technological advances.	The successful tenderer was National ICT Australia, NICTA, consortium. The NICTA partners will contribute some A$96 million in cash and in kind to the Centre over its first five years. The NSW and ACT Governments will each contribute A$20 million. The Australian National University, the Universities of NSW and Sydney, the venture capital firm Allen & Buckeridge, Redfern Photonics and Bovis Lend Lease will also contribute.	A$129.5 million over 5 years (2001/02 to 2005/06). In principle agreement to renew funding subject to performance review.
Endorsed Supplier Arrangement Program	These arrangements apply to the purchase of information technology, major office machines, commercial office furniture and auctioneering services by the Government. To obtain ESA status, suppliers must conform to a number of requirements including a range of industry development related activities.	More than 700 suppliers.	Not applicable.

Program	Aim	Target and reach	Commonwealth funding
Voluntary ICT Strategic Industry Development Guidelines	Guidelines encouraging mutually beneficial partnerships with the Government's major ICT suppliers to continue the development of the Australian ICT industry by undertaking strategic activities in Australia such as R&D, export development, strategic investments, venture capital investments, SME alliances, technology transfer and skills development.	Over 70 companies.	Not applicable.
Networking the Nation	Regional Telecommunications Infrastructure Fund to help bridge the gaps in telecommunications services, access and costs between urban and non-urban Australia, including computer training, public Internet kiosks and increased on line services.		A$460 million over 5 years from 1997/98. An additional A$214 million allocated in 1999.
National Communications Fund	Assist in the rollout of the infrastructure and applications to enable high-speed telecommunications networks to deliver education and health services in regional Australia.	Minimum project grant is A$3 million. Applications for funding closed on 28 February 2002.	A$52 million.
Broadband Content Fund	Seed funding for innovative Australian content producers to pursue opportunities in new broadband applications. The emphasis will be on high end, high technology content, including interactive applications.		A$2.1 million.
ARC Linkage-Projects (National Competitive Grants Program)	The Linkage-Projects element of the NCGP is an application-based program available for individual researchers or research teams. It supports collaborative research projects between higher education researchers and industry and identifies an allocation to projects of benefit to regional and rural communities. Proposals must contain an industry contribution, in cash and/or in kind.	A$20 000 to A$500 000 per grant. Grants are made to universities which have industry collaborators on specific projects.	About A$58 million per year.

Program	Aim	Target and reach	Commonwealth funding
ARC Linkage - Infrastructure (National Competitive Grants Program)	The Linkage - Infrastructure element of the NCGP funds large items of research infrastructure for collaborative use by universities, research organisations and industry. Industry and research stakeholders also contribute.	Grant size of A$100 000 up made to universities.	A$24 million per year.
Australian Industry Involvement Program	Facilitates Australian industry's development through Defence's acquisition and support projects. All Defence projects with a value in excess of A$5 million require tenderers to prepare an AII Plan describing a proposed program of local content or Strategic Industry Development Activities (SIDAs).	20 to 25 major capital equipment acquisition contracts per year including an AII Plan.	Not applicable.
Investment Recognition Scheme	Gives overseas companies interested in future Australian Defence procurement activities the opportunity to gain formal recognition for activities that help to build or sustain an indigenous defence industry base, contribute to other defence needs of industry, or contribute to the Industry Requirements of acquisition programs.		Not applicable.
Capability and Technology Demonstrator Program	Funds projects which show Defence users how leading edge technology can be integrated quickly into existing, new defence capabilities.		Up to A$20 million per year, depending on quality. Most proposals are under A$5 million and take 3 years or less, with some less than A$1 million.

Source: Department of Communications, Information Technology and the Arts, personal communication.

EAST ASIA'S ICT AND E-COMMERCE MARKETS

KEY POINTS

- East Asia's information and communication technology, ICT, market is large and growing rapidly; in 2001, the region spent US$612.6 billion on ICT goods and services, 24 per cent of world ICT spending, up 9 per cent annually since 1993.

- Industrialised East Asia spends more on ICT per capita and as a share of GDP and also generally allocates more ICT spending on ICT services than developing East Asia; ICT services exports have strong growth potential as regional incomes grow.

- In developing East Asia, personal computer and telephone diffusion generally is low and the legal structure for telecommunications and e-commerce is lacking, hindering e-commerce development and ICT take up. In particular, China, Indonesia, the Philippines, Thailand and Vietnam need stronger laws and regulations to facilitate rapid e-commerce growth. Telecommunication services are a large and growing market in these economies.

- East Asia is a major ICT production centre, with industrialised East Asia producing higher value added ICT components and products and developing East Asia specialising in the more labour intensive ICT assembly processes. However, some developing economies are moving up the value chain to more advanced ICT equipment design and production.

- Most regional governments actively support the ICT production industry and faster ICT take up through a range of proactive policies.

- Australian exporters are already pursuing export markets in advanced ICT equipment and services mainly in industrialised East Asia, but opportunities will expand in developing East Asian markets as per capita incomes rise, ICT take up spreads and the legal and regulatory environment improves.

With the world's most populous country, two of its biggest economies, 28 per cent of the world's population and relatively strong growth, East Asia already is the world's second largest regional ICT market and has the potential to be its most important (International Trade Administration, 2000). East Asia also is a major world ICT goods producer. However, East Asian markets are diverse in their total and per capita gross domestic product, GDP, population size, ICT take up levels and business cultures; ICT and e-commerce firms seeking to access these markets need to recognise and capitalise on this diversity.

To assist in accessing this dynamic and rapidly growing market, this chapter analyses the key developments and issues in the ICT and e-commerce markets of East Asia's 11 major economies. First, it assesses the size and growth rates of their ICT and e-commerce markets and ICT production specialisation, distinguishing between industrialised and developing regional economies.[1] The chapter then identifies key policies governments are implementing to support ICT and e-commerce industries and the impact of the legal and regulatory environment in promoting and constraining new technology take up. It concludes by summarising East Asia's ICT strengths, identifying where policies require further development and drawing implications for synergies and opportunities for Australian ICT exporters.

EAST ASIAN ICT AND E-COMMERCE MARKETS

Despite considerable volatility, East Asian ICT and e-commerce markets have grown rapidly in the past decade. ICT take up is rising strongly, with an increasing share of populations benefiting from access to fixed and mobile telephones, computers and the Internet. However, in developing East Asia, significantly higher telecom and computer penetration is needed before ICT and e-commerce noticeably spur productivity and income growth.

Although the Asian financial crisis temporarily slackened ICT take up, East Asia has become a significant ICT consumer goods market, with ICT spending growing rapidly in the 1990s. Assuming the region resumes strong growth, its rising higher education levels and strong technology awareness should ensure its ICT and e-commerce markets continue to grow robustly over the next decade.

ICT Spending in East Asia Growing Strongly

East Asia is a large and growing ICT market. In 2001, the 11 major East Asian economies spent a combined US$612.6 billion on ICT equipment and services, accounting for 24 per cent of world ICT spending; this has risen at an average annual rate of 9 per cent since 1993. China and Vietnam's spending grew the strongest at around 27 per cent per year.[2] However, Japan still has 72 per cent of

1 Industrialised regional economies were early producers of simpler ICT goods and have since moved to higher value added ICT production; they include Japan, the Republic of Korea, Taiwan, Hong Kong and Singapore. Developing East Asian economies are industrialising later and mainly undertake lower value added ICT production; these include China, Indonesia, the Philippines, Thailand and Vietnam. As a middle income economy and a strong ICT producer, Malaysia arguably falls between these two groups of economies.

2 Also over this period, Singapore's ICT spending grew at almost 12 per cent, the Philippines at over 11 per cent while Taiwan and Hong Kong's both grew at 10 per cent.

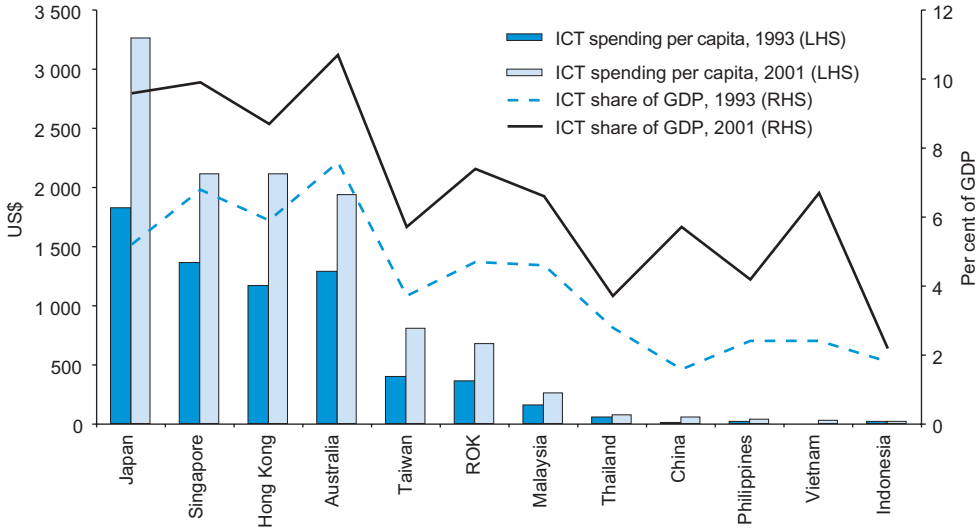
the region's ICT market, followed by China with just under 12 per cent.[3] While Japan's demand for ICT equipment slowed in recent years as a result of the prolonged recession, purchases remained high due to Year 2000 remediation, increased Internet take up, growing use of e-commerce strategies and business ICT equipment investment aimed at increasing productivity. China's ICT spending is expected to soar, with growth of up 23 per cent per year in small and medium sized enterprise spending expected to last until 2005 (*South China Morning Post*).

Several developing East Asian economies spend relatively high shares of their GDP on ICT, although generally less than developed economies (Figure 3.1). Over the 1990s, East Asian economies significantly increased their ICT expenditure as a share of GDP; for example, Vietnam's rose from 2.4 to 6.7 per cent and China's from 1.6 to 5.7 per cent of GDP. Indonesia's ICT expenditure and share of GDP is the lowest.

Figure 3.1

ICT Spending in East Asia Appears Related to Levels of Development

ICT Expenditure as a Share of GDP and Per Capita, 1993 and 2001, US$ and per cent



Source: International Data Corporation, 2002.

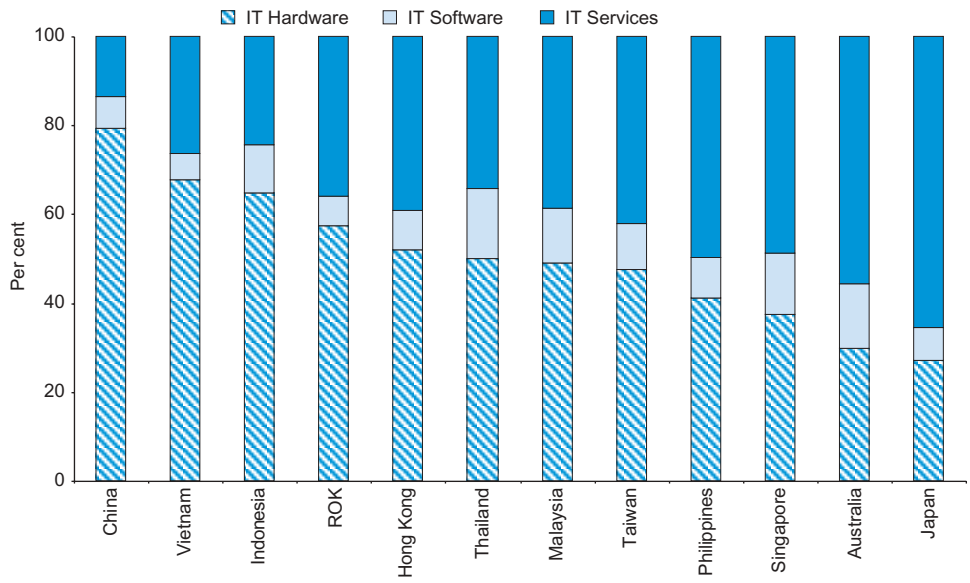
[3] They are trailed by the Republic of Korea with almost 6 per cent and Taiwan with 3 per cent of the market; ASEAN economies have a minimal share of the market.

As economies develop, businesses allocate relatively more of their ICT spending to software and services and less to hardware. Most developing East Asian economies allocate 60 to 80 per cent of their ICT expenditure on hardware while most developed regional economies spend only 40 to 50 per cent on hardware. However, the ROK and the Philippines are outliers, with respectively higher and lower shares of hardware spending than their development level would predict (Figure 3.2). This expenditure pattern indicates regional demand for ICT services and software should rise significantly as developing economies grow.

Figure 3.2

Great Potential in East Asia's ICT Services Sector

ICT Hardware, Software and Services, Share of Total ICT Expenditure by Country, 2001, Per cent



Note: [a] IT services includes internal IT spending; its inclusion has little effect on the analysis.

Source: International Data Corporation, 2002.

East Asian Technology Diffusion

East Asia's preparedness for the Internet and e-commerce varies greatly. While a 2002 e-readiness study ranked Australia, Singapore and Hong Kong as e-business leaders, several East Asian economies lag considerably, with Indonesia and Vietnam the least prepared; a networked readiness index reached similar conclusions (Table 3.1). Although many regional economies moved down the relative rankings over the year, absolute e-readiness scores increased for all except Japan and the Philippines. Throughout the region, ICT spending is highest in the government, ICT, telecommunications and banking and finance sectors and ICT adoption generally is highest in large enterprises, which also use local area networks and run websites more intensively (Austrade, 2002).

Table 3.1

Most East Asian Economies Not Yet Ready for E-Commerce

E-Readiness Scores and Rankings, 2002

Country	E-readiness ranking 2002 (2001)[a]	E-readiness score (out of 10)	Networked readiness index[b]	Networked readiness index ranking
United States	1 (1)	8.41	6.05	1
Australia	6 (2)	8.30	5.22	14
Singapore	11 (7)	8.17	5.47	8
Hong Kong	13 (13)	8.13	5.23	13
Taiwan	20 (16)	7.26	5.18	15
ROK	21 (21)	7.11	4.86	20
Japan	25 (18)	6.86	4.86	21
Malaysia	32 (33)	5.50	3.82	36
Thailand	46 (46)	3.86	3.58	43
Philippines	49 (39)	3.72	3.27	58
China	51 (49)	3.64	3.10	64
Indonesia	52 (54)	3.29	3.24	59
Vietnam	56 (58)	2.96	2.42	74

Note: [a] E-readiness rankings are calculated by adding scores across six categories: connectivity and technology infrastructure; business environment; consumer and business adoption; social and cultural infrastructure, legal and regulatory environment; and supporting e-services.

[b] The networked readiness index is a major comparative assessment of economies' capacity to exploit the opportunities offered by ICTs; it provides a summary measure that ranks 75 countries on their relative ability to leverage their ICT networks based on network use (quality and quantity) and enabling factors (access, policy, society and economy) (Kirkman et al., 2002).

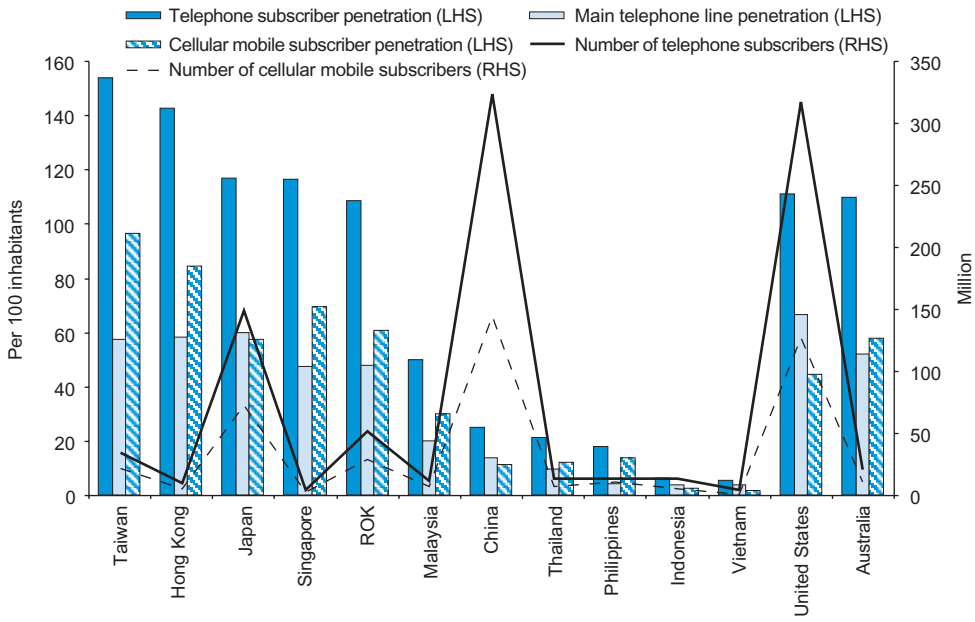
Source: The Economist Intelligence Unit/Pyramid Research, 2002; and Kirkman et al., 2002.

As telephony penetration is a major e-business readiness indicator, developing East Asian economies' low penetration rates limit short term e-commerce opportunities (Figure 3.3). However, as telecommunications investment and telephony penetration is growing rapidly throughout the region, medium to long term opportunities are likely to be considerable.

Figure 3.3

Low Telephone Penetration Impedes E-Commerce in Developing East Asia

Main Telephone Lines, Fixed and Cellular Subscribers, 2001, per 100 Inhabitants and Million



Source: International Telecommunication Union, 2002.

Personal computer and Internet penetration also is relatively low in developing East Asia but is high in industrialised regional economies, promoting e-commerce there (Figure 3.4). Given East Asia's large population, absolute e-commerce markets are significant; Japan has almost 58 million Internet users and China has around 34 million.[4] Despite low personal computer ownership and Internet connections in developing East Asian economies, many people can access the Internet through Internet cafés; these are particularly popular in China, Indonesia, the Philippines, Thailand and Vietnam.[5] They are also very popular in the ROK where they are a cultural phenomenon. However, relatively low incomes and weak regulatory regimes could undermine future e-commerce growth in developing regional economies, as discussed below.

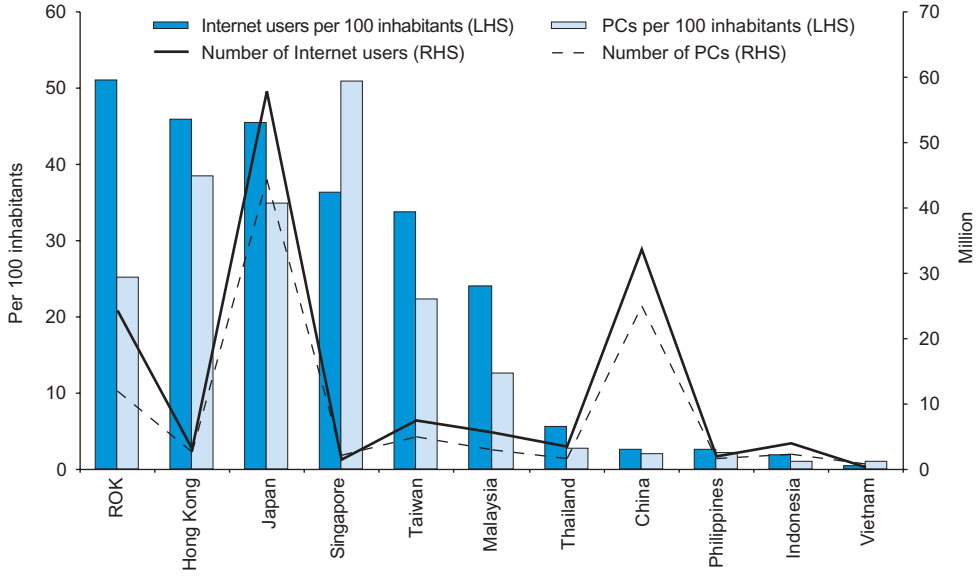
4 Despite Japan's large number of Internet connections, a high proportion are for mobile phones, a low intensity use of the Internet; as at August 2002, Japan had 56 million mobile phone Internet users (www.soumu.go.jp/joho_tsusin/eng/index.html accessed 4 November 2002). Much of Japan's B2C e-commerce is for ring tones and music downloads for mobiles.

5 For example, a household survey by Thailand's National Electronics and Computer Technology Centre found the actual number of Internet users, including via informal sources like Internet cafes was 3.5 million compared to other data showing that users totalled only 2.6 million (National Electronics and Computer Technology Centre, 2002b; International Data Corporation, 2002).

Figure 3.4

Internet and PC Penetration Rates Low in Developing East Asia

Internet Users and PCs, 2001, Total and per 100 Inhabitants



Source: International Telecommunication Union, 2002.

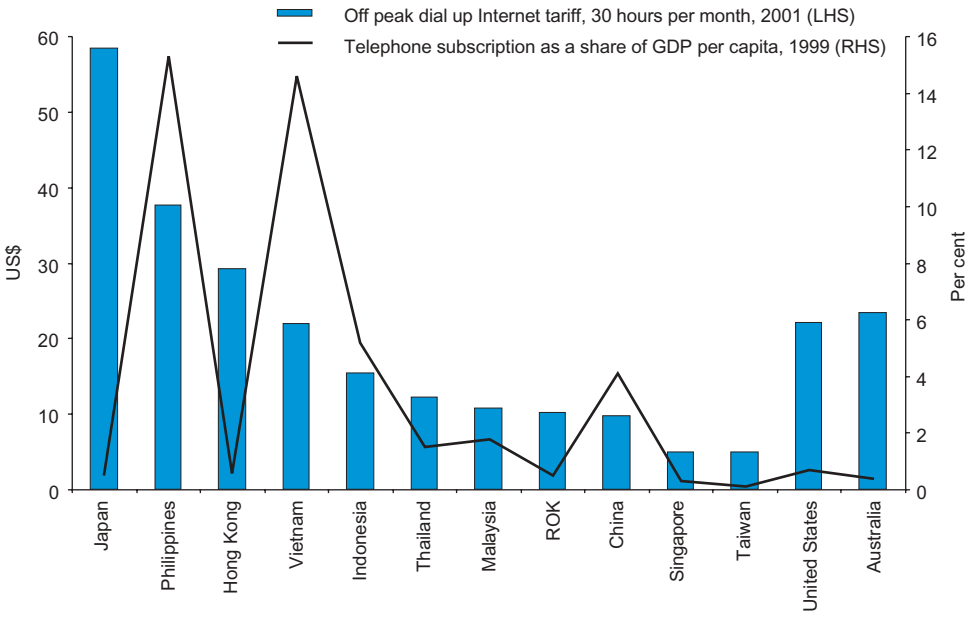
Another key factor determining e-commerce and ICT uptake is availability of efficient and cheap telecommunication services; these make Internet access more affordable, increasing consumer and business use of Internet technologies. Developing East Asian economies like the Philippines, Vietnam and Indonesia have high Internet access tariffs and telephone subscription charges as a ratio of per capita GDP, reducing the potential pace of ICT take up (Figure 3.5).

The Australian Government has responded to Australian industry concern that high access prices charged in the region are also in part due to the practices of market dominant backbone providers in the United States. This aspect is being pursued in international forums, particularly the Asia-Pacific Economic Cooperation and the International Telecommunication Union.

Figure 3.5

East Asia's Telephony and Internet Access Expensive for Lower Income Economies

East Asian, Australian and US Telephone Subscription Fees, 1999, and Off Peak Internet Tariffs for 30 Hours per Month, 2001, US$ and per cent of GDP per capita



Note: [a] Subscription charges are the recurring fixed charge for subscribing to the public switched telephone network; subscription as a share of gross domestic product per capita is the cost of an annual residential subscription as a share of gross domestic product per capita.

Source: International Telecommunication Union, 2002.

FROM DIGITAL DIVIDE TO DIGITAL PROVIDE

The digital divide refers to the gap between those who have access to ICT tools and those who do not.[6] A digital divide can exist both within a country and between countries. The gap between developed and developing countries is large; developed countries have around 15 per cent of the world's population but about 80 per cent of the world's personal computers and almost 90 per cent of its Internet users. However, PC ownership is growing twice as fast in developing as in developed countries. For example, between 1993 and 2001, China's ICT spending increased by around 27 per cent a year and the number of PCs by over 45 per cent per year raising China's share of world ICT spending from 0.7 to 2.8 per cent (International Data Corporation 2002).

Wide disparities in access to ICTs also exist within countries. Developing East Asia has large disparities between rural and urban teledensity; in many rural areas, populations lack access

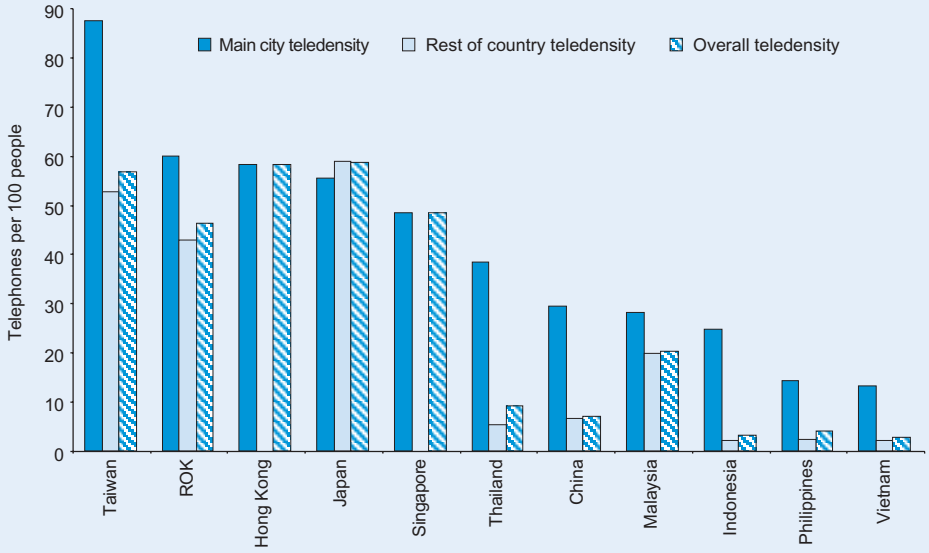
6 Bridging the digital divide is the main focus of the Development Sector of the International Telecommunication Union and will be the major theme of the World Summit on the Information Society to be held in Geneva in December 2003.

to telephones and reliable electricity supplies, making access to the Internet impossible (Figure 3.6). Access to computers also is important; though many developing countries introduced more PCs to classrooms in the 1990s, most of these are in urban areas. To access jobs in the ICT sector and use new technologies, populations also need basic literacy and technical skills. Finally, competitive telecommunications sectors and secure e-commerce require competitive markets and transparent governments and business. Hence, closing the digital divide requires concerted policies to increase education levels, provide appropriate infrastructure and establish relevant legal and market environments.

Figure 3.6

Digital Divide Wide in Developing East Asia

Teledensity in East Asia, 2000



Assistance to developing economies to improve ICT and e-commerce take up and reduce the digital divide needs to be carefully targeted. For example, in Indonesia Internet cafés or kiosks, Warung Internet or 'Warnet,' are flourishing as a relatively cheap and convenient way for people to get on line. In Laos, villagers in a remote, harsh region without electricity or telephone connections are being wired up to the Internet. Engineers working for a American-Lao organisation devised a computer with no moving and few delicate parts, powered by a car battery charged by bicycle cranks. Wireless Internet cards connect each computer to a solar powered hilltop relay station that passes signals to a computer in the nearest town which is connected to the phone system and the Internet. The new network will give villagers up to date information on market prices for their crops and the weather.

Sources: International Telecommunication Union, 2002; World Development Indicators, 2001; Minges, 2001; The Economist, 2002.

EAST ASIA'S ICT INDUSTRY

East Asia's ICT industry is heavily skewed towards ICT equipment production and telecommunications services; with a few exceptions, ICT services and software production sectors are under represented. However, as developing regional economies increasingly move from merely producing ICT equipment to adopting ICTs throughout their economies, ICT services and software demand is growing.

ICT Equipment Production

East Asia's ICT industry reflects the current pattern of industrialisation in the region; industrialised regional economies undertake more skill and capital intensive ICT equipment production while developing East Asian economies undertake more labour intensive assembly activities. Japan, ROK, Singapore and Taiwan have strong bases in high value added technology production and increasingly outsource production of lower technology parts and assembly to developing East Asia. Japan is a leader in developing new products and technologies and produces mostly technologically advanced components and services. The ROK, Taiwan and Singapore are heavily engaged in original equipment manufacturing for foreign firms, generally in the form of technical cooperation or production licence agreements.[7]

East Asia's electronics production grew strongly in the 1990s, averaging 7 per cent per year. Japan dominates the market with 50 per cent of regional production but growth was fastest in Indonesia, the Philippines and Malaysia (Figure 3.7). In 2001, low global demand for ICT products, particularly semiconductors, forced many East Asian ICT manufacturers to reduce production; excluding China, provisional 2001 data shows regional production fell 13.5 per cent. However, throughout the downturn, industrialised East Asia's production of peripherals like liquid crystal display monitors continued to grow and an export recovery in 2002 indicates production should be rising again.[8]

The ROK is an important centre for ICT equipment manufacturing, which dominates its outwardly focussed, internationally competitive ICT industry. Its ICT manufacturing industry is moving increasingly into high value added electronics, vacating lower value added product lines to Chinese and South East Asian producers. The ROK supplies more than 20 per cent of the world's dynamic random access memory chips and semiconductors accounted for 72 per cent of the total value of the components sector and 36 per cent of the ROK's electronics output (Reed Electronics Research, 2002). Between 1996 and 2000, the ROK's ICT equipment sector grew on average by 25 per cent per year; information equipment grew the fastest at 33 per cent per year, largely due to exports of a few ICT products (Ministry of Information and Communication, 2001).

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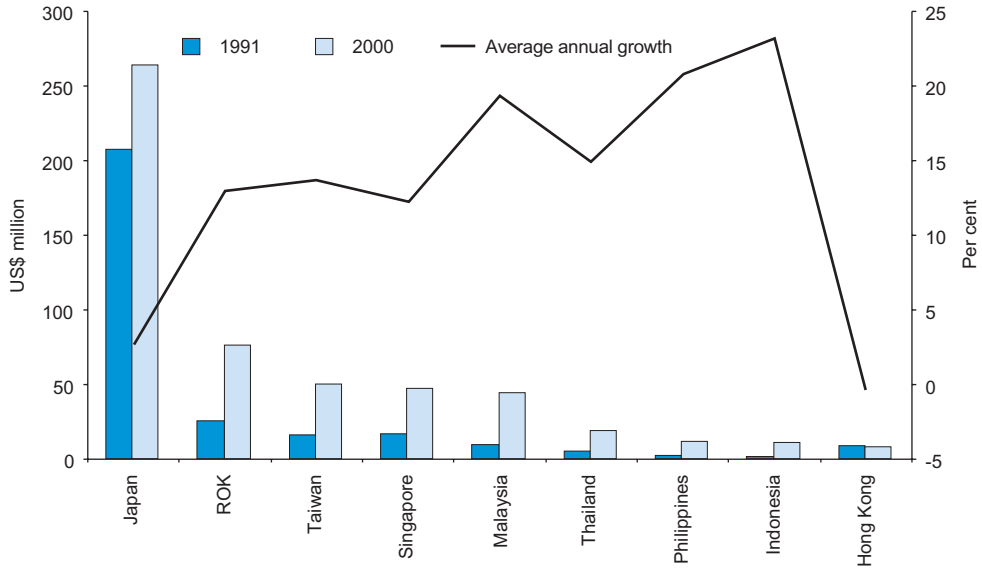
7 An original equipment manufacturer uses its own or other companies' components to build a product it sells under its own company name and brand. Many computer hardware manufacturers with their own brand name products derive considerable revenue by reselling the product or key parts of it to original equipment manufacturers that appear to compete in the same market. This can allow them to access a market sector where a competitor is already active to achieve more efficient production from higher volumes. Frequently, original equipment manufacturers differentiate themselves from companies from which they buys parts by adding features or using different selling concepts (www.whatis.techtarget.com).

8 For example, in 2001, Taiwan's production of liquid crystal display monitors rose by 208 per cent and production of servers increased by 73 per cent.

Figure 3.7

East Asian ICT Production Surges in 1990s

East Asia's Electronics Production and Average Annual Growth, 1991-2000, US$ million and per cent



Notes: [a] Electronics production includes electronic data processing, office equipment, control and instrumentation, medical and industrial, communications and radar, telecommunications equipment, consumer video, consumer audio, consumer personal, active components, passive components and other components.

[b] Data not available for China or Vietnam.

Source: Reed Electronics Research, 2002.

Taiwan is the world's third largest producer of ICT products and has a broadly based ICT production industry. Over the last two decades, its ICT industry has moved from assembling imported components to manufacturing world class integrated chips, advanced electronic components and complete products such as personal computers. Many leading ICT equipment manufacturers have subsidiaries in Taiwan or rely on independent Taiwanese firms for their original equipment manufacturing needs.

Singapore also has a strong base in ICT production but Hong Kong, now primarily a service economy, is not a major ICT equipment manufacturer. Singapore's ICT manufacturing is strong in advanced electronic industrial products such as computer assemblies and computer peripherals, including integrated circuits, disk drives, printers and electronic components; most of the world's major electronics companies have a factory in Singapore (Reed Elsevier, 2002). While most Hong Kong manufacturers have relocated production to mainland China, Hong Kong still produces high value added items and Internet products. Over a 100 ICT multinationals including IBM, Compaq, Microsoft, Hewlett-Packard and NEC have their regional headquarters in Hong Kong and Singapore coordinating their regional manufacturing, software development, research and development and distribution operations (Austrade, 2002l).

In other regional economies, ICT corporations employ imported components and relatively cheap labour to undertake mass assembly of ICT equipment, locally undertaking relatively few skill and technology intensive production processes. Domestic production supplies a large share of their respective local markets but most production is exported. (See Chapter 4 – *East Asian Trade and Investment*.) Foreign firms' branch plants dominate this export oriented ICT manufacturing and developed economy ICT firms supply most advanced components for assembly. This is true even for Malaysia, which has a more developed local supplier base for electrical equipment and electronics than other developing regional economies (United Nations Conference on Trade and Development, 2002).[9] (See Appendix 1 – *Global Markets*.) China, Malaysia and Thailand are major computer and telecommunications equipment assemblers. The Philippines has strong electronic assembly industries, manufacturing equipment for companies such as Intel and BenQ. Indonesia has attracted several large foreign ICT equipment manufacturers including from the United States, Japan and Korea, mainly for assembly operations and also aims to attract component manufacturers.[10] Since the mid 1990s, Vietnam also has focused on assembling ICT hardware, with this sector growing 15 to 20 per cent annually (Figure 3.8). Many East Asian governments are concerned that as China's ICT sector opens over the next few years, its lower unit labour costs could encourage relocation of multinational ICT equipment manufacturers to China.

Software

East Asia's software segment is growing fast but from a low base. At present the region relies heavily on imported software with US vendors dominating the market. As would be expected, industrialised East Asia has a more advanced software industry than developing regional economies. For example, although still relatively small, the ROK's software sector is one of its fastest growing ICT sectors, averaging annual growth of 31 per cent between 1996 and 2000. Taiwan's domestic software industry also is developing fast from a low base; in 2000, domestic software production totalled US$3.5 billion, an increase of 24 per cent over 1999 and its software exports reached US$300 million, mainly anti-virus, multimedia and writing input programs for the Japanese and North American markets (Hess and Lendon, 2001). Hong Kong's software companies are linking with mainland Chinese companies to develop products for the Chinese market and export. Most of Hong Kong's local software developers are small firms producing competitive customised software to support local and foreign clients (Austrade, 2002b).

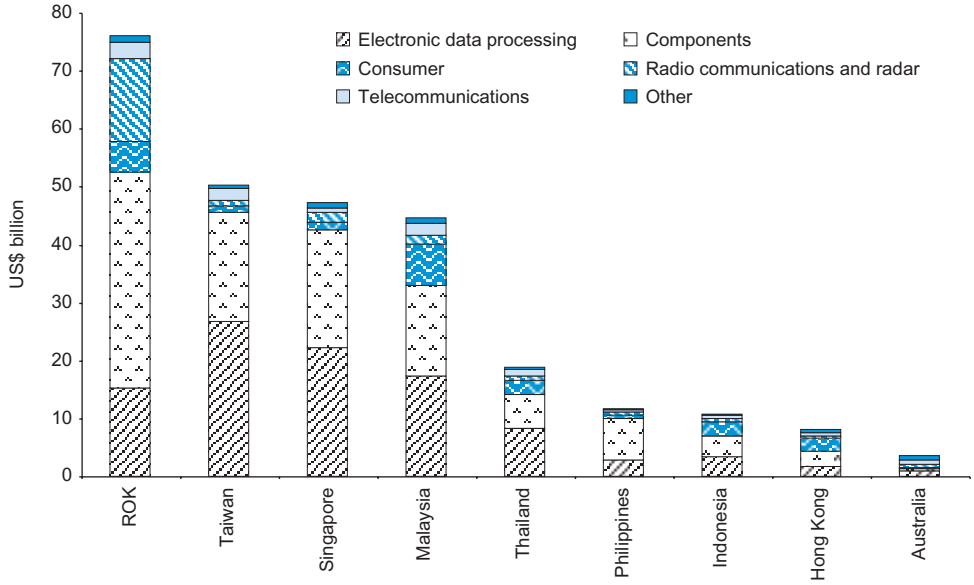
9 Malaysia manufactures a wide range of computer components and accessories through either foreign direct investment or original equipment manufacturing partnerships with local investors; many are based in the Penang Free Trade Zone, usually referred to as the Silicon Valley of South East Asia (Austrade, 2002i).

10 These include Canon, BenQ, APC, Compaq, Dell, Digital, Epson, Hewlett Packard, IBM, Interlink 2000, Micron, NEC, Notebook, and Toshiba.

Figure 3.8

Components and Computers Dominate East Asian ICT Equipment Production

East Asia's Electronics Production by Major Segment, 2000, US$ billion



Notes: [a] Japan is not included on the figure due to its size, with 50 per cent of East Asian production; its electronics equipment production of US$263.5 billion is comprised of US$109.6 billion of components, US$65.1 billion of electronic data processing, US$26.2 billion of radio communications and radar, US$20.6 billion of telecommunications, US$19.3 billion of consumer and US$22.5 billion of other equipment.

[b] Data not available for China or Vietnam.

[c] 'Electronic data processing' includes computers and complete systems, peripherals storage, input output devices and accessories and parts; 'radio communications and radar' includes radar, navigational aids, reception apparatus, transceivers, mobile radio telephones, public broadcasting transmitters, accessories and parts; 'telecommunications' includes switching, facsimile and transmission equipment, telephone sets for line telephony, answering machines and other equipment accessories and parts; 'consumer' includes televisions, video recorders and cameras, tuners and, radios; 'components' includes active components such as television tubes, diodes, transistors, integrated circuits, passive components such as capacitors, resistors, printed circuit boards, and audio components; 'other' covers office, control and instrumentation and medical and industrial equipment.

Source: Reed Electronics Research, 2002.

Although software is a small share of the ICT industry in most of developing East Asia, several economies are making major gains in this area. China has around 10 000 software companies, of which 3 000 are engaged exclusively in software development, meeting around 30 per cent of local demand (Austrade, 2002a). Only about 100 of these companies are wholly foreign owned or joint ventures. Chinese firms are most competitive in systems integration, software designed for specific businesses and software focusing on the Chinese environment. The Philippines also has a thriving, increasingly export oriented software sector, with many local and international firms investing there. Its skilled ICT workforce receives salaries competitive with India and China. Its many educated English speakers give the Philippines a major advantage but its ICT services production and exports are still relatively low and India remains the giant in computing services exports (*Far Eastern Economic Review*, 28 June 2002; Economic Analytical Unit, 2001).

Vietnam also is starting to make progress as a software development base for clients from North America, Europe and Japan. Based on its lower salaries for programmers than India or China, its software sector has grown quickly from a low base. The Vietnamese Government sees the software industry as a major economic sector; the software industry has grown at an average annual rate of 25 per cent over the last 5 years and the Government's goal is to achieve US$500 million in software exports and to have 25 000 professional programmers by 2005 (Austrade, 2002o).

In the rest of developing East Asia, software sectors are small and mainly domestically oriented. Indonesia's software segment is a small share of the overall ICT industry, with software companies providing solutions for business management, operating systems, accounting and payroll and other areas. Further expansion of the software industry will depend on the availability of trained software engineers. Thailand's local software industry is young and imports meet most packaged software market demand. As in most developing regional economies, US software is the industry leader with over 80 per cent of the market for business integration software, database management systems, database management tools, systems management and messaging applications (US Commercial Service, 2001).

IT Services

East Asia's ICT services market is growing more rapidly than either its hardware or software sectors, though its share of the ICT market is still relatively small (Figure 3.2).[11] The main ICT services users are banking and finance, government administration, state enterprise, telecommunications, media and some manufacturing sectors. A major trend is East Asian businesses' increasing acceptance of the contribution of application and system infrastructure service providers.

The ICT services market in the Asia Pacific, excluding Japan, is expected to grow at an average annual rate of over 20 per cent, to reach US$38.8 billion by 2006. Forecasts expect China will grow to become the third largest ICT services market in the world by 2003 (Internet.com International, from IDC forecasts, 26 August 2002). The ROK is expected to grow at 28 per cent per year between 2001 and 2006 and is set to overtake the size of Australia's ICT services market by 2005. Between 1996 and 2000, Korean computing services grew at a rapid average rate of 37 per cent and, from low levels, multimedia content development services grew by almost 50 per cent annually (Ministry of Information and Communication, 2001). Taiwan is moving beyond manufacturing to a range of higher end, knowledge intensive support services. Without particular strengths in manufacturing, Hong Kong focuses on product design and development, industrial engineering, management logistic support and marketing (Pierce and Maher, 2000).

Many regional economies lack sufficient skilled personnel to supply all ICT services demanded. For example, Thailand's computer services market suffers from a shortage of skilled ICT personnel to operate the equipment necessary to successfully run Internet, Intranet and e-commerce applications.

[11] ICT services production statistics across East Asia are not available.

Computer retailers provide maintenance services as a marketing tool. Hence, ICT consulting services are profitable in Thailand, particularly for ICT vendors, multinational consulting firms and local consulting firms which provide professional advice on aspects of ICT related technologies (US Commercial Service, 2001).

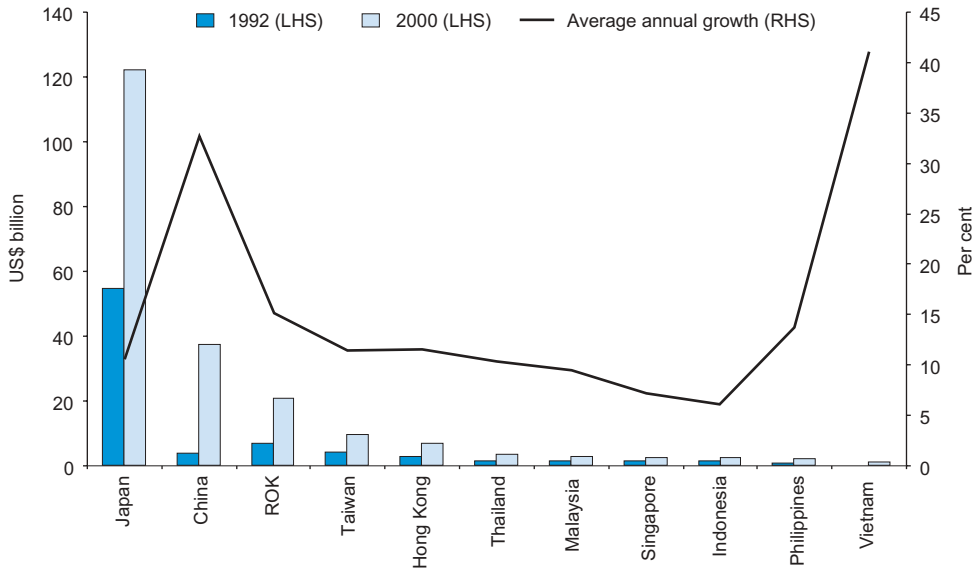
Telecommunications

While the world telecommunication services market grew more slowly in 2001 than in previous years, East Asia's market continued to grow strongly. In 2000, it accounted for almost 23 per cent of world telecommunication services revenue, up from 19 per cent in 1992. Japan's market is the largest in the region, however China is second largest and is growing quickly (Figure 3.9). In 2001, China overtook the United States to become the world's largest mobile phone market (International Telecommunication Union, 2002a). East Asian operators make up three of the top four mobile operators in the world in terms of subscribers.[12]

Figure 3.9

Telecommunication Revenues Growing Strongly

East Asian Telecommunication Services Revenue and Annual Growth, 1992 to 2000, US$ million and per cent



Source: International Telecommunication Union, 2002 and 1994.

12 As at December 2001, China Mobile was the largest with 69.3 million subscribers, Nippon Telegraph and Telephone DoCoMo was second with 39.6 million subscribers and China Unicom was fourth with 27.0 million subscribers (International Telecommunication Union, 2002). The Chinese mobile operators are either fully or partly owned by the domestic state enterprise fixed line operators.

Many international and domestic operators, including Telstra, are active in East Asia's telecommunication services markets, with several also in the mobile telephony and Internet service provider segments. Liberalising telecommunications industry investment including under the WTO's Agreement on Basic Telecommunications Services has allowed multinational telecommunication companies to participate in East Asian markets, including by joint venturing with local operators. In most regional economies increasing competition has reduced costs, particularly in mobile, international and Internet service provider segments.[13] However, several economies still have monopolies in local and long distance fixed line services (Table 3.3).

Table 3.3

Telecommunication Sectors Reasonably Competitive

East Asian and Australian Telecommunications Competition and Service Providers, by Country and Selected Segments[a]

Economy	Fixed domestic		Mobile		International	Internet service provider
	Local	Long distance	Analogue	Digital		
China	P	C	M	P	C	C
Hong Kong	…	-	-	…	…	…
Indonesia	M	M	C	C	P	C
Japan	C	C	…	C	C	C
ROK	C	C	C	C[b]	C	C
Malaysia	P	P	P	P	P	P
Philippines	C	C	C	C	C	C
Singapore	C	-	C	C	C	C
Taiwan	…	…	…	…	…	…
Thailand	P	P	C	C	M	P
Vietnam	P	M	P	M	M	P
Australia	C	C	C	C	C	C

Note: [a] C denotes competitive, P is partially competitive and M represents a monopoly.

[b] P in IMT2000 services.[14]

[c] An International Telecommunication Union competitiveness assessment is not available for Hong Kong, Taiwan or Thailand. Thailand's level of competition was estimated.

Source: International Telecommunication Union, 2002.

13 In competitive Internet service provider markets, prices may still be elevated by the pricing practices of the dominant backbone providers, particularly those who control significant shares of the US interconnection market.

14 International Mobile Telecommunications, IMT2000 is a third generation mobile wireless technology offering much higher data speeds to mobile and portable wireless devices; it can support converging technologies such as mobile or portable voice, images, data, and video communications at 384 kilobits per second up to 2 megabits per second.

Continuing telecommunications deregulation in line with WTO commitments should encourage ongoing demand growth, creating expanding ICT opportunities in industrialised and developing East Asia. Industrialised economies operate advanced telecommunications systems, featuring high bandwidth through international gateways. Hong Kong is a leading telecommunications hub in the region; its fixed and mobile telecommunications operators have committed to extend their networks and provide new value added and data services.[15] The ROK's telecommunication services are expanding rapidly, with revenue growth averaging 19 per cent between 1996 and 2000, mainly due to 36 per cent annual growth in mobile telephony (Ministry of Information and Communication, 2001). Singapore places great emphasis on developing and maintaining its advanced telecommunications infrastructure. Mainly because about half its over 5 000 multinational companies have substantial regional functions, Singapore is considered a strategic market in Asia's high growth telecommunications industry (Austrade, 2002l).

Malaysia also is upgrading rapidly its telecommunications infrastructure to meet strong demand for fixed and mobile phone services and value added services like e-commerce, interactive distance learning, video on demand and interactive multimedia content. The Malaysian Government plans to continue developing basic telecommunications infrastructure, targeting 250 Internet access points, 250 mobile phones and 500 fixed lines per 1 000 people by 2006. Fixed line growth slowed over the late 1990s, due to the Asian financial crisis, market saturation and the switch to mobiles (Minges and Gray, 2002). The integrated state owned company, Telecom Malaysia still dominates the fixed line market, with 99 per cent of fixed telephone lines in service. In March 2002, Malaysia had 7.8 million mobile telephone subscribers, growing strongly and with a mobile telephone penetration rate much higher than for personal computers, indicating good opportunities in value added on line services for mobile users.[16]

Telecommunications markets in developing East Asia are growing strongly, with most expanding and upgrading their telecommunications infrastructure. However, all need considerable further telecommunications investment to provide universal coverage and reliable services. In 2001, revenue from China's fixed telecommunication services market was US$27 billion and is projected to grow 18 per cent annually to reach US$52 billion by 2006 (The Economist Intelligence Unit, 2002i). Rapidly growing residential and business demand is due to lower installation fees and tariffs and shorter installation waiting times; local telecommunications companies mainly are meeting new demand by upgrading and extending national networks (The Economist Intelligence Unit, 2002f). Beijing now is receiving considerable Olympics related investment; by 2008, the Chinese Government expects Beijing's network communication capacity and technology will reach advanced economy standards (Ministry of Foreign Trade and Economic Cooperation, 2002). Under the current five year plan, the Ministry of Information Industry also will spend Rmb120 billion, US$14.5 billion, upgrading telecommunications networks in autonomous regions, aiming to increase fixed line and mobile phone penetration respectively to 5 and 10 per cent of their populations (The Economist Intelligence Unit, 2002b). In 2001, the Ministry planned

15 Hong Kong was the first city in the world to have a fully digitised fixed telephone network.

16 The number of mobile subscribers in Malaysia grew by 88.5 per cent in 2000 and 46 per cent in 2001 (Malaysian Multimedia and Communications Commission, www.cmc.gov.my, accessed 4 November 2002).

to use the latest technologies to expand the national fibre optic cable network, continue to expand and upgrade the existing global system for mobile network and deploy code division multiple access nationwide. The Ministry also is promoting new services such as mobile banking and mobile Internet, preparing to deploy third generation, 3G, mobile communications, improving management and billing systems and promoting Internet use (United States Commercial Service, 2001a).[17] The Chinese Government recently announced it would support a third, totally new, home grown standard for 3G, called TD-SCDMA; its main developer stated that it would be ready for commercial use in the second half of 2004 (www.wsj.com, 31 October and 1 November 2002).

Indonesia has only a basic telecommunications infrastructure with mobile services just taking off. While its long archipelago with many small islands hinders suppliers developing integrated telecommunications infrastructure, its network availability exceeds 99 per cent. However, in 2000, Indonesia had only 10 million installed lines for a population of over 212 million. Prior to the Asian crisis, the Indonesian Government planned to expand and modernise this network and services, indicating in 1995 it would install five million new telephone lines by the end of 1999.[18] However, the 1997 financial crisis disrupted this plan and little new telephone line construction has occurred since that time. Although currently low, Indonesia's mobile phone penetration is growing rapidly and the Government planned to develop 600 000 additional lines. As the Government reduces import tariffs to comply with WTO and ASEAN treaties, mobile phone handsets are becoming cheaper and their use is expected to rise. Nokia, a co-developer of wireless application protocol technology has committed to developing mobile Internet services in Indonesia.[19]

The Philippines' telecommunications market is one of the most competitive in the region, with five mobile cellular services companies, 12 domestic long distance providers, 11 international providers and at least two operators allowed to provide fixed services in each region. However, some analysts and authorities believe consolidation rather than more liberalisation is needed (Minges et al., 2002). As a result of a 1993 government directive requiring mobile cellular and international telephone operators each to install a specified number of fixed lines across different regions, the Philippines actually has an excess of fixed telephone line capacity. The telephone operators installed the target of 4 million lines by 2000; however, as prices did not fall, only 44 per cent of installed telephone lines

17 Third generation, 3G, refers to the latest developments in personal and business wireless communications technology. It offers high bandwidth services. Ultimately, 3G is expected to include capabilities and features such as enhanced multimedia (voice, data, video, and remote control), usability on all popular modes (cellular telephone, email, paging, fax, videoconferencing, and Web browsing), broad bandwidth and high speed (upwards of 2 megabits per second), routing flexibility (repeater, satellite, local area network), operation at approximately 2 gigahertz transmit and receive frequencies and roaming or always connected capability throughout Europe, Japan, and North America. While 3G is generally considered applicable mainly to mobile wireless, it is also relevant to fixed wireless and portable wireless (searchnetworking.techtarget.com/sDefinition).

18 Under five year plan targets, local exchange capacity was to reach 10.5 million lines or 5.1 per 100 inhabitants by 1999, increasing to 60.7 million lines or 23.6 lines per 100 inhabitants by 2019 (Minges, 2002). This was to be achieved in cooperation with private consortia under agreements, known as Kerjasama Operasi with 15 year concessions to provide fixed line telephony services and share revenues.

19 Nokia introduced its 'media phone', a mobile phone based on wireless application protocol technology and teamed with Indonesian cellular operators to introduce wireless application protocol. Two of Indonesia's three mobile phone companies became wireless application protocol-compliant at the end of 2000, with Excelcomindo being the first to provide wireless Internet services in April 2001.

were in use at the end of 2000 (Minges et al., 2002). Furthermore, due to past long connection delays, poor fixed line service and reasonable mobile charges, mobile telephone use has grown exponentially, tripling from 400 000 subscribers in 1995 to around 6.5 million in 2001, undermining fixed line demand. The Philippines is the only country in East Asia where mobile telephony has surpassed fixed and is only the thirteenth economy in the world to achieve this (Minges et al., 2002). An interesting feature is the use of the short or text messaging systems; Philippine phone users send an average of 30 to 35 million text messages a day, indicating mobile applications and value added services such as downloadable games, ring tones and logos are major potential growth areas.

Authorities also are expanding Thailand's telecommunications infrastructure to meet the growing demand for services. As part of its Eighth National Plan 1997-2001, the Government announced it would install 6 million fixed telephone lines and increase private sector participation in telecommunications (Austrade, 2002n). The plan anticipates significantly increasing rural public long distance telephone lines and submarine fibre optic cables, issuing licences for new mobile phone service providers and constructing satellite earth stations. If fulfilled, these plans would assist e-commerce expansion. Mobile provider Advanced Information Services also plans to expand the number of base stations, upgrade software, increase the capacity of its switching systems and transmission networks, achieving higher data communication speed and developing applications (Austrade, 2002n). Thailand's wireless market is growing rapidly, with approximately 2.1 million mobile phone subscribers and an expected annual growth rate of 10 per cent. This should increase opportunities to supply Internet products and services via mobile telephones. Over 2001-02, deregulation boosted Thailand's mobile services; now, mobile handsets purchased anywhere in the world can connect to the local network, dramatically reducing the initial purchase cost of handsets.[20] Opening the market to foreign investment expanded the mobile market, including to less affluent consumers and the traditionally poorly serviced provinces, where a boom in telecommunications infrastructure and a price war rapidly increased consumers' network access.

Although small, Vietnam's telecommunications sector also is growing quickly, averaging over 34 per cent annually from 1993 to 2001. By the end of 1998, Vietnam had around 2 million phone lines compared to only 127 000 in 1991. Since 1992, the Vietnamese Government has prioritised telecommunications infrastructure; as a result the network now employs some of the most modern telecommunications infrastructure in the region. Most major telecommunications companies, including Telstra, have offices in Vietnam and agreements with Vietnam Posts and Telecommunications Corporation to supply telecommunications equipment and provide services. Vietnam Posts and Telecommunications Corporation uses business cooperation contracts with foreign telecommunications companies to jointly provide services; Telstra was an early and significant participant in these agreements.[21] Between 2001 and 2005, the Government plans to construct a modern telecommunications network offering a much wider range of

[20] For example, UK company Orange took advantage of deregulation to offer very cheap handsets at flexible rates.

[21] Since 1988, Telstra has entered into several contracts with Vietnam Posts and Telecommunications Corporation, including constructing satellite earth stations, developing and managing the international services network and domestic long distance network and supplying services under an Internet Service Agreement (Kelly and Minges, 2002).

telephony and data transmission services. The Government aims to raise telephone penetration to 12 to 15 telephone lines per 100 people by 2010 or about 10 million lines. To achieve this, Vietnam will need to invest about US$6.3 billion in telecommunications equipment by 2010, providing considerable commercial opportunities (Austrade, 2002o). The mobile telephone market also is growing quickly; without an older mobile system in place, Vietnam has created a modern, digital system from scratch and wireless technology is expected to leapfrog fixed line networks in connecting remote and rural areas (International Trade Administration, 2000).

East Asian economies increasingly are accessing cheaper calls by implementing voice over Internet protocol telephony.[22] For example, China's Internet protocol telephony services supply almost half the time spent on all long distance calls.[23]

Broadband

Telecommunications companies are rolling out broadband networks across East Asia, particularly in Hong Kong, Japan, ROK, Malaysia and Singapore. Because of strong competition between digital subscriber line and cable Internet providers, relatively low service charges, a strong demand for broadband and the government constructing a high speed fibre optic backbone linking 144 major cities, the ROK has the highest rate of broadband penetration in the world; it has 9.86 million connections, almost half the region's total of 20.9 million (Telecom Asia, October 2002).[24] Also, the ROK has one of the most geographically concentrated populations in the world, making broadband infrastructure cost effective. Hong Kong's advanced telecommunications infrastructure includes a broadband network covering all commercial buildings and more than 95 per cent of households. Singapore has an advanced broadband network in the government built Singapore ONE, a national initiative delivering a advanced interactive, multimedia applications and services to homes, businesses and schools throughout Singapore.[25] Japan's current broadband Internet use is limited but is increasing rapidly.[26] The Philippines has 14 000 installed digital subscriber lines with the consumer market accounting for 80 per cent of digital subscriber line use. Filipinos demand high speed Internet access and email, Net meeting or

22 Voice over Internet protocol delivers voice information using the existing infrastructure and transmission methods of the Internet protocol. In general, this means sending voice information in digital form in discrete packets rather than in the traditional circuit committed protocols of the public switched telephone network. Voice over Internet protocol and Internet telephony allows customers to avoid tolls charged by ordinary telephone services (www.searchNetworking.com, accessed August 2002). However, quality and speed may reduce.

23 Long distance calls through China Telecom are expensive because they subsidise local call business (The Economist Intelligence Unit, 2002d).

24 Digital subscriber line uses existing two wire copper telephone network to deliver higher speed data services, ranging from 144 kilobits per second to 1.5 megabits per second or 2.5 to 25 times faster than a standard 56 kilobits per second dial up modem. Thus, it provides continuous, 'always on' Internet access and use of the telephone at the same time and delivers bandwidth intensive applications like streaming audio/video, on line games, application programs, telephone calling, video conferencing and other high-bandwidth services.

25 Singapore ONE includes two distinct but integrated levels; a high capacity broadband infrastructure network and switches and advanced applications and services taking advantage of the infrastructure's high speed and capacity capabilities (www.s-one.gov.sg/, accessed 25 October 2002).

26 Due to heavy investment in integrated services digital network in the early 1990s, Nippon Telegraph and Telephone is alleged to be reluctant to encourage growth of digital subscriber line and it is trying to promote a fibre to the home service (Kirkman et al., 2002). Integrated services digital network is a communication standard enabling the interconnection of a variety of mixed digital transmission services; it can increase data transfer speeds up to 128 kilobits per second over ordinary copper telephone lines.

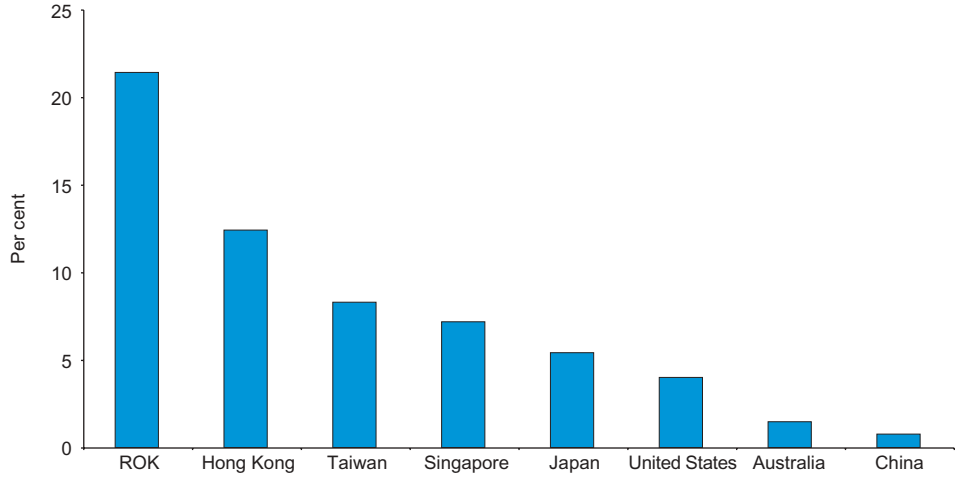
Internet protocol based video conferencing, on line gaming and gambling and Internet protocol based entertainment such as downloading and recording of music, video clips, news and on line shopping (Metropolitan Computer Times, www.mctimes.net, accessed 12 September 2002).

In other regional economies, subscribers access the Internet through dial up, leased lines and very small aperture terminals.[27] Access to broadband will increase as fixed line telephony is liberalised further; in the past, closed regulatory environments limited bandwidth capacity development. As broadband becomes more prevalent, opportunities for e-commerce and on line games will expand.

Figure 3.10

Broadband Take Up Strong in Industrial East Asia

East Asian Broadband Penetration Rates, 2002, Per cent



Source: Telecom Asia, October 2002, pp. 18-21.

E-Commerce

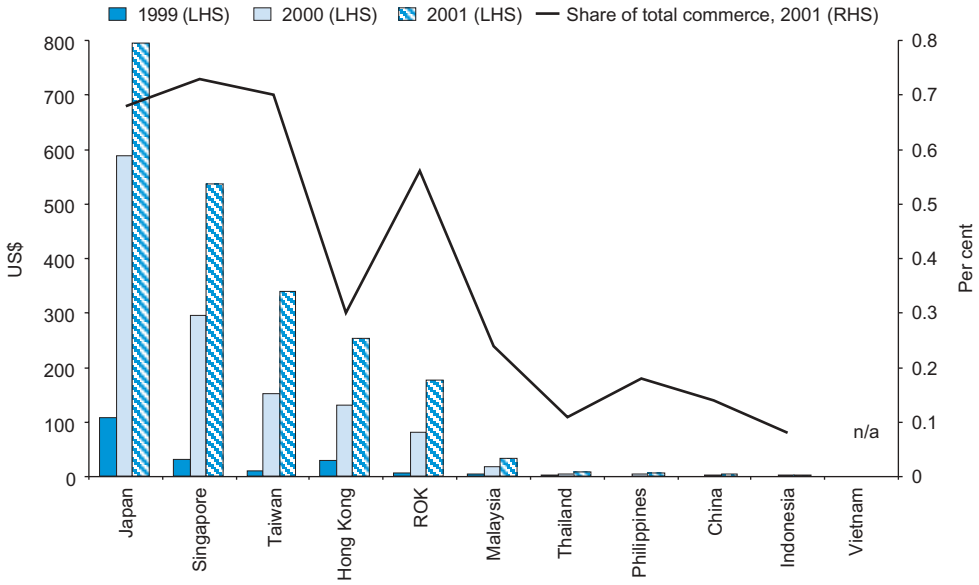
East Asian e-commerce is growing exponentially from a low base, with industrialised East Asia increasing rapidly its per capita spending on Internet commerce (Figure 3.11). From 1999 to 2001, China's level of Internet commerce grew 763 per cent, the most rapid in the region, followed by Taiwan at 521 per cent and the ROK at 434 per cent.

[27] Very small aperture terminal is a satellite communications system that handles data, voice, and video signals. A user needs a box that interfaces between the user's computer and an outside antenna with a transceiver which receives or sends a signal to a satellite transponder. The satellite sends and receives signals from an earth station computer that acts as a hub for the system; each end user is interconnected with the hub station via the satellite. For one end user to communicate with another, each transmission has to first go to the hub station which retransmits it via the satellite to the other end user's very small aperture terminal. This system offers a number of advantages over terrestrial alternatives; companies can have total control of their own communication system without dependence on other companies and both business and home users get higher speed reception than if using an ordinary telephone service or an integrated services digital network (searchnetworking.techtarget.com, accessed September 2002).

Figure 3.11

Internet Commerce Growing Rapidly

East Asia's Internet Commerce, Per Capita and Share of Total, 1999 to 2001, US dollars and per cent



Source: International Data Corporation, 2002.

While e-commerce has expanded quickly since 1999 it remains low as a share of total regional commerce. Industrialised East Asia has lower levels of e-commerce than developed economies like the United States and, as would be expected, developing East Asian e-commerce is even less advanced. To promote e-commerce, authorities in many regional economies need to strengthen regulatory environments. For example, Hong Kong's share of Internet commerce in total commerce is low compared to other industrialised East Asian economies with stronger e-commerce regulation; this suggests medium term expansion opportunities for the sector as regulation strengthens. Internet shopping in the ROK exploded in 2002 with 31 per cent of Internet users making on line purchases, compared to 14 per cent in Australia. This is the highest rate in Asia, and second only to the United States at 32 per cent.

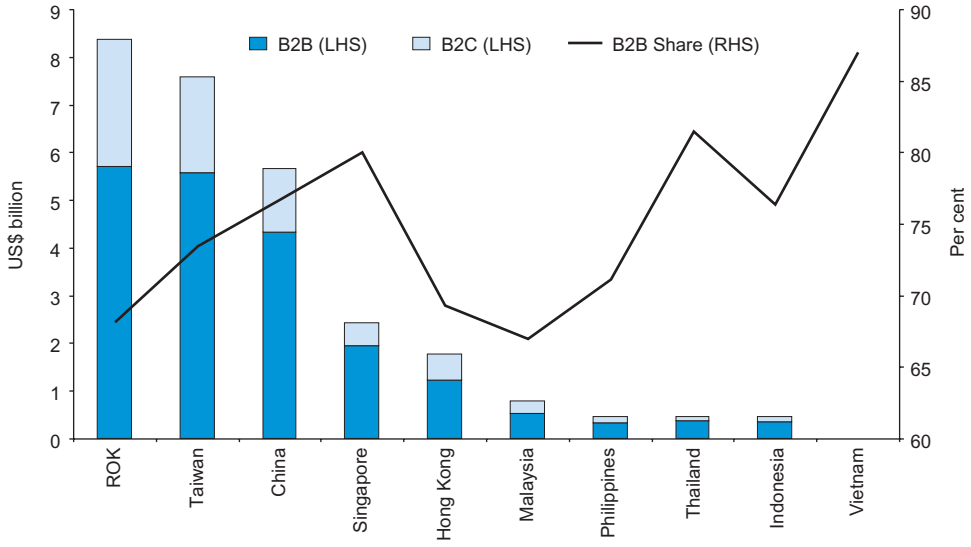
Most East Asian Internet commerce is between businesses, with business to consumer, B2C transactions unexpectedly low. In 2001, business to business, B2B's share of total Internet commerce ranged from 90 per cent for Japan to 67 per cent for Malaysia (Figure 3.12).[28]

[28] Japan has the highest amount spent via Internet commerce, with US$101 billion or over 78 per cent of East Asia's total; Vietnam has the lowest at US$11 billion (International Data Corporation, 2002).

Figure 3.12

B2B E-Commerce Dominates

East Asia's Internet Commerce and B2B's Share, 2001, US$ billion and per cent



Note: Japan is not included in this figure as it would distort the scale; it has very high e-commerce levels, with B2B Internet e-commerce of US$90.9 billion and B2C Internet e-commerce of US$10.1 billion

Source: International Data Corporation, 2002.

Most of the region's successful portal providers and leading B2B marketplace players are its major export oriented industries. Industries including ICT, automotive, shipping, chemicals, steel, clothing and healthcare are active in the B2B marketplace. Most of these industries require short and precise input delivery times to save time and costs in their supply chains, forcing suppliers and buyers to use B2B ordering. For example, many original equipment manufacturers source their components from Japan, Taiwan, China, Malaysia and the Philippines, requiring their suppliers to adapt their own supply chain management technologies. Larger suppliers employ multi purpose portals to meet their customers' demands. Trading companies increasingly are establishing on line marketplaces to support vertically integrated industries such as manufacturing and shipping.

Vertical portals, or vortals, are challenging the traditional horizontal business models, providing customers with complete services, including procurement, insurance, logistics, shipping and delivery. Vortals have developed strategic alliances among infrastructure providers, suppliers, trading companies, content providers and insurance companies. The healthcare industry also is establishing portals; sales of medical supplies and pharmaceutical drugs are forecast to be the fastest growing segment of B2B over the next few years.

ICT AND E-COMMERCE SUPPORT

East Asian governments actively support the ICT industries and e-commerce, recognising their importance to economic growth. Industrialised East Asian governments have supported the industry over many years, starting with high technology equipment producers, while the developing East Asia economies only recently have emphasised the industry's development. Notably, the Korean and Malaysian governments provide significant support. Most government support programs assist the industry directly, improve ICT infrastructure, encourage e-commerce through legal framework, e-security and other initiatives, provide ICT skills for the labour force and reduce the digital divide (Table 3.4). Liberalising the telecommunications sector and industry regulation, discussed more fully below, also are important.

Table 3.4

Government Support Strongly Underpins the ICT Industry

Major Current East Asian Government Programs Supporting ICT

Economy	Policy body	Major programs	R&D/Incubators	e-government
China	State Leading Group on Informatization Ministry of Information Industry	Tenth Five Year Plan and 2015 Long Term Development Plan (being developed)	Science Park and cyber cities	Government Online Project
Hong Kong	Information Technology and Broadcasting Bureau	Digital 21	Hong Kong Science and Technology Parks Corporation, Cyberport, Science Park, CyberIncubator and Applied Research Fund	e-Government Strategy
Indonesia	Ministry of Communication and Information Directorate General of Posts and Telecommunications	Blueprint of Policy on Telecommun-ications Information Infrastructure Development Project	Several private sector schemes	Government Online National Action Plan
Japan	Telecommuni-cations Bureau, Ministry of Public Management, Home Affairs, Posts and Telecommunications	Millennium Project e-Japan Strategy	National research institutes Prefectural government technology parks	e-Japan Strategy 2001-03
ROK	Ministry of Information and Communication	Cyber Korea 21 Five Year Plan to develop ICT	Revitalising the venture capital market	Silkroad 21

Economy	Policy body	Major programs	R&D/Incubators	e-government
Malaysia	Ministry of Energy, Communications and Multimedia	Eighth Malaysia Plan 2001-2005 Vision 2020, including Multimedia Super Corridor National Information Technology Agenda	Multimedia Super Corridor	Several initiatives including the Government Multipurpose Smart Card and networking between agencies
Philippines	Information Technology and Electronic Commerce Council Department of Transportation and Communications	National Information Technology Action Agenda for the 21st Century Medium Term Philippine Development Plan 2001 to 2004	Science and technology parks	Government Information Systems Plan, or Philippine Government Online
Singapore	Ministry of Communication and Information Technology Infocomm Development Authority	Infocomm 21 Vision	Science hubs	e-Government Action Plan e-Citizen service portal
Taiwan	Ministry of Economic Affairs (including the Institute for Information Industry and the National Information Infrastructure Steering Committee); Ministry of Transport and Communication	National Information Infrastructure Project e-Taiwan Plan	Industrial parks	e-Government Project Government Service Network and developing applications
Thailand	National Science and Technology Development Agency, including National Information Technology Committee Ministry of Transport and Communications	IT2000 (1995) and IT2010 (being developed) Ninth National Economic and Social Development Plan 2002-06 e-Thailand Project	Software Park Board of Investment Incentives	Government Information Technology Services 2001-06 Government Information Network Government District Offices Online Program
Vietnam	Ministry of Posts and Telecommunications	ICT Master Plan 2001-05 E-commerce Development Project	ICT parks	E-Commerce development strategy

Sources: Austrade, 2002 various; www.gbde.org, accessed 16 September 2002.

Most industrialised regional economies are implementing policies to develop modern ICT infrastructure, skilled ICT labour forces and high levels of new technology take up. Both Hong Kong and Singapore seek to become digital cities to drive their expansion. Singapore has been successful in making ICT a cornerstone of the economy and, from the mid 1970s, invested heavily in ICT infrastructure (Kirkman et al., 2002). The ROK's Cyber Korea program aims to make the ROK the information hub of Asia; its ICT sector contributed significantly to its recovery from the Asian financial crisis. The National Information Infrastructure project drives investment and decision making across several ministries includes deregulating telecommunications and improving related laws, expediting network construction by developing network exchanges, broadband networks, telecommunication and community access television network interconnection and integrating computer and network education into all education levels. The Government is committed to extending ICT applications, developing Internet related industries and enhancing research and development. The Taiwanese Government wishes to make Taiwan an e-commerce hub for the region. Primarily by dealing with the challenges facing the ICT sector, Japan's e-Japan program aims to help Japan catch up to other industrialised economies' ICT adoption rates and make Japan the leading ICT nation.

Malaysia has a grand vision to become a knowledge economy; its Vision 2020 plan is an aggressive and comprehensive ICT program permeating all aspects of the economy and society, including telemedicine, e-government, education and industry. A major element is the Multimedia Super Corridor an ultra high technology business city aimed at attracting foreign ICT and service companies (Kirkman et al., 2002).

Developing East Asian governments also recognise the importance of adopting ICTs to global competitiveness and have implemented programs to improve infrastructure and services, develop skills and encourage the up-take of the new technologies. The Philippines' Government gives high priority to dispersing ICT capabilities across a broad range of economic activities and income groups. The Government also aims to increase the economy's capability to become a knowledge centre, achieve its selected market niche in software development and data management and become the e-services hub of Asia. However, the Asian financial crisis significantly affected many government ICT support programs, particularly in Indonesia and Thailand.

REGULATORY ENVIRONMENT

As elsewhere, East Asia's telecommunications and e-commerce sectors are subject to a significant regulation, which impacts on the speed of ICT industry growth and e-commerce take up.

Telecommunications Regulation

Over the past decade, and earlier in some economies, most East Asian economies deregulated and liberalised their telecommunications sectors to varying degrees. Many separated post and telecommunication services, split policy and regulatory functions from operator functions, permitted private sector competition and implemented regimes controlling interconnection charges (Table 3.5).

Table 3.5

East Asia's Telecommunications Sector Slowly Deregulating

Telecommunications Regulatory Environment in East Asia

Country	Start of deregulation	Incumbent operator[a]	Regulator	Regulatory independence	Interconnection rules
China	1993	State owned; corporatised	Ministry of Information Industry	No	Yet to be determined
Hong Kong	1996	Fully privatised	Office of the Telecommunic-ations Authority	Yes	Yes; fair
Indonesia	1995	Partially privatised	Directorate General of Posts and Telecommun-ications or Postel[b] Planning Bureau	No; but IMF commitment	Yes; set by operators under guidelines
Japan	1985	Partially privatised	Telecommunic-ations Bureau, in the Ministry of Public Manage-ment, Home Affairs, Posts and Tele-communications	No	Yes; onerous
ROK	1997	Fully privatised	Korea Communications Commission	Yes	Yes; cost based and agreements approved
Malaysia	1996	Partially privatised	Malaysian Communications and Multimedia Commission[b] 1998	Yes	
Philippines	1995	Fully privatised	National Tele-communications Commission 1987	Yes; decisions appealed to Supreme Court	Yes; mandatory
Singapore	1993	Partially privatised	Info-communic-ations Develop-ment Authority[b] 1999	Yes	Yes; appear fair and transparent
Taiwan	1996	Partially privatised	Directorate-General of Telecommunications, in the Ministry of Transport and Communication	No	Yes; some difficulties
Thailand	1993	State owned; corporatised	Post and Telegraph Department of Ministry of Transport and Communications	No	No; revenue sharing system in licensing process
Vietnam	-	State owned, not corporatised	Ministry of Posts and Telecommunic-ations	Not as yet	No

Notes: [a] The incumbent operator refers to the former monopoly operator before the introduction of competition.

[b] Recognising technological convergence, these regulators are responsible for telecommunications, ICT and broadcasting.

Source: APEC Regulatory Outlook, 2001; International Telecommunication Union, 2002a and 2002b.

Although the Japanese Government has taken significant measures to foster a more competitive telecommunications regulatory regime and market, Japan's telecommunications market remains highly regulated and activities of the dominant carrier constrain competition. In 2001, the Government amended the Telecommunications Business Law to acknowledge the importance of competition, enhance Japan's system of dominant carrier regulation, establish a category for wholesale services, clarify competitive and anti-competitive behaviour and introduce a new dispute resolution mechanism (United States Trade Representative, 2002).[29] The Government also moved to open optical fibre networks to competitors. Further, in 2002, authorities conducted a review of telecommunications policy aimed at promoting competition and developing a networked society. However, analysts express concern political and industry interests still can impede the regulator from enforcing competition.[30] The United States has asked Japan to address specific market access impediments, including interconnection rates, cross subsidises from competitors to retail customers, lack of regulatory independence and discriminatory pricing by the dominant carrier.[31] Also, new entrants face costs and difficulties in building competing networks due to problems securing 'rights of way'; laying of cables and building facilities face a labyrinth of onerous restrictions.

The ROK has made significant progress in liberalising its telecommunications sector. The Korean Government has liberalised the telecommunication services market faster than it was obliged to do under the WTO Basic Telecommunications Services Agreement. From 1998, the new laws and later amendments relating to the telecommunications industry have privatised Korea Telecom and other state owned firms, increased the limits on foreign ownership in the sector, allowed for number portability, mandated local loop unbundling and introduced new services such as international simple resale and Internet telephony; these developments led to a tremendous growth in the telecommunication services sector and a more competitive market environment (Ministry of Information and Communication, 2001). The ROK is the world leader in code division multiple access wireless technology and broadband Internet services and applications.

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29 Dominant carrier regulation focuses regulatory oversight on dominant carriers, that is carriers that control services or underlying facilities, while allowing carriers without market power to operate with minimal restraint; the aim of such regulation is to speed the introduction of new services and technologies.

30 Recent enforcement actions by the Japan Fair Trade Commission regarding access to Nippon Telegraph and Telephone facilities and challenging unfair marketing practices are an important step in developing regulatory independence (United States Trade Representative, 2002).

31 The United States, Australia and the EU are concerned that Japan's telecommunications wholesale market is not open. Even with recent significant reductions, the interconnection rates Nippon Telegraph and Telephone, NTT, regional operators charge competitors to use their networks are substantially higher than in other developed economies, although a revised pricing model may address this concern. Although the law now prohibits operators charging high costs to competitors while subsidising the service for their retail customers, Ministry of Public Management, Home Affairs, Posts and Telecommunications does not have effective means to identify when this anti-competitive behaviour occurs. The MPHPT also is engaged in policy development while regulating a dominant carrier. NTT regional companies also adopt discriminatory pricing schemes ensuring traffic stays on NTT's network. For example, NTT's subscribers cannot get discounts on calls to numbers on competitors' local networks; this particularly affects ISPs, who are forced to locate on NTT's network to service NTT's huge customer base. As a result, competitors lose the ability to host ISPs on their networks, have to pay substantial interconnection fees when their subscribers access ISPs on NTT's network and cannot match the flat rates for dial-up services NTT offers (United States Trade Representative, 2002).

The Taiwanese government also has liberalised the telecommunications industry, reducing the Directorate-General of Telecommunications' monopoly power. In 1996, it spun off Directorate-General of Telecommunications' business arm to form Chunghwa Telecommunications Corporation; in 1997 and 2000 it began deregulating mobile telephony and privatising Chungwha. It also awarded three extra licences for fixed telecommunication network services, opening up the broadband sector to competition. Deregulation of the mobile sector increased competition and lowered prices, causing mobile phone penetration to surge from under 7 per cent at the end of 1997 to around 97 per cent in 2002. Market churn and the low potential for future growth in an island economy is causing concern as the market has reached maturity. During 2002, Taiwan plans to develop criteria for issuing new licences, including those for domestic long distance and international services. However, fixed line operators have experienced difficulties in negotiating reasonable interconnection arrangements at technically feasible points in the dominant carrier's network and the regulator has been slow in resolving these difficulties (US Trade Representative, 2002). The Directorate-General of Telecommunications submitted revised regulations to Parliament preventing fixed line operators from hampering others' interconnection rights. Government regulation and arbitration between carriers remain serious issues. The regulatory framework remains ill equipped to deal with the challenge of competition; new competitors face enormous hurdles in building networks quickly and efficiently and once operational, new networks remain vulnerable to anti competitive conduct (American Chamber of Commerce in Taiwan, 2002). This has impacted negatively on the roll out of asynchronous digital subscriber line.

Although Malaysia's telecommunications sector still exhibits low levels of competition, its telecommunications regulation now is reasonably pro-competitive. In 1989, Malaysia began opening its telecommunications market; previously Telecom Malaysia Berhad was the only telecommunications provider. Between 1993 and 1995, the regulator granted various operating licences to three companies. Under the WTO Basic Telecommunications Services Agreement, Malaysia made limited commitments on most basic telecommunications services and partially adopted the reference paper on regulatory commitments (United States Trade Representative, 2002). The Malaysian Communications and Multimedia Commission replaced the service-based licences with four generic licence types which are technologically neutral. While these place emphasis on the activity rather than the technology, this approach may create other problems; for example, mobile communications may require several licences (Minges and Gray, 2002). In July 2002, the Malaysian Communications and Multimedia Commission awarded conditional 3G spectrum licences to Telekom Malaysia and Maxis Communications.

Telecommunications markets in China, Indonesia, Thailand and Vietnam generally are less competitive than industrialised economies' markets. Two state owned operators dominate China's market, but the Government has made progress in increasing competition in telecommunications services. In the 1990s, the Government separated post and telecommunications services, divorced policy and regulatory functions from operational functions, developed a telecommunications law and lowered connection costs. In May 2002, the Government formally split China's largest telecommunications company, China Telecom, into two companies, China Netcom Communications Group in the north and China Telecom in the other provinces. This step is designed to break China Telecom's monopoly and enhance competition as part of the World Trade Organization accession commitments; however,

much work remains to be done to implement the changes.[32] While telecoms companies will be able to compete against each other, the plan is unlikely to spur genuine competition as the two carriers would continue to dominate in their respective regions through monopolistic control of the local network and the last mile connection (*South China Morning Post*, 22 May 2002). Hence, true competition will depend on the Government's ability to enforce rules on interconnection and entry assistance. The Government recently issued two additional 3G mobile licences, to China Telecom and China Netcom Communications Group, creating the risk a duopoly will control lucrative mobile licences and fixed line networks. Creating a telecommunications regulator and developing new regulations are major policy issues; the current regulations are vague and lack details (United States Trade Representative, 2002).

Partly due to WTO commitments and International Monetary Fund conditions, Indonesia also is liberalising its telecommunications market slowly. The Government partially privatised the two state owned companies, PT Telkom and PT Indosat, no longer requires PT Telkom to have equity in all telecommunications operators and removed cross ownership conflicts of PT Telkom and PT Indosat. PT Indosat gained management control over Satelindo, giving it a monopoly over international telephone traffic until August 2003 (Minges, 2002). The changes resulted in PT Telkom and PT Indosat forming a duopoly in the short term. In early 2002, PT Telkom lost its monopoly over local fixed line services, eight years ahead of schedule, and will lose its exclusive rights for long distance in 2003, rather than 2005. Thus, PT Telkom can provide international telecommunications services from 2003 and PT Indosat can provide local services in 2002 and domestic long distance services in 2003 (Minges, 2002). Operators determine interconnection rates and end user tariffs based on government guidelines and telecommunications network operators are obligated to interconnect their network to other network operators on request (Minges, 2002). In January 2002, the government raised telephone tariffs closer to market levels; this should make the market more attractive to private investors (United States Trade Representative, 2002).

Thailand also has some way to go to increase competition in the telecommunications sector. In February 2001, Thailand's state privatisation committee approved plans to restructure the fixed line operator, Communications Authority of Thailand, and the international operator, Telephone Organisation of Thailand; in September 2001, the Parliament passed a new Telecommunications Bill to reform the telecommunications sector including corporatising the Telephone Organisation of Thailand. The Government planned to partially privatise the two agencies and considered merging them prior to privatisation (United States Trade Representative, 2002). However, privatisation is some

[32] Under the latest changes, two of China's seven national basic telecommunications companies, China Netcom, a data communications operator and Jitong, will merge with China Telecom's ten northern subsidiaries to form China Netcom Communications Group. China Telecom subsidiaries in the other 21 provinces and municipalities in southern and western China will retain the China Telecom name. The other national companies will continue to operate separately. In 1999, the Government split China Telecom into four major operating companies; China Telecom kept fixed line and data network operations, the mobile division was spun off and named China Mobile Communications, the satellite division became China Satellite Communications, ChinaSat, and China Telecom's paging operations, Guoxin, was spun off and transferred to China Unicom. Established in 1994 as a competitor to China Telecom, China Unicom was only strong in the mobile market at that time (The Economist Intelligence Unit, 2002e).

way off and a merger now is not likely. The Government also intended to establish a National Telecommunications Commission by October 2000, but this has stalled. Until it begins operating, issues such as licensing, interconnection and standards remain unclear (United States Trade Representative, 2002). If it is established, the National Telecommunications Commission should develop new market rules, helping to increase Internet penetration and develop e-commerce.

While the Vietnamese Government has allowed new state enterprises to enter the telecommunications market, an integrated state owned monopoly dominates the sector and hence it is largely uncompetitive. The Government is drafting a new telecommunications act, which should separate policy and regulatory functions.

In contrast, Singapore, Hong Kong and, to a lesser extent, the Philippines have competitive telecommunications sectors. In April 2000, two years ahead of schedule, Singapore fully opened the sector to competition. The Info-Communications Development Authority developed what appears to be a fair and impartial framework for competition, the Code of Practice for Competition in the Provision of Telecommunications Services, based on technological neutrality and tighter regulation of the dominant licensee.[33] Some doubts have been expressed about the degree of independence of Singapore's telecommunications regulator. The telecommunications chapter of the recently negotiated Singapore Australia Free Trade Agreement seeks to extend transparency requirements on all regulatory matters so as to include all decision makers and not merely decisions of the regulator.

The Hong Kong Government commenced significant telecommunications market reform only in May 1999 but then introduced a moratorium on additional local fixed line operators until 1 January 2003. A June 2000 amendment to the Telecommunications Ordinance strengthened the Government's authority to intervene in the market if dominant operators engaged in anti competitive behaviour.[34] In 2001, OFTA announced plans to issue four licences for 3G mobile services, with the networks likely to become operational in 2005; the new licensees must open at least 30 per cent of their network capacity to non-affiliated mobile virtual network operators.[35] In January 2002, the Office of the Telecommunications Authority reaffirmed its commitment to fully liberalise the local fixed telecommunications market from 1 January 2003 and is evaluating plans to 'front load' the licensing process by awarding licences prior to 2003. This may allow new licensees to proceed with business plans and start constructing networks to prepare for market opening (US Commercial Service, 2001).

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33 In 1992, Singapore was one of the first economies to establish a sector specific telecommunications regulatory body, the Telecommunication Authority of Singapore, which the Info-communications Development Authority replaced in 1999.

34 The Hong Kong Office of the Telecommunications Authority recently has faced litigation and criticism from telecommunications players which believe that it is not intervening in the market when it should to deal with activities of Pacific Century Cyber Works, the former monopoly provider.

35 Mobile virtual network operators are wireless network operators who may not own the wireless spectrum or wireless infrastructure but give a virtual appearance of owning a wireless network. These operators lease the pipe or wireless capacity from traditional operators and then repackage it for a specific vertical industry application. Mobile virtual network operators' main added is in billing and customer care functions. Mobile virtual network operators generally provide both voice and data services to end users through a paid up subscription agreement (www.mobileinfo.com, accessed 4 November 2002).

The Philippines' telecommunications market is unusual in the region in that it was formerly dominated by an inefficient private sector monopoly, Philippines Long Distance Telephone; but, it has recently been opened to domestic and international competition. This company still plays a dominant role in the market, controlling the fixed line network. The new regulatory regime promotes universal access, supports and sustains competition and liberalisation, sets down mandatory interconnection of all public telecommunications networks and aims to promote consumer welfare (National Telecommunications Commission, 2001).[36] Due to the presence of a dominant player, the regulatory authority closely regulates local exchange service providers, but regulates inter-exchange, international and cellular mobile radio service providers more lightly. Radio paging and value added service providers are deregulated. While only licensed telecommunication operators can provide voice over Internet protocol this is not the case for computer to computer Internet calls (Minges et al., 2002).[37]

Regulation of Internet Service Providers

In general, East Asia's Internet service provider sector is competitive and lightly regulated. However, the Chinese, Vietnamese and a few other governments seek to limit the free flow of information via the Internet. China's Internet service provider sector and the Internet itself are heavily regulated by an assortment of authorities, constraining the free flow of information and consumer privacy needed for e-commerce (United States Trade Representative, 2002).[38] The system allows for one way to access the Internet from China through the international gateway controlled by the Ministry of Information Industry; any new international connection requires the approval of the State Council (Coudert Brothers LLP, 2000). China has six interconnecting networks; two academic and four commercial ones. As the interconnecting networks charge access networks high access fees, the number of Internet service providers is likely to remain flat (Baker and McKenzie, 2000).[39]

In Singapore, the Internet falls under broadcasting restrictions in the Singapore Broadcasting Authority Act. The Act requires Internet service providers to channel all incoming and outgoing Internet traffic through Internet access service providers who function as gateways to the Internet and must block access to 100 Internet sites the Government considers obscene, excessively violent or likely to incite racial or religious conflict (US Trade Representative, 2002). Internet service providers and Internet access service providers must be licensed. Internet service resellers, people with personal web

[36] It also instructs the Government to sell publicly held telecommunication assets, calls for operators to list up to 30 per cent of their shares, sets out the duties and obligations of public telecommunications operators, lays down interconnection rules and gives the National Telecommunications Commission the right to establish tariffs for telecommunication services (Minges et al., 2002).

[37] Due to difficulty in obtaining a congressional franchise, this policy protects existing telephone companies and impedes the growth of voice over Internet protocol.

[38] The Chinese authorities control encryption and regulated Internet content, developing a system of companies and organisations and a limited number of 'interconnecting networks to control access to the Internet. 'Access networks', essentially Internet service providers, give users access to the Internet at a local level and can only connect to the global Internet through interconnecting networks (Baker and McKenzie, 2000).

[39] These very high internal access fees may be seen as inconsistent with China's leading role in moves within the International Telecommunication Union against the high access fees charged by the global backbone providers.

pages, software developers, providers of raw financial information and news wires services do not have to register, but Internet content providers or individuals who provide web pages for political or religious causes must be licensed (US Trade Representative, 2002).

In Indonesia, the Internet is classified as broadcasting and subject to censorship. Enforcement is unclear as implementing regulations do not exist but standards suggest that material offensive to morality, social harmony and politics is unacceptable (Baker and McKenzie, 2001c).

In Malaysia, content on the Internet is not formally controlled under the terms of the *Communications and Multimedia Act* and cannot be controlled or censored. The Government aims to deal with content through industry codes of practice and self-regulation (Minges and Gray, 2002).

E-Commerce Regulation

A major prerequisite for e-commerce take up is a strong legal and regulatory structure to support the sector. While many East Asian economies have established legal frameworks to support e-commerce, in others this is lagging (Table 3.6). Most adopt the principles of the United Nations Commission on International Trade Law's Model Law on Electronic Commerce. This generally provides that information prepared, transmitted, received or stored in an electronic form is deemed to be a document which can be used in a court as evidence. Most of the legislation also includes provisions for computer crime.

Some economies lack a legal framework for ensuring security of on line or electronic transactions, a certification authority or a payment gateway, reducing the use of electronic contracting and hampering the development of e-commerce. For example, while China has implemented rules for electronic contract formation, no national legislation provides for the use of digital signatures in on line contracts or electronic contract enforcement (Baker and McKenzie, 2002).[40] Vietnam also has no laws or regulations governing electronic transactions and digital signatures making it difficult to prove the existence of a contract concluded electronically (Baker and McKenzie, 2001k). The Indonesian e-commerce industry lacks a certification authority and payment gateway as well as laws covering electronic transactions. Its contract law follows principles often dating from the Dutch colonial era, which may cause problems for e-commerce (Baker and McKenzie Consultants and Hadiputranto, Hadinoto and Partners, 2001). However, Indonesian law is moving towards recognising electronic evidence; a new law allows companies to store their documents in electronic form. The customs payment system also has been changed to a paperless electronic data interchange system and plans exist to implement paperless trading in Indonesian stock exchanges (Baker and McKenzie Consultants and Hadiputranto, Hadinoto and Partners, 2001). A small working group is preparing laws on digital signatures and computer misuse.

[40] However, the municipal government of Shanghai has established an agency responsible for issuing digital certificates (Baker and McKenzie, 2001a).

Table 3.6

East Asia's E-Commerce Legal Environment Still Developing

E-Commerce Related Legislation in East Asia

Economy	Legal framework	Certification
China	People Republic of China Contract Law 1999 (limited)	None
Hong Kong	Electronic Transactions Ordinance April 2000	Electronic Transactions Ordinance
Indonesia	None	None
Japan	-	Law Concerning Electronic Signatures and Certification Services 2001
ROK	Electronic Transaction Basic Act 1999	Electronic Signature Act of 1999
	Basic Electronic Commerce Act (revised 2002)	Digital Signature Act (revised 2002)
Malaysia		Digital Signature Act 1997
Philippines	Electronic Commerce Act 2000	Electronic Commerce Act 2000
Singapore	Electronic Transactions Act	
Taiwan	Electronic Signature Law	National Communication Law
Thailand	Electronic Transactions Act	Electronic Transactions Act
Vietnam	None	None

Source: Baker and McKenzie, 2001a to 2001k.

Most industrialised and several developing regional economies have strong legal frameworks which provide legal recognition to electronic records and digital signatures and facilitate certification authorities' operation. The Singaporean Government has taken an active role in creating a sound legal environment to encourage electronic commerce and has few significant barriers hindering its development and use. Hong Kong also has a strong legal framework for e-commerce and the Government is conducting a top level review to further develop its e-commerce laws (*The Washington Post*, 5 March 2002). The law accords electronic records the same recognition as paper based records and recognises digital signatures if supported by a valid certificate (Baker and McKenzie, 2001b). The ROK also is strengthening its e-commerce legislation. Revisions to the *Basic Electronic Commerce Act* clarify the rights and obligations of the sender and receiver of a commercial electronic message, give the Government more authority to settle e-commerce disputes and bring security and consumer protection rules more in line with Organisation for Economic Cooperation and Development standards (United States Trade Representative, 2002). The *Electronic Transaction Basic Act of 1999* provides guidelines for forming electronic contracts, deeming that information stored electronically is a document for evidentiary purposes and for establishing legal validity; it also ensures electronic signatures are enforceable and admissible (Baker and McKenzie, 2001e). Malaysia has similar rules to the ROK. The *Telemedicine*

Act 1997 also allows registered doctors to practice 'teleconsultations'. The relevant Philippines legislation facilitates computerised transactions by giving electronic messages and electronic signatures legal status and providing for their admissibility in courts. It provides for authentication and infrastructure security, makes hacking and software piracy a crime with stiff penalties and provides for privacy and confidentiality (Minges et al., 2002).[41] However, the Act still needs to address several issues, including preserving electronic evidence. Although Japan lacks a specific law covering e-commerce, in early 2002, it issued guidelines for interpreting the existing civil code for the purpose of e-commerce transactions. These guidelines covered contracts for sales over the Internet, consumer protection, licensing agreements for information products and intellectual property.

In 1998, Thailand began investigating drafting six key pieces of e-commerce legislation covering electronic signatures, data protection, computer crime, electronic funds transfer and universal access to the Internet. By November 2002, only the *Electronic Transactions Act*, covering electronic transactions, electronic signatures and certification had become law.

Encryption and Public Key Infrastructure

Some economies have established public key infrastructure arrangements to enhance security and public trust in electronic transactions over open networks.[42] For example, in January 2000, the Hong Kong Government established a public key infrastructure, supported by certification authorities (Pierce and Maher, 2000). Recognising the advantages of facilitating international trade via on line contract, the Thai Government developed a system to increase e-commerce signatures' reliability and security and accept public encryption (Baker and McKenzie, 2001j). As part of Japan's policy to institute a secure e-government by 2003, the Information-technology Promotion Agency is evaluating cryptographic techniques (Baker and McKenzie, 2001d). As China has yet to establish a public key infrastructure to use public key encryption technology, it is unclear whether Chinese Contract Law will recognise a digital signature created by asymmetric public key encryption as a legal signature (Baker and McKenzie, 2001a). The Philippines has no encryption policy or any law dealing with encryption (Baker and McKenzie, 2001g).

Electronic Payments Systems

Several regional economies, particularly China, Indonesia and Vietnam, do not yet have functioning electronic payment systems, hindering the take up of e-commerce. Under current Japanese law, consumer credit customers cannot apply for credit cards or receive bills and notifications electronically; this would require amending the E-Notification Law to include the Money Lending

41 Hacking or cracking refers to unauthorised access into or interference in a communication system; piracy refers to the unauthorised reproduction, distribution, importation, use, removal, alteration and downloading or broadcasting of copyrighted works including legally protected sound recordings.

42 The public key infrastructure enables users of an unsecure public network such as the Internet to securely and privately exchange data through the use of a public and a private cryptographic key pair that is obtained and shared through a trusted authority; the public key infrastructure provides for a digital certificate that can identify an individual or an organisation and directory services that can store and, when necessary, revoke the certificates.

Business Law (United States Trade Representative, 2002). Taiwan's Ministry of Finance is assessing ways to regulate on line banking and on line transactions between commercial banks and their clients (Austrade, 2002m).

Other regional economies have strong electronic payment systems. In 1998, Bank Negara selected the Malaysian Electronic Payment System to install and develop the Secure Electronic Transaction Payment Gateway based on the standard pioneered by Visa and MasterCard for on line transactions (Austrade, 2002f). Hong Kong has several electronic payment schemes to facilitate e-commerce, including Internet accounts linked to credit cards, cheque accounts, electronic cash and smart cards to store and transfer funds electronically. Hong Kong's Banking Ordinance applies to issuing multi-purpose stored value cards; smart cards with digital authentication capabilities are regulated under the *Import and Export (Strategic Commodities) Regulations* (Baker and McKenzie, 2001b).

On line credit card fraud in East Asia is a growing concern. Retailers should do at least basic checks on electronic orders, such as using free software to verify that the originating country and bank of a credit card match the customer's shipping address; card issuers now are introducing an extra layer of security that should reduce on line fraud to some extent (*Far Eastern Economic Review*, 3 October 2002, pp. 46-7).

Internet based marketing is lightly regulated. Where it is regulated, generally information on the terms of sales must be included on the website. Several regional economies prohibit Internet gambling.

Taxation

In line with the WTO Declaration that customs duties should not be levied on electronic transmission, East Asian governments do not tax e-commerce transactions. However, they do levy withholding and value added taxes. Taiwan is considering a proposal to assess duties for software sold and downloaded over the Internet (US Trade Representative, 2002). Although the Philippines does not tax electronic transactions, a reciprocity clause in the Electronic Commerce Act states only parties whose country of origin grants the same benefits to Philippine citizens will enjoy all benefits established under the Act (US Trade Representative, 2002).

Intellectual Property Protection Remains Weak

Most East Asian governments are members of major international agreements and conventions to protect intellectual property rights and have enacted many laws and regulations to comply with international agreements. (See Appendix 2 – *Trade Policy*.) Thus, many have passed legislation to comply with the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights and cracked down on intellectual property piracy and counterfeiting. However, several economies have significant problems enforcing this legislation. Hence, many East Asian economies including China, Indonesia, ROK, Malaysia, the Philippines, Thailand and Vietnam are on the United States' 301 Priority Watch List.[43]

[43] Hong Kong also has had problems controlling software piracy and in 1998 was placed on the United States Trade Representative's Watch List for Special 301 Consideration.

Although several economies have revised laws to provide criminal penalties for some intellectual property rights violations, poor enforcement and weak punishments result in widespread violations. Piracy and counterfeiting are sophisticated and widespread, discouraging foreign direct investment in ICT industries, e-commerce and other technology intensive sectors.[44] In October 2001, China introduced new copyright law strengthening enforcement measures and in January 2002 brought in a new regulation protecting computer software copyright, specifying the interests involved in computer software development, circulation and application. However, significant problems remain, particularly the software industry's lack of clear procedures for addressing corporate end user software piracy; this caused estimated revenue losses of approximately US$1.1 billion in 2000 (United States Trade Representative, 2002).

Other developing regional economies are attempting to address intellectual property rights protection but serious issues remain. Indonesia recently passed new patent, trademark and copyright laws, protecting trade secrets, industrial designs and integrated circuits, helping it better conform to international standards, but doubts exist about enforcement capacity.[45] The Philippines does not have comprehensive intellectual property rights protection, enforcement is weak and the Intellectual Property Code of 1997 has deficiencies, including onerous restrictions on contracts licensing software and other technology and the courts' lack of authority to order the seizure of pirated material without notice.[46] In 1997, the Thai Government established a specialised intellectual property court with improved judicial procedures and the ability to impose tougher penalties. However, due to the lack of official enforcement resources, rights holders often must initiate actions, which is very labour intensive (United States Trade Representative, 2002). Vietnam has poor intellectual property rights enforcement. However, under the US-Vietnam Bilateral Trade Agreement, Vietnam committed to providing protection for integrated circuits within 24 months (Baker and McKenzie, 2001k).

More developed regional economies have moved to strengthen their intellectual property rights regimes. Hong Kong traditionally had lax copyright and piracy laws but recently introduced an amendment criminalising the corporate use of unlicensed copyright materials. It also improved dramatically its sanctions on piracy, particularly of optical discs, including by creating an anti piracy task force in the Customs Department. Customs has begun to tackle Internet based piracy and the courts have supported this initiative (United States Trade Representative, 2002). Japan also recently amended its copyright and trademark laws. The revised copyright law incorporates criminal penalties for producing and distributing devices designed to circumvent copyrights and illegally revising copyright management information for profit (United States Trade Representative, 2002). Malaysia also has taken steps to enforce protection of intellectual property rights, particularly against digital piracy.

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44 In 2001, Vietnam and China had the highest piracy rates in the world, with 94 and 92 per cent respectively, compared to 27 per cent for Australia (International Planning and Research Corporation, 2002).

45 The patent law still contains concerns for foreign rights holders, as the product must be produced or a process utilised in Indonesia before it is possible to obtain a patent for it.

46 As well, the Presidential Inter-agency Committee on Intellectual Property Rights requires all technology transfer arrangements prohibit the use of certain clauses in such arrangements; this can obstruct the normal contracting process (US Trade Representative, 2002).

Several regional economies have laws protecting copyright on the Internet. China's intellectual property rights laws protect trademarks, service marks and copyrights of Internet operators and users. However, existing laws offer insufficient intellectual protection for Internet works like Internet web page design (Baker and McKenzie, 2001a). Hong Kong's Copyright Ordinance imposes copyright infringement provisions on those publishing a copyright work on the Internet without the owner's permission. Internet service providers are exempted if their only involvement is provision of the server. Hence, viewing a work in Hong Kong using the Internet is not an infringement but if a Hong Kong user downloads copyright material onto a PC without authority, it may be an infringement and the operator of the website from which the material was copied also may be liable for authorising the infringement (Baker and McKenzie, 2001b).

Privacy Protection

Privacy protection is relatively new in East Asia with governments only recently enacting or amending privacy legislation to reflect technological change. Privacy generally receives lower priority in developing regional economies than in industrialised economies (Table 3.7). Most East Asian economies have rules prohibiting the interception of communications.

Table 3.7

Privacy Protections Lacking in Some East Asian Economies

Main Privacy Legislation in East Asia

Economy	Legislation	Main provisions
China	PRC Constitution – no specific legislation	Rights to privacy with broad exceptions for the state to limit these rights for national security, public safety or societal interests.
Hong Kong	Personal Data (Privacy) Ordinance 1996	Protects the privacy of individuals in relation to personal data by regulating collection, storage and use of personal data, the right to access and correct personal data, matching procedures, transfer of data outside Hong Kong and direct marketing.
Indonesia		No general data protection or privacy law.
Japan	Legislation being debated – Proposed Law Concerning Protection of Personal Information	Expected to establish a minimum standard for all industries for using personal data, allowing legislation in areas such as telecommunications.
ROK	Electronic Transaction Basic Act	E-commerce entities must protect information that is processed, transmitted or kept by them from unauthorised use, access or disclosure.
	Information Society Promotion Basic Law	Includes guidelines on information protection systems, but no system exists to protect the security of information or users from any unauthorised disclosure to a third party or a foreign country or false information.

Economy	Legislation	Main provisions
Malaysia	Personal Data Protection Bill drafted	Malaysian law currently does not recognize the right to data privacy, has no data protection or protection of privacy legislation or a data protection agency.
Philippines	1987 Philippine Constitution and New Civil Code	Privacy of communications and correspondence is inviolable except on lawful order of the court, or if public safety or order requires otherwise; disturbing another's privacy results in a cause of action for damages, prevention and other relief.
Singapore		No general data protection or privacy law.
Taiwan	Computer Processed Personal Data Protection Act	Specifies that many public and private agencies must apply for licences to collect personal data and process it by computer; the collection, processing and utilisation of personal data must serve a specific purpose and requires the written consent of the person concerned or a contract with them.
Thailand	1997 Constitution Proposed data protection legislation	General data and privacy protection. Aims to protect the right of privacy by striking a balance between the privacy rights of individuals with the development of ICT.
Vietnam	Civil Code – no specific legislation	Collection, storage, use and disclosure of personal information must be agreed to by the person concerned, unless a competent authority legally decides otherwise. No special requirements exist for information stored electronically; however, if it is stored on a website with a '.vn' domain name, the storage and distribution of such information is subject to the control of the Ministry of Culture and Information.

Sources: Baker and McKenzie, 2001a to 2001k and Electronic Privacy Information Center and Privacy International, 2002.

China's legislation gives lower priority to protecting privacy than controlling Internet content; although existing laws and regulations provide limited protection the Government has not enacted laws or regulations aimed at protecting privacy rights in cyberspace (Baker and McKenzie, 2001a). For example, China does not have regulations limiting the ability of Internet service providers to use and distribute personal data gathered through the Internet. However, local regulations exist controlling information movement on the Internet and some major Internet service providers also formulate user policies to guard against junk emails (Baker and McKenzie, 2001a). Internet service providers must provide user log in information and transaction records to authorities upon request, without clear guidelines as to the circumstances warranting such requests, raising concerns about consumer privacy and data misuse (United States Trade Representative, 2002).

Hong Kong and Japan provide more privacy protection. Hong Kong has strong privacy provisions and established an independent Office of the Privacy Commissioner for Personal Data. Due to the growth of the Internet and ICTs and a desire to comply with the EU directive's on data protection, Japan has moved from a reliance on self regulation to government protection. The Korean Ministry of Information and Communication established a Cyber Privacy Centre to provide information on information privacy rights in Korea (www.cyberprivacy.or.kr). In 2000, it issued guidelines which prohibit e-commerce and telecommunications companies from seeking information on personal characteristics (Baker and McKenzie, 2001e).

Although Singapore does not have specific privacy legislation, it has more than 150 laws with privacy provisions. In September 1998, Singapore's National Internet Advisory Committee released an E-Commerce Code for the Protection of Personal Information and Communications of Consumers of Internet Commerce. It aimed to increase public confidence in e-commerce transactions over the Internet. The Committee encouraged all relevant industry bodies to adopt the Code so as to protect their consumers against the improper disclosure or exploitation of personal and transactional information (Privacy International, 2002).

The Philippines' Government is seeking to create a law addressing Internet privacy and security, however, legislation has not passed Congress.

OUTLOOK

In the 2000s, significantly increased demand for software and ICT services will complement East Asia's current strengths in ICT equipment production. Bandwidth also is increasing and telecommunications are becoming cheaper as markets are deregulated and liberalised, rapidly increasing telephony and Internet penetration rates.

Currently, Hong Kong, Japan, the ROK, Singapore, Taiwan and, increasingly, Malaysia are relatively advanced ICT users and are expanding their use of broadband and related applications such as interactive multimedia and e-commerce. Other East Asian economies are rapidly increasing their ICT use, with penetration rates rising substantially. However, although still well behind the industrialised economies, China and Vietnam are a recent movers in the industry with strong potential to expand their ICT use.

While several industrialised East Asian economies generally have comprehensive and market oriented legal and regulatory structures supporting ICT and e-commerce, some economies need to develop further in this area. E-commerce is likely to grow more quickly in the economies with a strong legal environment.

Australian ICT exporters can take advantage of opportunities arising from telecommunications infrastructure roll out, increasing demand for value added telecommunications services and growing demand for ICT services. As more East Asian businesses invest in ICTs and adopt e-commerce processes, Australian businesses, particularly in advanced manufacturing and ICT services, including e-commerce capacity, have good prospects to expand their trade with the region.

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AUSTRALIAN ICT AND E-COMMERCE TRADE AND INVESTMENT IN EAST ASIA

KEY POINTS

- A new complementarity is developing between Australian and East Asian economies in information and communication technologies, ICTs; Australia imports a large and growing volume of ICT equipment from East Asia while it is a competitive producer and exporter of advanced ICT equipment, ICT services, some software and e-commerce applications. Australian ICT export opportunities should expand as ICT take up accelerates in industrialised and developing regional economies.

- East Asia's rapidly growing export sector increasingly specialises in ICT manufactures; ICT equipment now represents 31 per cent of total regional exports.

- Regional economies increasingly demand software and ICT services to apply ICTs to their own economies. For example, in the wake of the financial crisis, financial sectors are seeking to upgrade their ICT capacity to bridge the gap with foreign financial institutions and increase their risk assessment and customer service capacity.

- East Asian ICT import tariffs are falling due to the World Trade Organization's Information Technology Agreement and, by 2005, most ICT goods should trade duty free. However, non tariff barriers such as regulations, standards, conformance and testing requirements and labelling significantly restrict some ICT trade. Barriers, such as foreign direct investment limitations and other commercial regulations, also can restrict ICT service exports.

- In industrialised East Asia, good opportunities exist for Australian ICT service suppliers in Internet and e-commerce applications, multimedia, games software, telecommunications, particularly wireless, ICT consulting, network and system integration services, product R&D, smart card systems, ICT security, and business and industry specific application software including in financial services and mining.

- **In developing East Asia, major opportunities also exist in ICT services exports, Internet based infrastructure, remote education and e-learning applications, e-commerce applications and consulting, government provided customer services and integration and telecommunications equipment, technology and services.**

- **While foreign direct investment, FDI, in East Asia's ICT equipment industries grew strongly in the 1990s, foreign investment in telecommunication services is limited in all but a few regional economies and barriers can restrict foreign investment in ICT service providers. However, foreign ICT services firms increasingly will seek a regional presence to service local customers.**

This chapter identifies emerging trends in East Asia's ICT demand, analyses East Asia's trade in ICT goods and services and Australia's ICT goods and services trade with East Asia, assesses emerging trends in East Asia's ICT demand, barriers to ICT trade and FDI and highlights major export opportunities for Australian ICT firms.[1]

EAST ASIA'S ICT AND E-COMMERCE TRADE

In the 1980s and early 1990s, developed economies dominated world ICT exports; however, from the mid 1990s, the volume and technical sophistication of emerging economy ICT exports, particularly East Asia's, grew rapidly. (See Appendix 4.1 – *Global ICT Markets*.) For example, ICT manufacturing now is China's second largest export earner after clothing, textiles and footwear. Developing economies like China and the Philippines mainly assemble ICT products from components imported from more developed economies such as Japan, the Republic of Korea, ROK, Taiwan and Singapore (Department of Foreign Affairs and Trade, 2001).

ICT Equipment Trade Key

The ICT export market has become a very valuable but also a volatile one for East Asia. East Asia's increasing specialisation in ICT exports, particularly electronics and electrical products, helped most regional economies' exports recover from the 1997-98 financial crisis. (See Appendix 4.1 – *Global ICT Markets*.) However, this specialisation also exposed the region to the fall in global, particularly US, ICT demand in 2001, undermining East Asia's economic performance (Commonwealth Department of the Treasury, 2001).

Throughout the 1990s, East Asia's ICT equipment trade was growing even more rapidly than its overall trade. By 2000, East Asia exported ICT goods worth US$464 billion, increasing by 25 per cent per year since 1994, and imported ICT goods worth US$359 billion; around 31 per cent of its exports and 27 per cent of its imports were ICT products (Figure 4.1). From 1994 to 2000, East Asia produced on average 42 per cent of world ICT exports.[2]

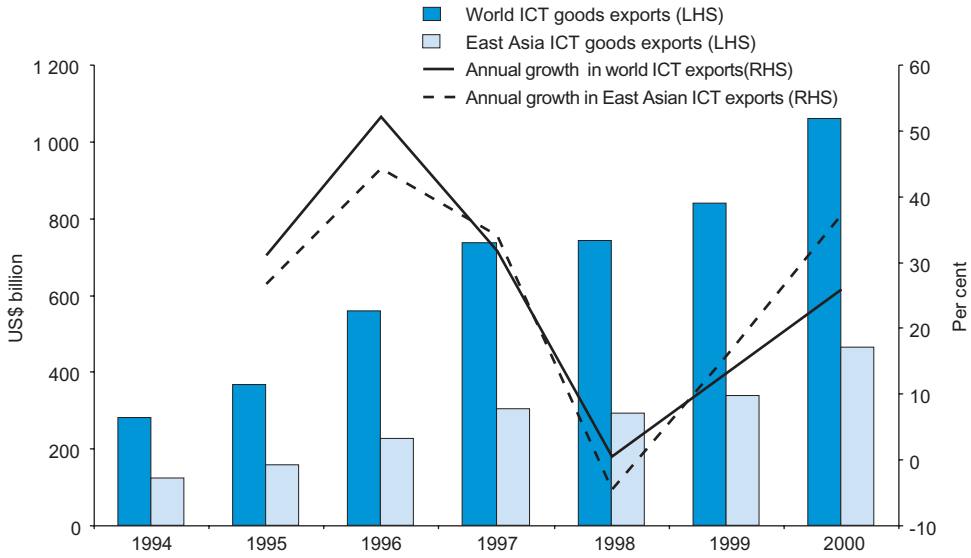
1 General issues regarding East Asia's business environment are analysed in other Economic Analytical Unit reports, including: *China Embraces the World Market*, 2002; *Changing Corporate Asia: What Business Needs to Know*, 2002; *Indonesia: Facing the Challenge*, 2001; *Transforming Thailand: Choices for the New Millennium*, 2000; *Asia's Financial Markets: Capitalising on Reform*, 1999; *Korea Rebuilds: From Crisis to Opportunity*, 1999; *Asia's Infrastructure in the Crisis: Harnessing Private Enterprise*, 1998; *The Philippines: Beyond the Crisis*, 1998, *The New ASEANs: Vietnam, Burma, Cambodia and Laos*, 1997 and *A New Japan? Changes in Asia's Megamarket*, 1997 (www.dfat.gov.au/eau).

2 In 2000, emerging economies had a 38 per cent market share in electronic equipment and components exports, 35 per cent market share in office equipment and components exports, 30 per cent of exports of electrical equipment and machinery and 21 per cent of telecommunication equipment exports (Kirkman et al, 2002).

Figure 4.1

East Asian ICT Trade Growing Faster than World's

World and East Asian ICT Exports and Growth, 1994-2000, US$ billion and per cent



Note: Data is based on the World Trade Organization's definition of ICT goods. The totals do not include Taiwan and Vietnam. In 2000, Taiwan's exports of ICT goods totalled US$65.5 billion, bringing East Asia's share of world ICT trade to 50 per cent, from 44 per cent excluding Taiwan.

Source: Department of Foreign Affairs and Trade, 2002.

While all East Asian economies' ICT exports grew strongly from the mid 1990s, the Philippines achieved the fastest average annual growth, with 88 per cent between 1997 and 2000; between 1994 and 2000, Indonesia grew fastest, at 43 per cent per year, followed by the ROK and China with 37 per cent per year; Japan grew slowest at 17 per cent per year (Figure 4.2).[3] East Asia's main exports are semiconductors and electronic equipment.[4]

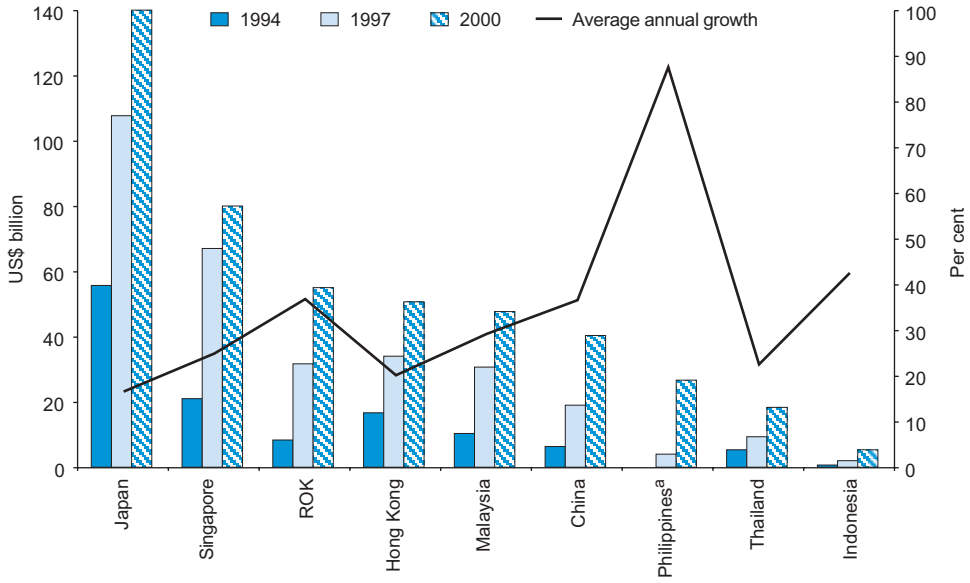
[3] Due to the disruption to trade financing during the Asian crisis, many experienced falls in ICT exports in 1998 prior to the cyclical upswing in global electronics demand during 1999-2000 and decline in 2001.

[4] East Asia also exports large amounts of consumer electronics, which currently are not included in the WTO definition.

Figure 4.2

ICT Exports from the Philippines, Indonesia, ROK and China Growing Fastest

East Asian Economies' ICT Exports, 1994-2000, US$ billion



Notes: [a] Data not available for the Philippines for 1994.

[b] Data not available for Taiwan or Vietnam; in 2000, Taiwan's ICT exports totalled US$65.5 billion.

Source: Department of Foreign Affairs and Trade, 2002.

After the 2001 slowdown in global ICT demand, several East Asian economies, particularly Taiwan, positioned themselves to take advantage of the next upturn in the electronics and semiconductor cycle.[5] Orders, revenues and capacity utilisation at semiconductor foundries are on the rise due to higher demand for laptops, mobile phones and consumer electronics (EIU Viewswire, 2002a). Significantly, China's electronics exports continued to grow during the 2001 global downturn. While US ICT expenditure showed signs of recovery in 2002, semiconductors and telecommunications equipment exports are expected to remain muted for some time. In 2002, the global ICT services market also has faced a more difficult year than expected, due to the decline in spending on computing and economic difficulties; however, ICT services spending still is forecast to grow by almost 11 per cent per year to 2006, with Asia Pacific ex Japan expected to grow by over 20 per cent to 2006 (Metropolitan Computer Times, www.mctimes.net, 11 November, 2002).

5 During the downturn, the Philippines' electronics exports fell sharply by 26 per cent, the ROK's by over 22 per cent and Taiwan's by 21 per cent. These declines were reflected in semiconductor trade which fell significantly after the 1999-2000 boom.

East Asia's ICT trade is highly dependent on the US and Japanese markets, with over 30 per cent of the region's ICT goods trade destined to or sourced from these economies. In 2000, US$118 billion or 25 per cent of East Asia's ICT exports went to the United States alone. As well, intra regional ICT trade is important; in 2000, over 46 per cent of East Asia's ICT exports and 62 per cent of its imports were intra regional.

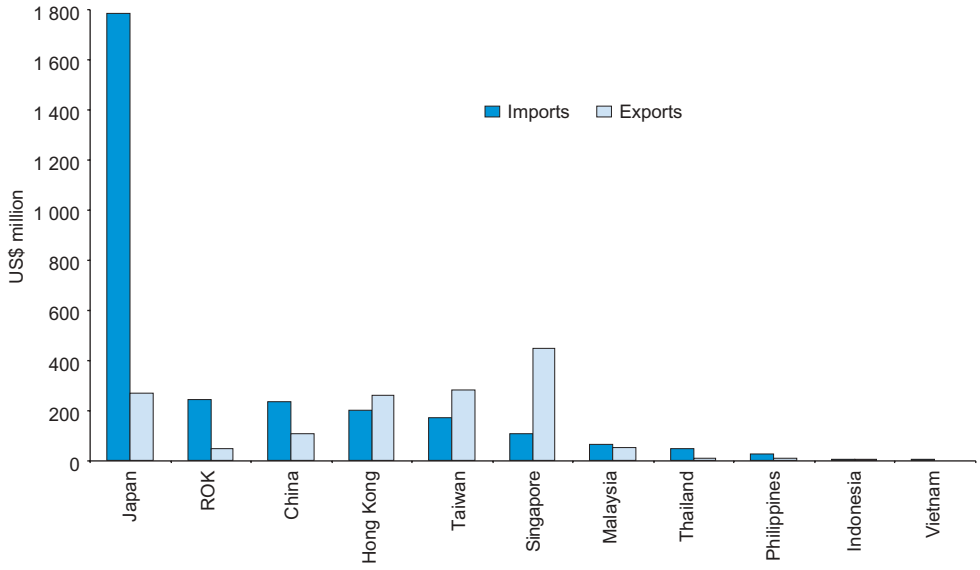
Software and ICT Services Trade

From a low base, East Asia's imports of software and other services, which includes ICT services, are growing strongly. Most regional economies run deficits in software and services trade. For example, despite having a large ICT equipment trade surplus, the ROK runs a US$300 million to US$400 million software and ICT services trade deficit in most years (Ministry of Information and Communication, 2001). Other regional economies, such as Malaysia, Thailand and Vietnam, also rely on imports of software and ICT services, particularly from the United States. Between 1997 and 2000, East Asia's imports of packaged software grew by 25 per cent per year. In 2000, most packaged software imports went to Japan, with a large share of the remainder going to other industrialised East Asian economies and China (Figure 4.3).

Figure 4.3

Many East Asian Economies Run Software Trade Deficits

East Asian Packaged Software Imports and Exports, 2000, US$ million

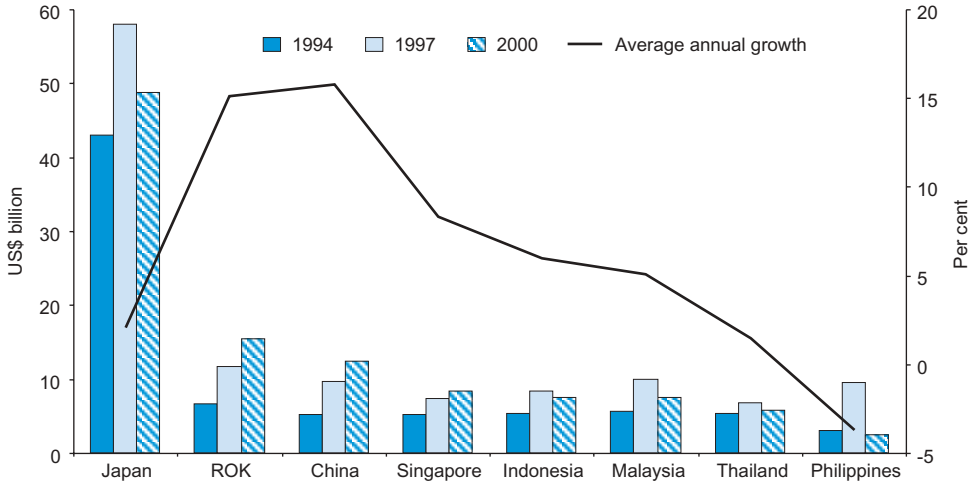


Source: Department of Foreign Affairs and Trade, 2002.

Figure 4.4

East Asian ICT Services Imports Growing Steadily

East Asia's Other Services Imports and Average Annual Growth, 1994-2000, US$ billion



Note: [a] Statistics not available for Hong Kong and Taiwan.

Source: International Monetary Fund, 2001.

Between 1994 and 2000, East Asia's other services imports, which include ICT related services, increased over 5 per cent annually to reach US$108 billion or 18 per cent of world imports of these services; growth was highest in China and Korea (Figure 4.4).[6] In 2000, regional economies with highest other services imports were Japan, with US$49 billion or 45 per cent of East Asian other services imports, the ROK with US$15 billion, China with US$12 billion and Singapore with US$8 billion. Many East Asian economies are likely to be net ICT services importers as, apart from Singapore, they run deficits in other services trade.

AUSTRALIA'S ICT TRADE WITH EAST ASIA

Australia exports a variety of advanced ICT products and, increasingly, ICT services to East Asia; it is a large net importer of ICT goods from the region (Appendix Table A4.5).[7] In 2001, Australia imported over 60 per cent of its ICT goods, worth A$12.3 billion, from East Asia and sold 22 per cent

6 'Other services' covers services not included under transportation and travel; the category includes communication, construction, insurance, financial, computer and information, other business and personal, cultural and recreational services and royalties and licence fees (International Monetary Fund, 2002). 'Other services' figures are not available for Hong Kong, Taiwan or Vietnam.

7 In 2001, Australia's overall ICT merchandise trade deficit with East Asia was $6.8 billion and this deficit has been increasing 22.5 per cent per year since 1991. Over the period 1991 to 2001, Australia's ICT exports to East Asia grew at an average annual rate of 6 per cent while ICT imports from East Asia grew by an average of 19 per cent per year.

of its ICT goods exports of A$3.5 billion to the region. This trend reflects Australia's high and increasing ICT equipment investment and the movement of global labour intensive ICT production capacity to East Asia. While now recovering, the Asian financial crisis undermined Australia's ICT exports to the region. Exports to all except Indonesia and the Philippines have recovered subsequently, but many still have not reached pre-crisis levels.[8]

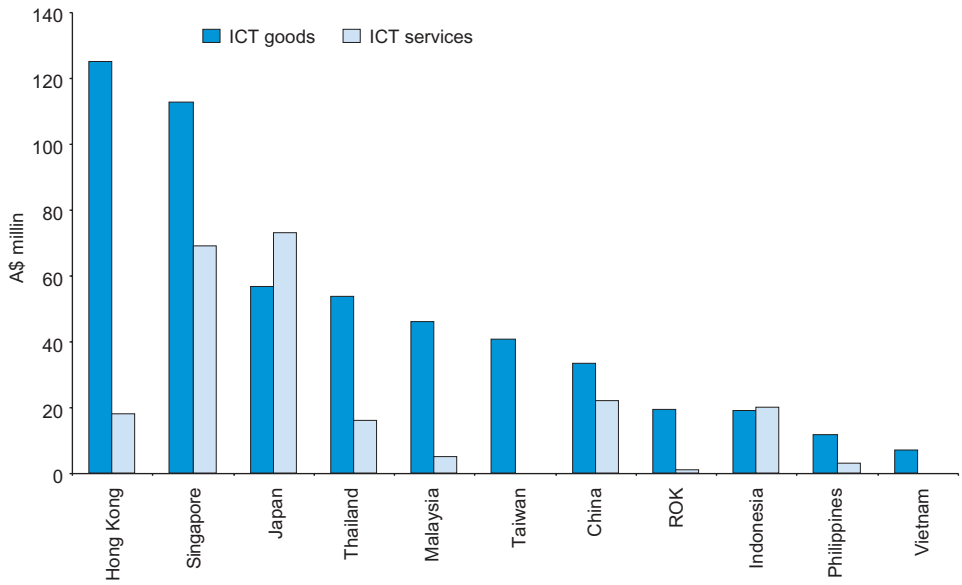
Australian Produced ICT Goods Exports to East Asia

A large share of Australia's ICT goods exports are re-exports; in 2001, total Australian produced ICT goods exports to the region were A$525 million or 15 per cent of total ICT goods exports. Between 1991 and 2001, re-exports of ICT goods to East Asia grew by 5 per cent per year. Australia exports levels of ICT services to some regional economies that are higher than or comparable to its ICT goods exports to these economies (Figure 4.5).

Figure 4.5

Significant Australian ICT Exports to Region

Australian Produced ICT Goods and Service Exports to East Asia, 2001, A$ million



Note: ICT services are for the financial year 2000/01.

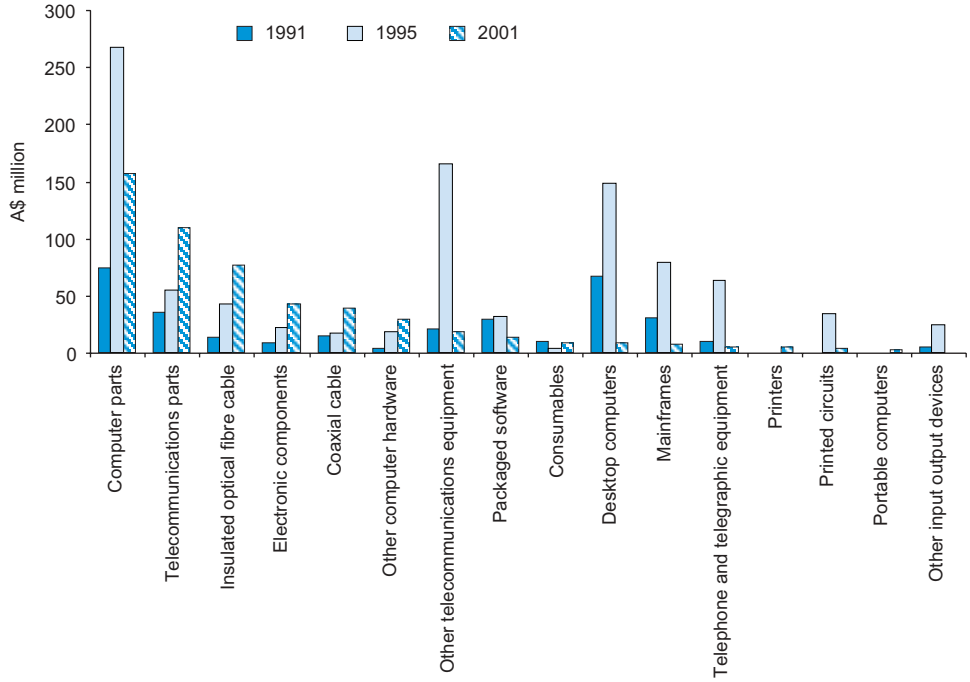
Source: Department of Foreign Affairs and Trade, 2002.

[8] In particular, Australia's ICT exports to Indonesia fell by a 65 per cent and still are only around half of the pre-crisis level. After growing steadily over the first half of the 1990s, ICT exports to Malaysia dropped by 46 per cent but have steadily grown again. Australia's ICT exports to the Philippines have continued to fall since the Asian financial crisis and, in 2001, fell by a significant 83 per cent. ICT exports to Singapore grew substantially over the first half of the 1990s then dropped by 54 per cent between 1996 and 1999. Until 1997, ICT exports to Taiwan grew steadily then dropped by more than half by 1999 after which they rebounded, increasing by more than 53 per cent in 2001. ICT exports to Vietnam have fallen steadily since 1998.

Figure 4.6

ICT Components and Parts Main Australian Goods Exports

Australian Produced ICT Goods Exports to East Asia, 1991-2001, $ million



Source: Department of Foreign Affairs and Trade, 2002.

In 2001, computer parts, telecommunications parts, insulated optical fibre cable, electronic components, coaxial cable and other computer hardware dominated Australian produced ICT goods exports to East Asia (Figure 4.6).[9] Over the decade and particularly after the Asian financial crisis, Australian exports of several ICT goods involving more labour intensive processes declined, while exports of higher value added, more advanced goods continued to grow.

In 2001, Australia's main ICT goods export destinations in East Asia were industrialised economies; Hong Kong took almost 24 per cent of Australian produced ICT exports, Singapore 21 per cent and Japan 11 per cent (Figure 4.7). The high exports to Singapore and Hong Kong may partly reflect these economies' role as entrepôts for South East Asia and China. Hong Kong and Singapore are important trading centres for electronic parts and components. Hong Kong imports and re-exports computers, telecommunications equipment, telephone apparatus and audio visual recording apparatus.

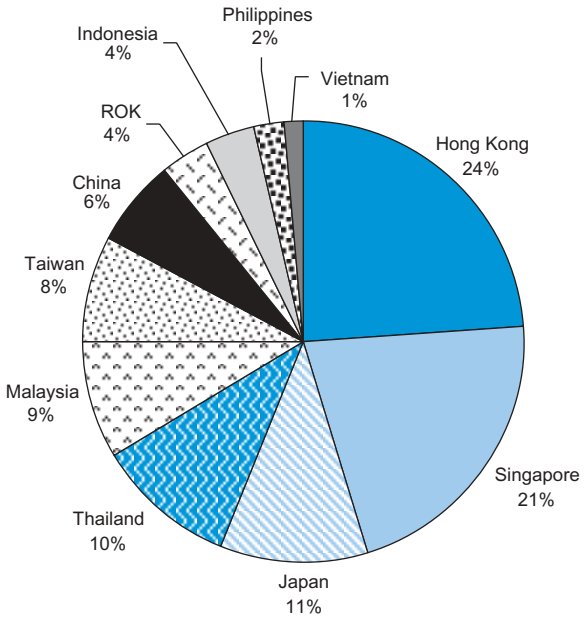
[9] In 2001, about 33 per cent of Australia's ICT goods exports to East Asia were re-exports while around 40 per cent of overall Australian ICT equipment exports were re-exports. The re-export share to East Asia ranges from 60 per cent for exports to Taiwan and 55 per cent for Malaysia to 9 per cent for the Philippines. Computer parts are the main re-export to East Asia, though in some years re-exports of marine telecommunications cable are significant.

It is the entrepôt for much of southern China's ICT trade, with many ICT components going to China for further production; in 2000, China imported over 25 per cent of Hong Kong's ICT exports (US Commercial Service, 2001a). China's accession to the World Trade Organization should increase Hong Kong's trade in electronic parts and components. Singapore performs a similar role for Malaysian and Thai ICT producers.

Figure 4.7

Australian Produced ICT Exports Mainly to Industrialised East Asia

Direction of Australian Produced Exports to East Asia, 2001, Per cent



Source: Department of Foreign Affairs and Trade, 2002.

In 2001, Australia's main East Asian ICT goods suppliers were Singapore with a share of 19 per cent and Malaysia, Japan and ROK each with a market share of about 15 per cent. Over the decade, personal computer imports from Malaysia grew significantly from very low levels, averaging growth of 131 per cent annually.

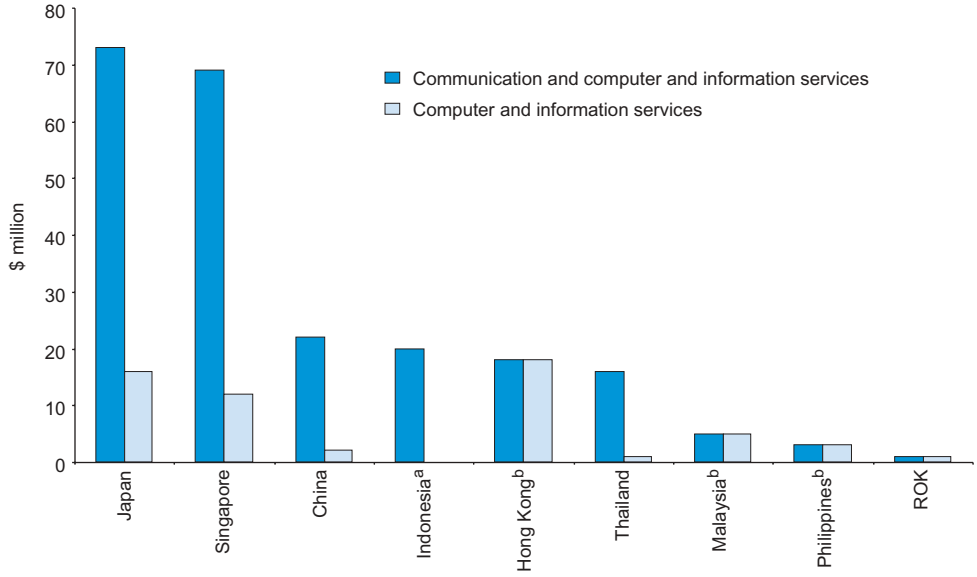
Australia's ICT Services Trade with East Asia

Over the last decade, Australia's ICT services trade with East Asia has grown moderately, reflecting overall growth in ICT services trade in the region.[10] In 2000/01, Australia's communication and computer and information services exports to East Asia totalled A$227 million. From 1997/98 to 2000/01, Australia's computer and information services exports to East Asia grew by an average of over 10 per cent per year, while communications services fell by 4 per cent annually. Australia's communication and computer and information services exports to East Asia mainly went to Japan and Singapore, which account for 63 per cent of the market (Figure 4.8).[11]

Figure 4.8

Industrialised East Asia Imports Most Australian ICT Services

Australia's ICT Services Exports to East Asia by Major Category, 2000/01, A$ million



Notes: [a] Data is not published for computer and information services exports for Indonesia.

[b] Data is not published for communication services exports for Hong Kong, Malaysia and the Philippines.

Source: Department of Foreign Affairs and Trade, 2002.

10 Data on ICT services trade has limitations; generally, it is not identified separately in world data and is often subject to confidentiality requirements, making assessment of competitive strengths in this area difficult.

11 Computer and information services exports include computer data service and news related service transactions, including database services, data processing, hardware consultancy, software implementation, maintenance and repair, news services and direct non bulk subscriptions to newspapers and periodicals. Communication services include telecommunications services, national postal services and express and door to door courier services (Department of Foreign Affairs and Trade, 2002b). Of these, only telecommunications services are relevant to this report.

Much scope exists for Australia to increase ICT services exports to East Asia over the medium term. As developing East Asian economies grow, increase their take up of ICT and become more service oriented, ICT services trade has the potential to rise, spring boarding from Australian success in the more mature markets of North America and Europe and from early successes in East Asia.[12]

MARKET ACCESS

Since the mid 1990s, many economies participated in international and regional forums to liberalise ICT products, services and e-commerce trade. (See Appendix 4.2 – *ICT Trade Reform and Market Access Initiatives*.) As a result, tariffs on international trade in ICT products have fallen significantly and attention now is turning to non tariff barriers.

Tariffs

The World Trade Organization's Information Technology Agreement, ITA, has been very effective in reducing tariffs on ICT products. East Asian signatories include Hong Kong, Indonesia, Japan, ROK, Malaysia, the Philippines, Singapore, Taiwan and Thailand. China joined the ITA on accession to the World Trade Organization, WTO. Developing economies were exempted from the 2000 deadline to remove ICT goods tariffs on all products, with most committing to remove all tariffs by 2005 (Table 4.1). In general, imports of software and e-business applications to East Asia attract no import duties.

On accession to the WTO, China committed to eliminate tariffs on ICT products by 2005. In January 2002, the Chinese Government announced 251 ICT products on which it would eliminate tariffs by 2005, including mobile telecommunications base stations, mobile telecommunications switches, computers, inkjet and laser printers, fax machines, resistors, capacitors, transistors and integrated circuits. Authorities also significantly cut tariffs on most remaining ICT products to 3.4 per cent (*South China Morning Post*, www.scmp.com, 14 January 2002).[13] Taiwan had made many ICT tariff cuts as required under the Information Technology Agreement before joining the WTO and further cut tariffs on 1 January 2002.

[12] For example, between 1997/98 and 2000/01, Australian ICT service exports to the EU grew 11 per cent annually and to represent 19 per cent of all Australian ICT service exports; over the same period, Australian exports of computer and information services to the EU grew 33 per cent annually to represent 10 per cent of Australia's computer and information services exports.

[13] However, tariff treatment of 15 products subject to the WTO Information Technology Agreement do not appear to fully match China's WTO commitments (United States Trade Representative, 2002). Under the ITA, reduced tariffs are required for certain goods normally used for ICT manufacture. China's tariff schedule includes reduced rates for the 15 products, but applies them only if the importer completes a certificate describing the intended end use. However, the ITA does not address end use, so the end use certification merely becomes an unnecessary burden and impediment to trade and raises the question of whether Chinese customs officials would withhold preferential tariff treatment if they do not like the intended end use. Tariffs vary depending on whether the imported product is defined as 'high technology'.

Table 4.1

East Asia's Tariffs on ICT Products Falling

ICT Tariffs for East Asia under the Information Technology Agreement, 2002, Per cent

Economy	ICT Product	Tariff
China	'High technology' products	0 to 9 per cent
	Other categories	15 to 20 per cent
Hong Kong	All ICT equipment	0 per cent
Indonesia	Most ICT equipment	0 per cent
	Some ICT equipment (cables, etc.)	5 to 10 per cent; 0 per cent by 2005
	Some telecommunications equipment	5 to 10 per cent; 0 per cent by 2005
Japan	All ICT equipment	0 per cent
ROK	Most ICT equipment	0 per cent
	Some ICT equipment (4 types)	4 to 8 per cent; 0 per cent by 2004
Malaysia	Most ICT equipment	0 per cent
	Some ICT equipment (switches, etc.)	5 to 20 per cent; 0 per cent by 2005
	Some telecommunications equipment	5 to 15 per cent; 0 per cent by 2005
Philippines	Some ICT equipment	0 per cent
	ICT equipment, such as semiconductor production equipment, storage units, recording media, switches, cables	8 to 18 per cent; 0 per cent by 2005
	Telecommunications equipment, such as telephone handsets	8 to 15 per cent; 0 per cent by 2005
Singapore	All ICT equipment	0 per cent
Taiwan	All ICT equipment	0 per cent
Thailand	Some ICT equipment	0 per cent
	Other ICT equipment	8 to 19.3 per cent; 0 per cent by 2005

Source: World Trade Organization, 2002b.

Vietnam is not a member of the WTO, hence has not joined the Information Technology Agreement; it has tariffs of 10 per cent on most ICT equipment and between 10 and 20 per cent on telecommunications equipment.

Non Tariff Barriers

Non tariff barriers such as standards, conformance and testing requirements, labelling, import quotas and anti-dumping and countervailing duties also impede ICT goods trade in the region. Some economies' non tariff barriers are minimal but in most of the region such non tariff barriers remain high, hindering market access.

Standards, testing and certification

As tariffs on ICT have fallen, some governments have increased regulatory barriers to ICT goods trade. Divergences between national standards and multiple testing and certification processes impose significant costs on ICT product exporters and add little value as ICT products generally are produced to international safety and electromagnetic compatibility standards. Most economies' main technical regulations are based on international standards; differences relate primarily to the means required to prove conformity to the technical regulations (US International Trade Commission, 1998). Several international agreements aim to reduce technical and other barriers to trade in these products.[14] (See Appendix 4.2 –*ICT Trade Reform and Market Access Initiatives*.) Several East Asian economies have high conformity testing barriers against ICT imports. Standards and testing are a major issue for finished ICT goods; the costs for product testing, estimated at an average of US$30 000, can lock small and medium enterprises out of markets. Mutual recognition arrangements are not always applied, with some economies still requiring a local certificate.

Most East Asian economies apply standards for telecommunications equipment, but these differ considerably in their rigour and application. While the Philippines National Telecommunications Commission approves the type of terminal and radio equipment permitted, in practice telecommunication companies type select the equipment they use (Austrade, 2002h).[15] Thailand applies no technical standard requirements to telecommunications equipment imports except for fibre optic cables used in government projects; this requirement is designed to protect local manufacturing (Austrade, 2002j). Vietnamese regulations require standard compatibility certificates for 14 categories of imported telecommunications equipment; importers must obtain a certificate for each contract before importing equipment (Mekong Research, 2000a). China's accession to the WTO requires it to apply international norms to its testing and standards administration.

Import licensing and customs procedures

Many East Asian economies employ import licensing procedures that may impede ICT trade. For example, in many economies, encryption software and hardware require import or export licences. Non-transparent customs procedures also can represent a non tariff barrier. Japan's customs regulations and import procedures for ICT goods are strict and importers need to understand and follow them closely (Austrade, 2002e). The Korean Government requires companies to submit extremely detailed documentation to obtain pre-approval for computer and telecommunications equipment imports and other ICT products; this also can represent a form of non tariff barrier (United States Trade Representative, 2002). Companies that send information products to the ROK, including software, must transmit their products to purchasers on disk or films to pass official customs procedures.

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14 The role of the International Telecommunication Union is central to ensuring maximum global support for conformity in standards.

15 With respect to satellite cellular phone handsets, the Commission requires cellular telephone service providers or authorised equipment dealers to obtain import certification prior to importation and products subject to mandatory Philippine national standards, including electrical wires and cables, must obtain local standards compliance (US Trade Representative, 2002).

However, ROK authorities indicated they plan to revise trade laws, allowing electronic transmission of software, movies and animation and giving them the same recognition as other business transactions (Baker and McKenzie, 2001). The Thai Customs Department's practices can appear arbitrary and irregular, applying complicated, non-transparent import regulations inconsistently (United States Trade Representative, 2002). However, to fulfil its WTO Information Technology Agreement obligations, Thai Customs is eliminating certificate of origin requirements for technology imports and, in 2000, to conform with the WTO Customs Valuation Agreement, the Thai Government enacted legislation to overcome valuation problems; however, implementation remains uneven (United States Trade Representative, 2002).

Other measures

Labelling requirements also can impose costs on ICT trade; the extent of information required, prescriptive rules on how it must be presented and inconsistent implementation of the requirements are costly trade barriers (United States International Trade Commission, 1998). For example, in Vietnam, certain telecommunications equipment requires detailed labels, including the name and origin of the equipment, name and address of traders responsible for the equipment and instructions to use, operate and preserve it (Mekong Research, 2000a).

Government procurement practices also can impede ICT products' market access. Many East Asian economies have public procurement policies which favour domestic suppliers, thus locking foreign suppliers out of the large government contract market. For example, government procurement in Thailand still is beset with irregularities and lacks transparency (United States Trade Representative, 2002).[16] Furthermore, in 2000, the Thai Government introduced regulations requiring holders of government contracts worth over 300 million baht to purchase Thai commodities valued at least 50 per cent of the principal contract; the Government also may proscribe markets into which commodities can be sold (United States Trade Representative, 2002).

Barriers to ICT Services Trade

ICT services trade falls within the WTO's General Agreement on Trade in Services which commits member economies to free trade in a range of services. The Basic Telecommunications Agreement also seeks to liberalise trade in basic telecommunication services. (See Appendix 4.2 – *ICT Trade Reform and Market Access Initiatives*.) Most major East Asian economies have signed

[16] The regulations require non-discriminatory treatment of and open competition between all bidders; various state enterprises also have their own procurement policies and practices. However, in a recent Thai tender for procuring and constructing a high speed fibre optic telecommunications network, the bidding process was repeated several times with changing definitions of technical specifications, generating public allegations of a non transparent procurement process (United States Trade Representative, 2002).

and ratified these agreements.[17] Under the Basic Telecommunications Services Agreement, all East Asian WTO members agreed to open their domestic basic telecommunications services markets to foreign competition to varying degrees.[18]

A range of regulations can impede trade in ICT services. These include restrictive commercial presence, residency and citizenship requirements, foreign equity and other FDI limitations, lack of recognition of qualifications, compulsory membership of industry associations, restrictions on licence issues, less favourable licence conditions for foreign licensees, quotas on numbers of foreign staff, onerous procedures for temporary stay visas, burdensome or non-transparent business operation regulations and a lack of independent ICT industry regulators. (See below for foreign investment regulations.) Japan, the ROK and Taiwan have made full commitments to liberalise trade in computer services under the General Agreement on Trade in Services, while other East Asian economies have liberalised partially (Table 4.3).

Several East Asian economies restrict the participation of foreign workers in the ICT and other sectors, limiting ICT service investment and exports to these economies. For example, Indonesia's visa and labour regulations restrict foreigners' ability to work in the ICT industry, although they make some exceptions for specialists and senior management. The Philippines' Constitution prohibits telecommunications entities appointing any executive managing officer who is not a citizen of the Philippines. Despite suffering shortages of skilled and technical employees, particularly in the electronics sector, Malaysian firms also face limits on their employment of expatriate workers (United States Trade Representative, 2002). However, authorities can exempt Multimedia Super Corridor status firms from these limits. March 2000 amendments to the Thai Alien Business Act eliminated some restrictions on foreign participation in several occupations, but many formal and informal constraints remain (East Asia Analytical Unit, 2000). However, these restrictions generally do not apply to projects receiving Thai Board of Investment promotion privileges and do not supersede more liberal provisions of bilateral treaties (United States Trade Representative, 2002).

17 However, the Philippines Government has not ratified the Fourth Protocol to the WTO General Agreement on Trade in Services, which embodies proposed obligations under the WTO Basic Telecommunications Agreement. Also, the Philippines did not provide market access or national treatment for satellite services commitments and made no commitment regarding resale of leased circuits/closed user groups (United States Trade Representative, 2002).

18 Basic telecommunications services are all telecommunications services involving end to end transmission of customer supplied information, such as relaying voices or data from sender to receiver. Examples are telephony, data transmission, telex, telegraph, facsimile and private leased circuit services, fixed and mobile satellite systems and services, cellular telephony, mobile data services, paging and personal communications systems. Basic telecommunication services provided over networked infrastructures and over leased circuits via value added retailers both fall within the scope of the Basic Telecommunications Agreement commitments (International Trade Centre, 1999).

Table 4.3

Computer and Related Services Liberalising

WTO Computer and Related Services Commitments under GATS, East Asia

Economy	Computer consultancy	Software implementation	Data processing	Database	Maintenance and repair
China	Full	Need joint venture[b]	Full	None	None
Hong Kong	No national treatment[c]	No national treatment[c]	No national treatment[c]	No national treatment[c]	None
Indonesia	Limited[d]	Limited[d]	None	None	None
Japan	Full	Full	Full	Full	Full
ROK	Full	Full	Full	Full	Full
Malaysia	Ownership limit[b]	Ownership limit[b]	None	Ownership limit[b]	None
Philippines	None	None	None	None	None
Singapore	None	Full	Full	Full	None
Taiwan	Full	Full	Full	Full	Full
Thailand	None; ownership limit[e]	None; ownership limit[e]	None; ownership limit[e]	None; ownership limit[e]	None

Notes: [a] The General Agreement on Trade in Services covers trade under four categories or modes. Mode 1 covers cross border supply of services, Mode 2 covers services consumption abroad, Mode 3 covers service suppliers' commercial presence in a country and Mode 4 covers the presence of natural persons.

These commitments are the 'specific' commitments (do not include obligations on all WTO members) and do not include the 'horizontal' part of countries specific commitments (the commitments and limitations for national treatment and market access applying to all of a member's services trade) or any most favoured nation exemptions that may be listed in a member's schedule. Mode 4 commitments generally were taken horizontally across all sectors and are not included here.

[b] Refers to Mode 3.

[c] Refers to Modes 1 and 2.

[d] No market access commitments for government funded projects and no national treatment commitments for Modes 1 and 2; market access and national treatment limitations for Mode 3.

[e] Refers to Mode 1 and Mode 3, respectively.

Source: World Trade Organization, 1997.

FOREIGN DIRECT INVESTMENT

Due to their ample supplies of competitively priced labour, supportive government policies and, in some cases, investment incentives, many East Asian economies have attracted a high level of FDI into their ICT equipment sectors, most of it heavily export oriented. The ICT industry, particularly the electronics segment, has been an important destination for Japanese and US multinationals' direct investment in East Asia.[19] In recent years, Scandinavian telecommunications companies also have invested heavily in East Asia, particularly China. Australian investment in East Asia's ICT equipment sector is relatively small.

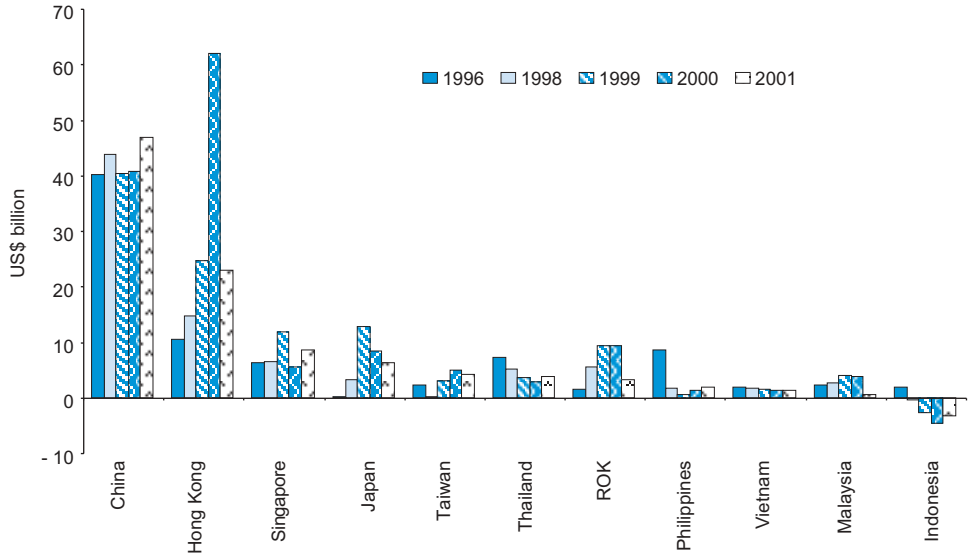
East Asia's ICT FDI Growing Strongly

While the Asian financial crisis reduced FDI flows to several East Asian economies, particularly Indonesia, flows to other regional economies including China increased, partially compensating for these falls (Figure 4.9).

Figure 4.9

Post Crisis FDI Inflows to East Asia Still Strong

FDI Inflows to East Asia, 1998-2001, US$ billion



Source: United Nations Conference on Trade and Development, 2002b.

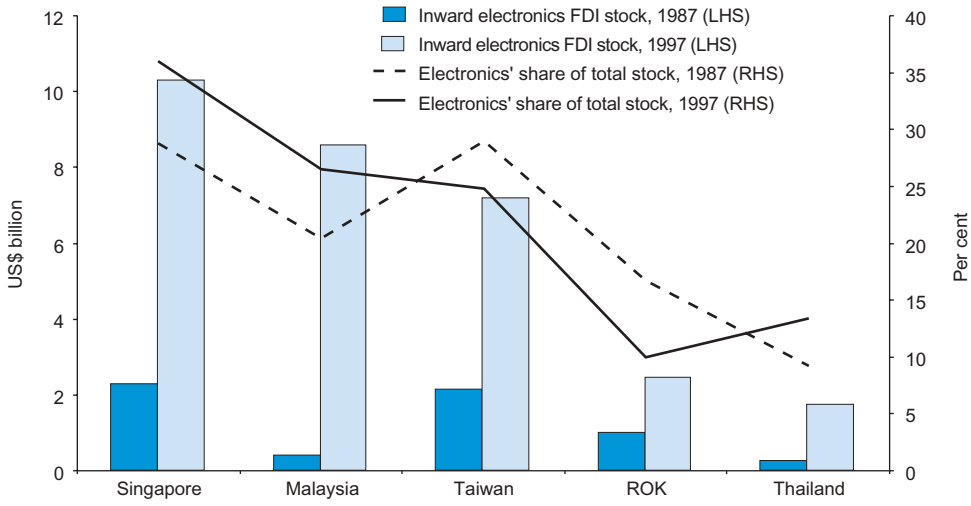
[19] From the late 1960s, US semiconductor and computer equipment manufacturers invested in export oriented, labour intensive assembly production in East Asia to take advantage of low labour costs. Japanese firms manufacturing consumer electronics and standardised components invested in East Asia from the mid 1980s due to the rising yen, relatively low labour costs, relatively high education and skills levels and good physical infrastructure and to counter high levels of protection against Japanese exports in major industrialised countries (United Nations Conference on Trade and Development, 2002a).

Attracted by its large potential domestic ICT market and its strong international competitiveness in labour intensive manufacturing, a large share of East Asia's ICT FDI now goes to China. By 2000, from total FDI inflows of US$346.7 billion, its ICT sector had received around US$97 billion (United Nations Conference on Trade and Development, 2001b). In early 2002, China's FDI inflows were 28 per cent higher than early 2001; flows to the ICT sector drove much of this growth (Export Finance and Insurance Corporation, 2002). In 2001, the ROK's stock of approved FDI totalled US$71.4 billion of which US$10.8 billion was in the electrical and electronics sectors (Ministry of Commerce, Industry and Energy, www.mofe.go.kr, accessed 21 May 2002).[20] Malaysia, Thailand, Singapore, the Philippines and Taiwan all receive significant ICT foreign direct investment inflows (Figure 4.10).

Figure 4.10

FDI in the ICT Industry Growing

Inward FDI Stock in Electrical and Electronic Equipment Sector, 1987 and 1997, US$ million and per cent of total FDI stock



Source: United Nations Conference on Trade and Development, 2000.

[20] Since the 1997 Asian financial crisis up to 2000, the ROK had been one of the most successful countries in Asia at attracting FDI; with respect to ICT, it introduced tax reductions for high-tech, foreign investment zone and service businesses and reduced rents in industrial complexes for foreign companies, 25 national industrial complexes and foreign investment zones, including by 100 per cent for high technology businesses and 75 per cent for manufacturing businesses.

The United States is a major investor in East Asia's electronics industry; in 2000, the United States' stock of FDI in East Asia's electric and electronic equipment industry was 11 per cent of its total FDI to the region with largest amounts in China with US$3.2 billion and Malaysia with US$2.7 billion (US Department of State, 2002). Japan is another major investor; in 2001, 18 per cent of its total FDI to the region went to the electrical industry (Ministry of Finance, www.mof.go.jp/english, accessed 12 November 2002). Australia's FDI in East Asia's ICT industry appears to be small, both as a share of total FDI received and of total Australian sourced FDI.[21]

FDI Regulations in the ICT Sector

Most East Asian governments recognise the importance of thriving ICT sectors and have agreed under international agreements to liberalise and open these industries to foreign participation. Economies with low levels of FDI regulation like Hong Kong and Singapore provide more opportunities for foreign investors to access markets. These economies impose no foreign exchange controls and impose few restrictions on foreign investors.

However, some onerous provisions still restrict potential foreign investors in most other East Asian economies. While most East Asian governments regulate FDI in the information technology sector in the same way as for other industries, the telecommunications and the Internet sectors generally face less flexible regulation. Most East Asian governments impede foreign firms' access to telecommunications markets by imposing foreign ownership caps (Appendix 4.4, Table A4.5).

Malaysia encourages ICT FDI in export oriented manufacturing and high technology industries but retains discretionary authority over individual investments and prefers foreign firms to enter joint ventures with local partners. While Malaysia's computer and software markets are largely deregulated, restrictions exist on bidding for government contracts; foreign equity limits in manufacturing encourage joint ventures and local distributorships with Malaysian companies (Digital Opportunity Initiative, 2001).

Largely due to commitments under the Basic Telecommunications Services Agreement, most regional governments are withdrawing such restrictions and opening their ICT industry to foreign participation. For example, China's WTO accession increases foreign providers' access to its telecommunications market. (See Chapter 3 – *East Asian Markets*; Economic Analytical Unit, 2002.) In early 2002, China gave WTO members access to the key telecommunication services corridor between Beijing, Shanghai and Guangzhou. Progress in opening the market for value added services, such as Internet service and content providers is less clear cut; the Government considers China based websites to be politically sensitive, so foreign companies face significant barriers owning such websites. Internet content providers also must obtain Ministry of Information Industry approval before receiving foreign capital, cooperating with foreign businesses or attempting domestic or overseas stock listings (United States Trade Representative, 2002).

21 For example, in 2001, Australian investment projects approved by the Thai Board of Investment involved 923 million baht (A$40 million) of investment by Australian interests, of which 2 million baht (A$0.1 million) was for ICT projects; Australian investment projects refer to projects with Australian capital of at least 10 per cent (Board of Investment, 2001).

Other developing East Asian economies also impose restrictions on ICT foreign direct investment but generally are liberalising their regimes. Indonesia's commitments under the WTO Basic Telecommunications Services Agreement were modest compared to other developing regional economies, with a lengthy schedule for opening its market. However, by 2003, several years early, the Government plans to open national and international long distance services to domestic and foreign competition. Following pricing deregulation, major foreign competitors now can enter the Thai telecommunications market; in the past, large connection fees and fixed rates kept most potential competitors out of the market. British company Orange has also taken advantage of the Government's deregulation of infrastructure ownership, acquiring Advanced Information Services, the dominant mobile provider, to gain access to its extensive infrastructure at competitive rates. By January 2006, consistent with its WTO commitments, Thailand plans to open its facilities based telecommunications services sector to direct foreign competition.[22]

Vietnam's strict regulation of FDI in strategic sectors like telecommunications explains the low FDI in this sector; foreign companies are restricted to participating in revenue sharing business cooperation contracts. They provide equipment, training, supervision and financing, while Vietnam Posts and Telecommunications Corporation supplies the opportunity to participate and manages the operations. Foreign companies and Vietnam Posts and Telecommunications Corporation share the revenues of the system usually for 5 to 15 years (Mekong Research, 2000b). The recent US-Vietnam bilateral trade agreement may expand business structure opportunities.

Other Regulation

Some regional economies' legal systems and processes do not encourage ICT FDI. For example, China's relevant legislation has been opaque and often inconsistently enforced. Partly as a result, the procedures needed to form a Sino-foreign joint venture to supply basic ICT services can take from nine to 12 months; the main Chinese investor must handle all related measures (United States Trade Representative, 2002; Coudert Brothers LLP, 2002). The lack of effective contract enforceability in Indonesia is a major issue for foreign investors, with telecommunications contract disputes common. Obtaining foreign investment permits also can be cumbersome and time consuming (United States Trade Representative, 2002).

While at senior levels, the ROK Government has shown a lively appreciation of the need to meet investors' concerns and streamline its FDI regime, hurdles remain at lower administrative levels including complex registration, notification, licensing and approval requirements. Other problems include bureaucratic intransigence, inter-agency disputes, which can delay approvals, and Korean firms' often unrealistic expectations of the fair value of assets.

[22] Facilities based telecommunications services are those provided by a telecommunications service providers who own their own networks (www.wto.org, accessed 15 August 2002).

OPPORTUNITIES FOR AUSTRALIAN BUSINESS

Australian exporters can take advantage of East Asia's high growth, high value ICT markets. Australian business has a global track record in supplying smart cards, information technology for on line banking services, photonics, telecommunications services and products, such as specialised equipment and billing services, application service provision, government on line services and mining software (www.austradetech.com, accessed 25 October 2002).

Opportunities for Australian ICT exporters and investors vary considerably across East Asia depending on economies' level of development, diffusion of ICT products and services and government policies supporting the sector. (See Chapter 3 – *East Asian Markets*.) In general, East Asia's competitive ICT equipment industry is complementary to Australia's vibrant ICT services and software industry. East Asia is likely to build up its software and ICT services sectors over the medium term, creating prospects for Australian firms. Australia is strong in applications software development for the engineering, science, finance, banking, legal and government administration sectors, creating significant potential ICT service and software export opportunities in East Asia for Australian business. In many East Asian economies, the growth of e-commerce opens opportunities to supply services and consultancies in that segment, as well as to market other Australian products and services using electronic communications. While Australian opportunities for trade and investment in mass produced ICT equipment appear somewhat limited, Australia has competitive strengths in some niche areas of advanced ICT manufacturing, including components, in which Australia has intellectual property advantages. Such products are among Australia's fast growing ICT equipment exports to East Asia.

With considerably higher per capita incomes and technological diffusion, industrialised East Asia's advanced telecommunications and Internet related services demand should grow rapidly in future years. Although strong foreign and local competitors are active in these ICT markets, many of these economies' industries should offer opportunities for Australian ICT solutions. In particular, good opportunities for Australian suppliers exist in specific ICT equipment, including photonics, and Internet and e-commerce applications including electronic payment solutions, multimedia, games software development, telecommunications, particularly wireless, ICT consulting, network and system integration services, product research and development, smart card systems, ICT security, business application software and industry specific application software.

In developing East Asia, rapidly expanding ICT industries and increasing technological diffusion, often based on foreign based technologies, also provide opportunities for ICT services suppliers. While in some regional economies, red tape, language barriers and technological standards may create difficulties for potential Australian services exporters, significant opportunities exist in software, ICT services, Internet based infrastructure, remote education and e-learning applications, financial and banking systems, vertical applications such as inventory management, retail technology, customer relationship management software, e-commerce applications and consulting, government front-end customer services and integration and telecommunications equipment, technology and services.

Salient trends in the sector include pressure on smart cable and optical fibre manufacturers as China and other economies becomes increasingly competitive in this area, the likelihood that China will become Australia's main ICT trading partner within 12 to 15 years and the move of big telecommunications companies out of the region.

ICT Equipment

East Asia offers Australian firms opportunities to export equipment embodying advanced technology, including telecommunications equipment and robotics, particularly when they hold patents. Australia is less competitive in mass produced, labour intensive ICT equipment production processes.

KRONE EXPORTING HIGH VALUE EQUIPMENT TO EAST ASIA

Krone is a leading network cable and connectivity supplier, providing high performance network solutions for both wide and local area networks. Since starting production of distribution frames and cable connection hardware more than 70 years ago, Krone has established an extensive product line, exports to more than 140 economies, with 3 500 employees in 26 business units and 11 factories around the world. The company aims to supply its customers with high quality, state of the art products and services for both public and private communications networks. Krone is a total solutions provider, offering a complete line of copper or fibre based cabling systems and connectivity products for both voice and data communication applications. Innovation is key to Krone's success, with Krone presently holding over 2 000 patents.

Krone Australia, the company's Asia Pacific headquarters, exports to East Asia from production facilities in Australia, winning numerous export awards. Export sales generate around 30 per cent of its revenue with its top markets in the United States, South Africa and Hong Kong. Krone uses subsidiaries in East Asia, including in China, Hong Kong, Indonesia, Japan, Singapore and Thailand, to distribute its products. The Chinese subsidiary is the only production facility; it assembles components, including from Australia, as high import tariffs make importation of complete products uneconomic. Krone has not experienced licensing problems in East Asia. All its products comply with Australian and US standards and these are accepted in East Asia. As Krone produces a high quality product that is relatively more expensive than some competitors, the main issues it faces doing business in East Asia are price and weak enforcement of intellectual property rights.

Source: Krone Australia Pty Ltd, 2002.

The demand for ICT equipment is destined to grow rapidly as industrialised and developing East Asian economies increasingly apply ICTs to their real economy sectors. Many East Asian businesses are seeking e-commerce marketing solutions, requiring computer hardware, peripherals and software purchases. Further opportunities will arise in China as it eliminates tariffs on specialised ICT products and as WTO accession opens up to more foreign investment in finance, retailing, distribution and

[23] The Seoul City Government is providing tax and other incentives to attract foreign investment to the project.

telecommunications. As a result, Hong Kong should play an even more important role as a trading centre for ICT goods trade with China (United States Commercial Service, 2001a).

Due to government incentives, Internet popularity and growing awareness of computerisation's importance, many East Asian organisations are modernising their computer and networking systems. As incomes rise, purchases of home computers are increasing rapidly. E-government projects across the region also will spur hardware demand. Some economies are undertaking large ICT promotion projects which will boost demand for ICT equipment. For example, the Seoul City Government is building a high technology media, entertainment and ICT industry complex in Sangam-dong, close to Seoul. Planned for completion by late 2005, it will include information network and media-entertainment facilities and be fitted with high speed telecommunications infrastructure.[23] Introducing digital television in the region, currently mainly in Hong Kong, will provide opportunities for suppliers of broadcasting production hardware and software, transmission facilities and producers of consumer receivers. Opportunities also should expand for high technology products related to film production and television programming (United States Commercial Service, 2001b).

In industrialised North East Asian economies, telecommunications liberalisation and programs supporting new technology roll outs are spurring demand for fixed line and mobile telecommunications equipment. Taiwan's telecommunications liberalisation stimulated strong demand for network infrastructure and customer premises equipment products while construction of broadband backbone wireline and international submarine cable networks promise substantial long term business opportunities (US Commercial Service, 2001e). By 2005, the ROK plans to expand its telecommunications network infrastructure significantly providing trade and investment opportunities. Deploying new mobile networks also could generate opportunities for Australian equipment suppliers and professionals with technical expertise. Hong Kong's telecommunication operators are committed to expand their networks also presenting opportunities for companies with experience in telecommunications integration, network management and consulting services.

China's telecommunications equipment markets also will continue to grow rapidly over the next few years as network construction continues and teledensity deepens. Chinese telecommunications companies continue to invest heavily in network development and technology upgrades, while market deregulation and WTO accession could provide openings for specialised Australian telecommunications equipment and components manufacturers. China's appetite for large capacity, high speed transmission and Internet protocol switching capacity should continue to drive growth in

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24 Dense wave division multiplexing promises to solve the 'fibre exhaust' problem and should be the central technology in the all optical networks of the future. It puts data from different sources together on an optical fibre, with each signal carried on its own separate light wavelength. Up to 80 or more separate wavelengths or channels of data can be multiplexed into a light stream transmitted on a single optical fibre, with each channel carrying a time division multiplexed signal. The optical fibre's channels can each carry 2.5 gigabits per second, delivering up to 200 billion gigabits per second. Internet protocol data, synchronous optical network data and asynchronous transfer mode data can all travel at the same time within the optical fibre (searchnetworking.techtarget.com). Asynchronous digital subscriber line technologies are likely to dominate broadband capacity.

25 The frame relay and asynchronous transfer mode equipment markets are growing. By 2004, Internet protocol technology growth is expected to increase, with much action in next generation technology (The Economist Intelligence Unit, 2002b).

the telecommunications infrastructure market; by 2004, telecoms authorities will build higher capacity dense wave division multiplexing networks (The Economist Intelligence Unit, 2002b).[24] By 2004, China plans to roll out broadband access technologies widely. As a result of China's relatively low main line penetration, demand for switches will continue; more intelligent switches have entered the market with uptake expected to be strong over the next two years (The Economist Intelligence Unit, 2002b). Given the relatively small size of the data communications market and the Government's interest in increasing uptake, potential for high growth also exists in this market segment, particularly as the number of main line and Internet subscribers increases capacity demand.[25] The Chinese Government gives priority to meeting basic telecommunications infrastructure needs and plans to achieve ambitious rural teledensity targets by the end of the Tenth Five Year Plan in 2005. The potential entry of the State Administration for Radio, Film and Television to the telecommunications services market would expand the equipment market and introduce new technologies to the market (The Economist Intelligence Unit, 2002b). Opportunities also may arise in data network connection technology, interconnection billing systems, user access products, telecommunications power supply systems, HF and VHF communication products and in consulting and training to improve network efficiency (Austrade, 2002a). Few Chinese investors have a sophisticated understanding of the investment opportunities in Internet companies, opening opportunities for Australian companies with relevant skills (Austrade, 2002a).

In several developing regional economies, relatively low awareness of the benefits of applying ICTs, limited funds and poor telecommunications infrastructure hamper ICT take up, limiting short term business opportunities. However, increasingly, e-commerce use and capabilities will generate demand for appropriate hardware and communication bandwidth upgrades. For example, Philippine demand for alternative data transmission modes and Internet access using wire and wireless technologies is expanding, creating opportunities for equipment and contractor services providers (US Commercial Service, 2001d).

IT Services and Software

Most East Asian economies are less competitive IT services and software producers than hardware producers, though most economies aim to increase their skills in these sectors. Until this occurs, significant opportunities should exist for Australian IT services firms.

In the wake of the financial crisis, industrialised East Asian economies are upgrading their financial sectors, generating opportunities for financial sector IT service providers. For example, in 2002, as the ROK seeks to strengthen its financial sector, the total demand for financial sector IT goods and services is predicted to be US$2.6 billion; of this 57 per cent could be for system integration services.[26] To secure cost efficiencies, Korean financial institutions are expected to establish system integration subsidiaries and accelerate IT outsourcing. Also, industrialised East Asia has expanding market opportunities in enterprise application integration, next generation financial solutions, knowledge management, disaster recovery systems, IT outsourcing and smart cards.

[26] System integration services involve progressively linking and testing system components to merge their functional and technical characteristics into a comprehensive, interoperable system. Integration of data systems allows users to share or access data existing on disparate systems across functional or system boundaries (www.its.bldrdoc.gov, accessed 12 October 2002).

Due to their need to expand their IT use, many developing East Asian economies offer IT services trade and investment opportunities. For example, the Indonesian market has much potential for IT services as it needs to integrate computing environments developed on an ad hoc basis. It is at an early stage of developing disaster recovery and total facilities management and has an acute shortage of trained IT personnel to support expansion and handle sophisticated customisation of systems. Large organisations are rapidly increasing their Internet use and outsource many IT requirements (Austrade, 2002c).

INTEGRATED RESEARCH-INNOVATIVE SYSTEMS AND APPLICATIONS MANAGEMENT SOLUTIONS

Integrated Research is a global software company specialising in the development of systems and application management software and has been achieving double digit compound growth rates. Over 97 per cent of its revenue is derived outside Australia, highlighting the company's ability to perform in the global software market. In 1998, IR was recognized for its international marketing success when it won the prestigious award of 'Australian Exporter of the Year - Information Industries.' The company's ability to forge strategic alliances with some of the world's leading technology companies has been a major factor in its strong performance and growth. These alliances reflect Integrated Research's growing stature in the marketplace. Its customer base has grown rapidly with thousands of licences installed in over 40 countries. Integrated Research an extensive network of distributors in major marketplaces to ensure first class customer support, including in Indonesia, Malaysia and Thailand.

Integrated Research's aim was to create the most comprehensive suite of systems management products available. Its integrated product suite, PROGNOSIS, reduces the cost and complexity of managing critical business applications and concurrently optimises the performance and availability of those applications. It is proven in the demanding world of mission critical computing such as telecommunications, financial transactions and hospital management, where continuous availability is vital. Through its intuitive user interface, PROGNOSIS delivers real time information, problem identification and notification; automates routine or complicated management functions; and enables users to store, consolidate and review historical data for planning and management reporting.

Since 1994, Integrated Research's entry into South East Asia has been growing. The key to the success in this region has been value added partnerships. Integrated Research is continuing to expand its presence throughout this region. The PROGNOSIS customer base in South East Asia includes Thai Farmers Bank, NETS, OCBC, Krung, Kuala Lumpur Stock Exchange, ICICI and the Korea Stock Exchange.

Integrated Research continues to invest heavily in research and development to bring real world functionality and new products to market. The Sydney development group is composed of teams of highly experienced professionals with exceptional development skills. The mix of astute management, technical skills, proven products, new product development and strategic alliances has earned Integrated Research a strong reputation in the global information technology community and continues to position the company perfectly for the challenges of the new millennium.

Source: Integrated Research, 2002.

East Asia's software industry still is at an early stage of development. East Asia generally has a shortage of software producers and qualified software engineers, so software imports dominate its markets. As computer penetration deepens, the software market, including for specialist software applications should grow strongly. In particular, demand for IT security systems, including Internet security, is high due to rising Internet hacking, security breaches and virus attacks.

Strong opportunities exist for Australian financial institutions and software companies to develop advanced banking, brokerage and investment software. Most opportunities lie in the large financial sectors of industrialised East Asian economies, particularly in the ROK, Japan, Hong Kong, Taiwan and Singapore. Japan's financial sector is moving from mainframe based legacy systems to open architecture systems; currently, little competition exists in open platform financial application software, providing opportunities for firms with expertise in this area.

CARDS ETC

In 1998, Cards etc began developing a software suite to handle the back end processing for multiple smart card applications. A combination of Australian talent and expertise saw Cards etc commercially launch their Arterium software in mid 2000; Arterium offers platform independence between smart card and device formats and supports various card payment platforms such as Multos, Open Platform, JavaCard and Smart Card for Windows. Smart cards are used mainly for financial products, loyalty programs, identification and authentication and increasingly for transport. In expanding their Australian R&D efforts, Cards etc found talented smart card developers while keeping expenses low; this was the key to Cards etc's steady growth in the 1990s.

Cards etc has positioned itself to take advantage of organisations looking to smart card technology as a means to increase customer loyalty, improve market share and cut costs of launching new products on a card. Arterium allows organisations to add or delete products from a smart card after the card is issued, removing the need to issue new cards along with new products. Cardholders can download or delete products via various means, including the web, ATM networks and company intranets. Marketers can test new products and loyalty partnerships quickly, ultimately increasing their speed of entering the market and hence their profitability.

Between 80 and 90 per cent of Cards etc's market is overseas; it successfully exports to East Asia, currently to Taiwan and Japan. From its experience, ICT firms doing business in East Asia need to be aware of cultural differences. Expectation differences also need to be handled with care; in particular, firms may have to deal with a view that extra services should be included in the price, particularly in the case of software. However, Cards etc has not experienced problems with work visas.

Source: Cards etc, 2002.

The ROK depends entirely on imports to meet its systems software and special purpose applications software requirements. In 2001, total market demand for computer software was projected to increase by 15 per cent to reach $7 billion, and is expected to grow by at least 17 per cent per year to 2003 (US Commercial Service, 2001b). Taiwan also is seeking advanced innovation and technologies to develop its software capability. Opportunities exist for partnerships and cooperative relationships with companies that can supply next generation software and training (Australian Business Centre and Australian Commerce and Industry Office, 2002).

Chinese Government commitments to buy legal software copies and bundled software will continue to create demand for cheaper local and imported products. By 2006, the Thai Government hopes to reach its software production target of US$950 million for the domestic and export market (US Commercial Service, 2001f). Although Thailand currently is a very small market, with little software produced domestically, opportunities exist in customising packages for the Thai market. For example, many banks and Internet service providers develop customised software for internal use. The Philippines has skilled software engineers and aims to become a software production centre; joint ventures with Australian companies to service regional markets could produce good business opportunities.

Telecommunication Services

Considerable opportunities are emerging associated with the rapid growth in telecommunication services in East Asia, as ongoing deregulation and rising incomes spur latent demand. For many economies major opportunities lie in the rapidly growing mobile sector. While large foreign firms already are active in these markets, Australian ICT businesses are securing opportunities.

With higher levels of telephony penetration and growing demand for telecommunications, industrialised East Asia offers the best opportunities for suppliers of value added services. For example, in 2000, Hong Kong's regulator awarded additional licences to operate external telecommunications facilities based on satellites and cables. In 2001, two new international submarine fibre optic cables landed in Hong Kong dramatically increasing international telecommunication capacity. These developments support rapid development of innovative new ICT and telecommunications products and services, which will drive growth in the international telecommunication services market over the next few years (United States Commercial Service, 2001a). Opportunities also exist to partner with the licensed operators to provide telecommunication services in Hong Kong and the region (United States Commercial Service, 2001a).[27] The Hong Kong regulator now requires third generation network capacity to provide access to mobile virtual network operators.[28] This should lower significantly new players' costs of entering the mobile services market, creating additional demand for network hardware and software as well as support, consulting and content services (United States Commercial Service, 2001a).

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27 The opportunity to participate in the facilities based local service market, for either wireline or wireless services, remains limited to partnering with one of the ten fixed telecommunication network services licensees.

28 Third generation, or 3G, is a wireless telecommunications standard that facilitates applications that have not previously been readily available over mobile networks due to the limitations in data transmission speeds, allowing users to access the Internet, speed up Internet access and download video and audio clips.

Developing East Asia offers more opportunities for Australian ICT firms to provide basic services; the sector requires much development before value added services demand will grow significantly. As Indonesia's economic recovery proceeds and the Government announces projects to expand and develop the telecommunications network, opportunities may emerge for Australian companies. Growth in wireless technology will drive the Philippines' market for telecommunication services as the numbers of mobile users exceeds fixed line users. As Vietnam's national telecommunications system expands, more complex value added services will be needed. Although Australian ICT companies are not as active in Vietnam as those from the United States, India or the European Union, the significant achievements of some key Australian telecommunications players like Telstra, generates local market interest in Australian capabilities (Austrade, 2002k).

TELSTRA INTERNATIONAL

Telstra's international business strategy involves building relationships and developing business opportunities in the Asia Pacific. Telstra International's competitive strength is based on adding value, technology capabilities and growing new business, all increasingly important in the Asia Pacific. Potentially large markets are burgeoning as the underdeveloped telecommunications environments rapidly improve in line with economic growth in the region, particularly in China. Telstra International's Hong Kong head office is a springboard from which Telstra can connect with other Asian businesses, places Telstra closer to opportunities and also shows commitment to Asia. Telstra currently has interests in the Asia Pacific region including mainland China, Hong Kong and New Zealand.

In China, Telstra International continues to build and consolidate relationships with key Chinese telecommunications organisations, which form a critically important basis for developing new business activities. With a strong track record, rich experiences at the Sydney Olympics and contributions to Beijing's bid for the 2008 Olympics, Telstra received recognition as a strong partner from the Chinese government and China's telecommunication sector. As China's telecommunications industry becomes increasingly customer focussed, Telstra is working to capture the enormous opportunities and play a leading role in that transition. New business activities are building on previous success, particularly the November 2001 memorandum of understanding with China Unicom, which seeks to explore and develop partnership and cooperation opportunities for fixed and wireless, voice and data services and services to the business market. Telstra International and Chinese electronics company, SVA, are exploring the possibility of establishing a joint venture to supply value added telecommunications services in the growing Shanghai market.

REACH, the joint venture between Telstra and PCCW Limited, is Asia's largest wholesale carrier of combined international voice, data and Internet protocol connectivity services; it provides other carriers and service providers with regional and global wholesale services and Asian coverage for global telecommunications carriers. REACH is well positioned to

capitalise from the challenging market situation, as its business is well established, it has local expertise in all major Asian markets and is ideally placed to service the Asian customer base of global service providers. REACH's Asian Service Outsourcing strategy allows non-Asian companies to focus on their home markets while outsourcing management of their Asian networks and customers to REACH. Telstra's wholly owned premium mobile carrier, CSL, is a leading Hong Kong provider of mobile voice and data services; it was chosen as 'Best Asian GSM Operator' three times in the last five years. This success reflects CSL's industry leading innovation in the core business of mobile telecommunication service provision, backed by effective brand marketing and customer segmentation. The premium customer segment and the youth segment both have rapidly adopted the new technologies and services CSL provides, including multimedia messaging service, which allows customers to send pictures with text messages.

Telstra has been active in Vietnam since 1986 when little foreign investment occurred there and the telecommunications infrastructure was virtually non existent. Telstra's help with telecommunications development culminated with the historic completion of the US$237 million Telstra-VNPT Business Cooperation Contract in early 2002. Telstra officially completed the contract to assist in the design, development and build of Vietnam's international telecommunications network. This involved training more than 3 500 staff for VNPT, Vietnam's national carrier. Telstra's success was based on sound commercial opportunities, shared goals and a strong relationship with VNPT and the Vietnamese authorities.

Telstra has and will continue to explore business opportunities in the Asia Pacific region. In considering such opportunities Telstra assesses both transaction specific and non-specific risks.

Source: Telstra International, 2002.

E-Commerce Related

The region's growing e-commerce and mobile e-commerce sectors offer significant opportunities for Australian companies providing solutions in on line and value added services, particularly for software and Internet security. Many East Asian businesses are interested in implementing e-commerce applications. While the dot.com downturn dampened enthusiasm in 2001, this sector should improve as world growth picks up.

The main industry sectors seeking value added applications and innovative cost effective e-commerce solutions are finance and banking, wholesale and retail trade, manufacturing, education, multimedia entertainment, and telecommunications. ICT outsourcing and training sectors, customer relationship management and supply chain management application providers also offer opportunities. In many regional economies, new private sector telecommunications operators are committed to meet services provision targets under licence conditions; this should present opportunities for ICT companies providing services to these telecommunication firms and their customers, including innovative e-commerce, interactive broadcasting services, telemedicine, broadband data delivery and long

distance education. Governments' plans to put more services on line opens opportunities in e-commerce, e-procurement and e-supply chain management, web consulting and design, Internet applications, security and customer relationship management applications.

Industrialised regional economy businesses, particularly in Hong Kong, the ROK and Japan, increasingly use the Internet for e-commerce and m-commerce, increasing demand for Internet security products. Japan plans to spend over ¥2 billion, US$20 million, on ICT security policy projects, which should provide opportunities for Australian firms (Austrade, 2002e). While the ROK's e-commerce sector has rationalised since mid 2000, demand for Internet based systems solutions is strong and growing; in 2001, 48 per cent of these solutions were imported (Austrade, 2002f).[29] ROK demand for extended enterprise resource planning solutions, such as customer relationship management, supply chain management, strategic enterprise management, product lifecycle management, enterprise portals and e-marketplaces are likely to increase over the next five years; taxation deduction benefits for companies adopting customer relationship management and supply chain management will contribute to increased demand.

As many East Asian economies' e-commerce sectors lack local content, payment gateways and publicly available market data, opportunities also will expand as ICT diffusion increases. Currently, Malaysia offers good opportunities, providing openings for international companies to work with local companies to provide and develop technologies. Specific joint venture opportunities include e-commerce and Internet applications suitable for the Malaysian market, transferring and developing technology to build Internet/e-commerce markets and find Internet, e-commerce and m-commerce solutions (US Commercial Service, 2001c). As Malaysian consumers accepted e-commerce well, industry will need call centres as the sector grows to provide customer support. In the short term, Philippine application service providers, call centres, enterprise servers, Internet security, customer relationship management, broadband technology, e-commerce and e-business and multimedia services also should grow strongly (US Commercial Service, 2001d). While the Vietnamese population is very enthusiastic about e-commerce, the current lack of computer and telephone diffusion means the government is generating most opportunities. It is developing international donor and government funded projects in banking and finance, Internet-based ICT platform and database management, e-trade promotion and administration and operations management.

East Asian ICT education and training offers good prospects and e-government initiatives and government ICT integration also will generate growth opportunities in the computer services market. For instance, government initiatives to transform Malaysia into a knowledge economy, the Government's drive to increase computer and ICT literacy and Australian tertiary educational institutions leading edge in e-learning and strong presence in the Malaysian education and training

[29] Over the next few years, Korean ICT companies and manufacturers are expected to adopt basic enterprise resource planning solutions to make their information systems more responsive to customers' needs, become more competitive and productive and increase returns on investment. The ROK also presents opportunities in Internet-based solutions such as enterprise resource planning with such markets more than doubling between 1999 and 2001; in 2001, the Korean enterprise resource planning market was valued at US$211 million, an increase of 43 per cent in real terms over the previous year and is forecast to grow by a further 30 per cent in 2002 (Office of Information Technologies, 2002b).

markets should generate strong opportunities. The Philippines, Vietnam and Indonesia also have growing opportunities in Internet based education. E-learning sectors require content development and delivery, computer and web based training systems, learning management systems, instructional design and content. Thailand has strong demand for educational services, such as English language training, graduate management admission test tutorials and university courses, many of which could be delivered through e-learning.

In several economies, telemedicine initiatives will generate opportunities in ICT software and services. In particular, Malaysia and the Philippines are promoting this sector actively, while Indonesia's health sector also has a large demand for ICT applications and Japan has relaxed regulations in this area to encourage telemedicine. Japan's aging society has sparked an interest in ICT in the aged care area. Several economies, including the Philippines, Malaysia, Singapore and ROK are early leaders in e-government, creating consulting and related opportunities.

Due to its good post and telecommunications infrastructure and strong technological expertise, Singapore is a centre for e-commerce businesses wishing to sell on line in South East Asia. The ROK's and Taiwan's well developed infrastructure and world class technology sectors, combined with export driven economies, make them ideal locations for the development of e-business in North East Asia.

Given the range of services broadband can support, an increase in broadband services offers potential for Australian trade and investment. The strong demand for broadband in the ROK, Hong Kong and Singapore generates opportunities for applications such as gaming and real time entertainment, which depend on high speed connections.

Hence a wide range of Australian ICT business opportunities are emerging in East Asian markets (Table 4.4)

Australian business also should use strategies involving consortia and large distribution partners to provide critical funding mass and integrated products for overseas business objectives. Given the low share of ICT companies exporting, around 5 per cent, and in light of issues such as limited funds and low level of international business expertise, ICT companies can benefit from tailored export assistance.

Table 4.4

Opportunities in ICT Sector Burgeoning

Summary of Some Prospective Areas in East Asia

Economy	ICT equipment	Software and IT services	Telecommunication services	E-commerce related
China	Computer network products, such as access cards, servers, routers Telecommunications products, including cellular networks, optical fibre and broadband transmission technologies, wireless broadband access network products	Telecommunications software, such as for network management Industry-specific applications and software, including taxi dispatching systems Special purpose software, such as for water survey, geo-mapping, gas supply pipeline monitoring. Intelligent transport systems	Telecommunications consulting services including management, billing and customer care	Business process software, including B2B e-commerce solutions[a] Internet credit assessment solutions Payment systems for financial settlement and system solutions for the security of banks E-government Distance education systems
Hong Kong	Network solutions, wireless LAN connectivity solutions, television set top boxes for broadband Internet access and wireless application protocols	Streaming media, wireless enabling middle ware and applications		Business process software Firewall, encryption, anti-viral and public key infrastructure and authentication products
Indonesia	Fixed line and mobile network equipment	Professional services, system integration, support systems, training and computer education facilities, outsourcing Industrial software	Domestic fixed line and mobile services Consultancy, training and value-added services[b]	Internet, telemedicine, information web networks, hospital network information systems
Japan	Computer hardware and components	System integration services Support services Financial IT		Security solutions E-government Internet-based business systems solutions
ROK	Equipment and networking to support e-commerce expansion Smart devices	System integration services, financial sector solutions, disaster recovery systems, IT outsourcing Smart card and intelligent traffic systems Business process software Animation and games software		Security solutions Internet-based business systems solutions Payment solutions systems On line gaming applications E-government

Economy	ICT equipment	Software and IT services	Telecommunication services	E-commerce related
Malaysia	Electronic parts and components as inputs	Systems integration and consultancy services, outsourcing services Financial IT Smart card technologies and ticketing IT education and training	Computer telephony integration	E-commerce and secure on line payments, banking and e-security Digital content Internet-based business systems solutions E-learning software and services
Philippines	Hardware to upgrade communication bandwidth Wireless networks	Software to support upgrade of communication bandwidth	Wireless services	Internet-based business systems solutions E-government and e-learning Multimedia services Building and enhancing websites and developing Internet-based services
Singapore	Computer equipment and components inputs Photonics	Data storage Intelligent transport systems Financial IT Outsourcing	Data services	Internet-based business systems solutions E-learning
Taiwan	Telecommunication network construction	Application service provider services, electronic information streaming and exchange services, network linking services, telecommunications/ computer integration, information outsourcing, system customisation services, network integration and solutions	Operations system support, voice over Internet protocol, 2G and 3G solutions, network packages and other value added service solutions	Business process software, interactive audio and video programs, teleconfer-encing, e-learning, video games, on line banking, on line shopping and telemedicine Web hosting services, web space management
Thailand	Broadband network equipment, fibre optic equipment, chip card phone production equipment, web based systems and satellite based communications equipment	Software customisation, IT training Games Intelligent transport systems Financial IT Outsourcing	Mobile telephony, voice over Internet protocol	Internet, e-learning E-government E-security

Economy	ICT equipment	Software and ICT services	Telecommunication services	E-commerce related
Vietnam	Computer hardware and equipment Cable television transmission equipment, portable radio systems, digital microwave systems and digital switchgear	Software production and development, particularly IT outsourcing and database software and management System design and configuration, computer and network installation, hardware maintenance and on-going contract maintenance, IT consulting and training, security, technology and solutions, particularly for Internet-based virtual private networks	Value added services: billing systems and voice mail Fixed and mobile wireless services (Note: telecommunication services are provided under contract with Vietnam Posts and Telecommunications)	Web applications, design and consulting. Training in Internet marketing Internet-based business systems solutions

Note: [a] Business process software includes enterprise resource planning, supply chain management, uniform messaging systems, multi media messaging system, geographical positioning system, intelligent traffic system and similar software. It covers innovative solutions for business planning, scheduling and forecasting, distribution, transportation, warehousing, inventory control and management and retail processes. B2B e-commerce is the exchange of products, services or information between businesses using electronic means such as the Internet

[b] These include very small aperture terminal, Internet, radio paging services, electronic data interchange, voice over Internet protocol, radio trunking and cellular mobile communications.

Source: Austrade, 2002 various; US Commercial Service, 2001 various.

AUSTRADE'S GLOBAL ICT TEAM

No matter what the size of technology business, or what stage in the product cycle, Austrade's Global ICT Team has a service to meet ICT businesses' needs. Austrade's Global ICT Team adds significant value to ICT businesses by working in partnership. Austrade tailors its services and approach to meet businesses' individual needs, whether to expand established technology into a new market, roll out a new product internationally or plan ahead by building overseas market requirements into product specifications. Austrade's global network of ICT specialists can provide market savvy, on the ground support in key technology markets around the world and help in overcoming cultural challenges and achieving success in overseas markets.

By working with Austrade's ICT specialists, businesses spend less time explaining their product and benefit from Austrade's experience in working with other technology companies. Combining this knowledge with deep understanding of ICT businesses allows Austrade to reduce the risks of international investment and to seize opportunities that are not accessible by going it alone.

An investment in Austrade's services can save time and money. Austrade can help with market selection, market analysis, competitive analysis, market entry strategy, partner identification, visit programs, tailored event services, foreign language services, financial assistance and setting up an overseas office.

General information and referrals are provided free of charge. Austrade's tailored market research and business development services are charged at an hourly rate in line with Austrade's Client Service Charter. For companies eligible for the Export Market Development Grant scheme, Austrade's service fees may be claimed as expenses and reimbursed at a rate of up to 50 per cent.

Source: www.austradetech.com, accessed 12 November 2002.

LOOKING FORWARD

With good prospects for solid economic growth in the medium term, higher incomes and increasing levels of ICT, Internet and e-commerce use, particularly industrialised East Asia but increasingly developing East Asia offer significant opportunities for Australian ICT businesses. However, ICT exporters and investors need to tailor their business plan to each economy, recognising differences in levels of income, diffusion of technology, infrastructure availability, technical skills and business environments. The emergence of a consumer society is a key trend that will impact on demand for ICT products, particularly software and services. Industrialised East Asia offers good prospects in higher value ICT services, while developing East Asia offers prospects in infrastructure development and ICT services such as e-learning and e-government. To make the most of these opportunities, companies need detailed knowledge of the characteristics of Internet users, the legal framework and the priorities of the government in the sector.

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APPENDIX 4.1

GLOBAL MARKET TRENDS FOR ICT AND E-COMMERCE

Robust Australian and East Asian ICT trade reflects rapid growth in world markets for ICT goods, software and services and e-commerce since the early 1990s. The ICT industry is now one of the most globalised of all industries, with multinational corporations dispersing their production networks widely; East Asian economies play an increasingly important role in such networks (United Nations Conference on Trade and Development, 2002a). The rapid growth in demand for ICT equipment, components and related software and services is set to continue throughout the 2000s, providing many opportunities for ICT and e-commerce goods and services exporters in Australia and East Asia.

GLOBAL TAKE UP OF ICT AND E-COMMERCE

The ICT production industry was born in an era of rapid globalisation and has capitalised fully on locating production in the most competitive sites; production now is highly integrated internationally, spurring rapid intra industry and final product trade growth.

World ICT Spending Growing Rapidly

Over the last decade, the global ICT market has grown spectacularly and, in 2003, is expected to recover from its 2001/02 downturn. While increasing only 3.7 per cent in 2001 to reach US$2.4 trillion, since 1993 world ICT expenditure has grown 7.6 per cent per year on average (Figure A4.1).[1] Worldwide ICT spending is now equivalent to 7.6 per cent of world GDP, up from 5.6 per cent in 1993 (International Data Corporation, 2002).

Telecommunications equipment and services had the largest share of total ICT spending with 43 per cent, ICT services represented almost 18 per cent, ICT hardware just under 16 per cent and software accounted for 8 per cent. Large falls in ICT hardware expenditure drove most of the drop in ICT expenditure growth in 2001 (Figure A4.2).[2]

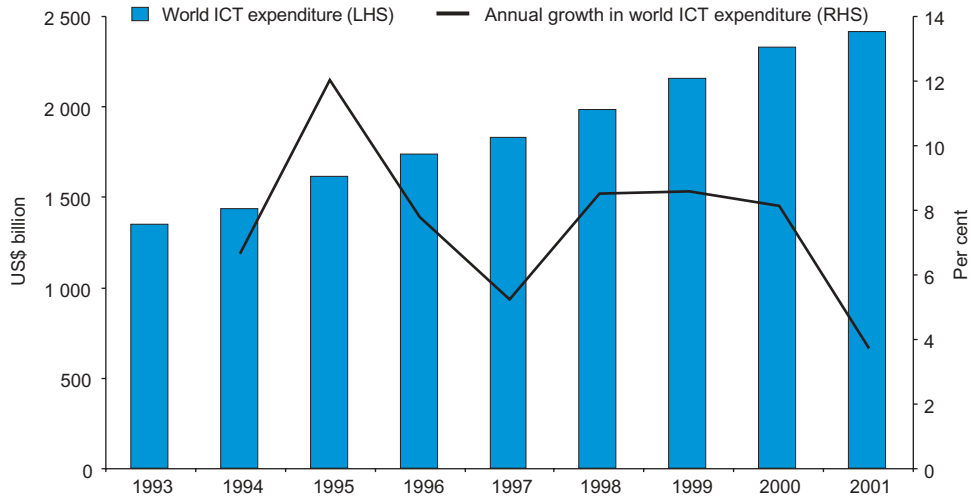
1 ICT expenditure data includes ICT equipment and services spending, including ICT hardware, ICT office equipment, software, ICT services and internal ICT spending. Internal ICT spending includes the internal portion of information system operating budgets, internally customised software, capital depreciation and any other ICT expenses which cannot be tied to a vendor (International Data Corporation, 2002).

2 This fall was partly due to firms bringing forward system upgrades to deal with year 2000, Y2K, problems. Statistics on ICT expenditure vary considerably. According to Aberdeen Group, worldwide ICT spending, defined as money spent on hardware, software or commercial grade services, grew by just 0.2 per cent in 2001 and by 0.4 per cent in the United States (Bizreport, 2002). However, International Data Corporation estimates ICT hardware, software and services spending totalled US$998 billion in 2001, representing an increase of 1 per cent on the previous year (International Data Corporation, 2002).

Figure A4.1

Strong World ICT Spending Growth Slowing

World ICT Expenditure and Growth, 1992-2001, US$ billion and per cent

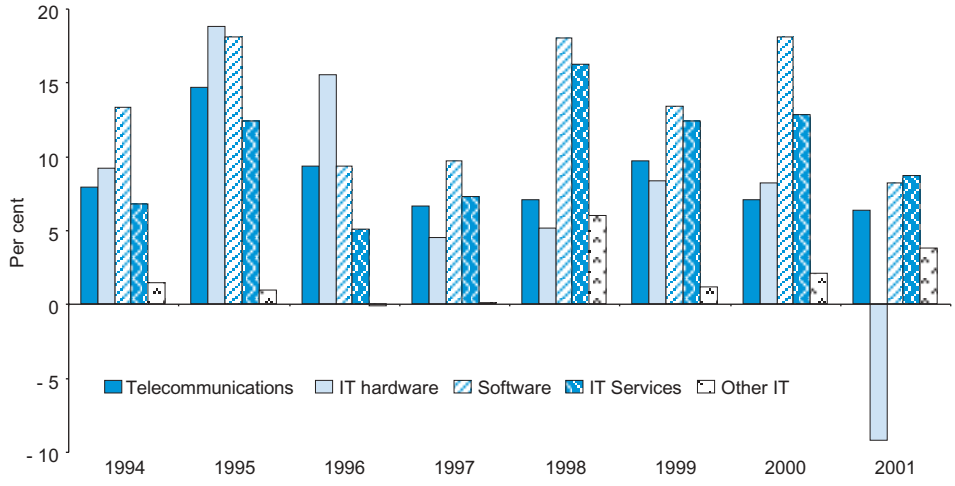


Source: International Data Corporation, 2002.

Figure A4.2

Lower Hardware Spending Drives Slower Spending Growth

Growth in Components of World ICT Expenditure, 1994-2001, Per cent



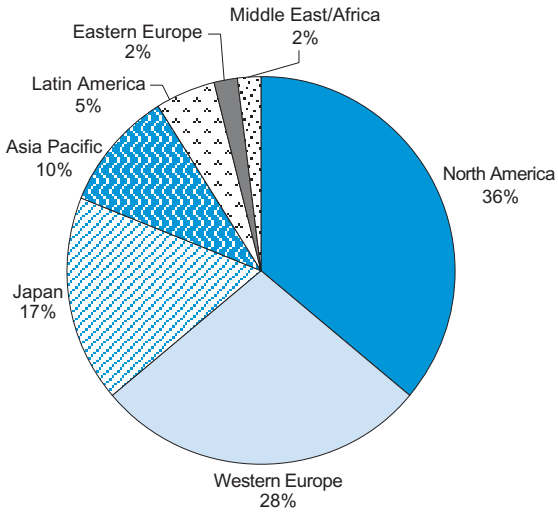
Source: International Data Corporation, 2002.

Although starting from a lower base, developing economies' ICT spending growth is significantly higher than developed economies'. For example, from 1993 to 2001, China achieved the world's fastest ICT spending growth, averaging 27 per cent per year, or around 4.5 times that of the United States; Vietnam, Poland, Colombia and India also achieved high growth (International Data Corporation, 2002). However, despite recent falls, the United States continues to dominate global ICT spending with almost 34 per cent of the world total in 2001, down from 36 per cent in 1993 (Figure A4.3). Japan and the Asia Pacific together have a similar share of world ICT expenditure as Western Europe.[3]

Figure A4.3

North America Still Dominates World ICT Spending

Regional Share of Global ICT Sector Spending, 2001, Per cent



Source: International Data Corporation, 2002.

Highly Globalised ICT Production

Increasingly, world markets for ICT goods and services are globalising, with closer industrial integration resulting in greater international specialisation of production and heavier reliance on imported ICT services. Also, product cycles are becoming shorter and demand for low technology inputs, such as materials, products, energy and unskilled labour is falling, while demand for higher quality products and value added services is expanding (International Trade Centre, 1999).

[3] Among emerging economies, China, Brazil, the Republic of Korea, India, Mexico, Hong Kong, Argentina and Singapore ranked highest in terms of shares of global ICT spending.

Trade in ICT products, including computers, office equipment, telecommunications equipment and semiconductors is expanding due to production sharing, or cross border manufacturing networks, an important aspect of the globalised ICT industry. Taking advantage of scale economies and cost competitive inputs allows companies to reduce costs or improve response times, increasing their competitiveness. Lower transport and communication costs and reduced trade and regulatory barriers facilitate production sharing, which generally is concentrated in labour intensive components, even of technologically complex production processes (United Nations Conference on Trade and Development, 2002a). Multinational corporations play a major part in this trend; 22 of the top 100 multinational corporations are in the ICT industry (Table A4.1).[4]

The major North American ICT production sharing trade flow involves the United States exporting machinery, components and materials to Mexico and Canada and importing finished televisions, computer hardware and telecommunications equipment from them.[5] Only a small portion of electronic products the United States imports from Asia contains US components. Similarly, Japanese, Korean, and Taiwanese companies access duty waiver and drawback provisions and lower labour costs in China, Indonesia, Malaysia, the Philippines and Thailand to outsource labour intensive ICT equipment processes, exporting components and importing finished goods (United States International Trade Commission, 2002). Hence, statistics showing an expansion of technology and skill intensive exports from developing economies often are misleading, as much of the skills in these exports are embodied in components produced in the technologically more advanced economies. Typically, developing regional economies are engaged in the lower skill and value added assembly stages of global production chains (United Nations Conference on Trade and Development, 2002a).

Reflecting the increase in global production networks, trade in components and parts are a dynamic sector in East Asian trade, accounting for about 20 per cent of East Asian exports of manufactures. East Asia's components exports grew faster than any other major product group between 1984 and 1996, at 15 per cent per year, while overall exports grew 11 per cent. Between 1985 and 1996, components imports grew over nine fold; for example, almost 75 per cent of all East Asian telecommunications equipment imports are components for further assembly (Ng and Yeats, 1999). Japan, Singapore and Taiwan have increased their specialisation in components manufacturing and largely exited assembly operations, which increasingly are moving to lower wage East Asian economies like China, Indonesia, Thailand and Malaysia that have broad and mature component assembly capacity (Ng and Yeats, 1999).[6]

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4 In 1999, partly reflecting growth in electronics production sharing and the beginning of the downturn in the telecommunications industry, several telecommunications companies, including Cable and Wireless, Nortel Networks and GTE Corporation, as well as the computer manufacturer, Compaq Computer Corporation, dropped out of the top 100 multinational corporations.

5 Mexico and Canada are important US partners in electronic goods production sharing mainly because of their proximity and high level of economic integration with the United States. The most important electronic products involved in US-Canadian production sharing are semiconductors, telecommunications equipment and computer hardware. Typically, the United States exports unfinished semiconductors, printed circuit boards, electrical circuit apparatus, other electronic devices and parts for telecommunications equipment to Canada where they are assembled into finished articles, some of which return to the United States incorporated into finished semiconductors, telecommunications equipment, computer hardware, motor vehicles, and aircraft (United States International Trade Commission, 2002).

6 This finding is based on analysis of detailed trade data to derive the revealed comparative advantage in production and in assembly of goods for each of the main East Asian economies.

Table A4.1

Large Multinationals Dominate World ICT Production

World's Largest ICT Multinational Corporations, Ranked by Foreign Assets, 1999

Rank	Corporation	Economy	ICT Segment
1	General Electric	United States	Electronics
9	IBM	United States	Computers
14	Siemens AG	Germany	Electronics
18	Mannesmann AG	Germany	Telecommunications/Engineering
21	ABB	Switzerland	Electrical equipment
22	Sony Corporation	Japan	Electronics
30	Telefónica SA	Spain	Telecommunications
32	Motorola Inc	United States	Electronics
33	Philips Electronics	Netherlands	Electronics
39	Hewlett-Packard	United States	Electronics/Computers
43	Alcatel	France	Electronics
48	Hutchison Whampoa Ltd	Hong Kong	Diversified, including telecommunications
50	Fujitsu Ltd	Japan	Electronics
55	Hitachi Ltd	Japan	Electrical equipment/Electronics
56	Matsushita Electric Industrial Co Ltd	Japan	Electronics
61	Canon Electronics	Japan	Electronics/Office equipment
69	Ericsson LM	Sweden	Electronics/Telecommunications
74	SBC Communications	United States	Telecommunications
80	Electrolux AB	Sweden	Electrical equipment/Electronics
83	Edison International	United States	Electronics
92	Lucent Technologies Inc	United States	Electronics
97	Toshiba Corporation	Japan	Electronics

Source: United Nations Conference on Trade and Development, 2002b.

Traditional telecommunications industry ownership forms and market structures also are changing rapidly throughout the world, with competitive international telecommunications suppliers and entrants from other sectors replacing integrated state owned monopolies.[7] The major telecommunications companies have established global alliances and a network of foreign subsidiaries, although not all are fully foreign owned because of foreign investment caps or the preference to share risks with local partners. Regulatory agencies are becoming more pro-competitive. (See Chapter 3 – *East Asian Markets*.)

ICT services and software are not highly globally integrated. However, economies such as the Philippines are using their labour cost, time zone and cultural affinity advantages to take part in some aspects of IT service provision, including call centres and software development.

World Growth in E-Commerce Activity

Telephony, Internet usage and e-commerce continue to grow strongly in the early 2000s, despite the downturn in the ICT industry. In 2001, world telephone subscribers totalled almost 2 billion people or 33 phones per 100 inhabitants, with telephone penetration rates highest in Europe, Oceania and the Americas (International Telecommunication Union, 2002a). In 2001, the number of people using the Internet increased by almost 31 per cent on the previous year, following an almost 50 per cent rise in 2000 (International Data Corporation, 2002). Although from a low base, the number of people using the Internet to purchase goods and services also increased by over 40 per cent in 2001 after rising by over 50 per cent in 2000. B2B e-commerce continues to surpass B2C e-commerce, with businesses spending four times more on line than consumers (International Data Corporation, 2002) (Figure A4.4). In 2001, B2B spending increased by 83 per cent while B2C spending rose 64 per cent, compared to rises of 188 per cent and 110 per cent respectively in 2000.

The United States has considerably more Internet e-commerce than any other economy, with US$207 billion of B2B spending and US$66.5 of B2C spending in 2001, double and six times the B2B and B2C of the next highest economy, Japan (International Data Corporation, 2002). However, other economies' Internet e-commerce spending is increasing swiftly; China's 2002 B2B spending was 60 per cent higher than in 1999, Taiwan's e-commerce spending rose 38 per cent in the same period and the Republic of Korea's, ROK's, increased by 31 per cent (International Data Corporation, 2002).

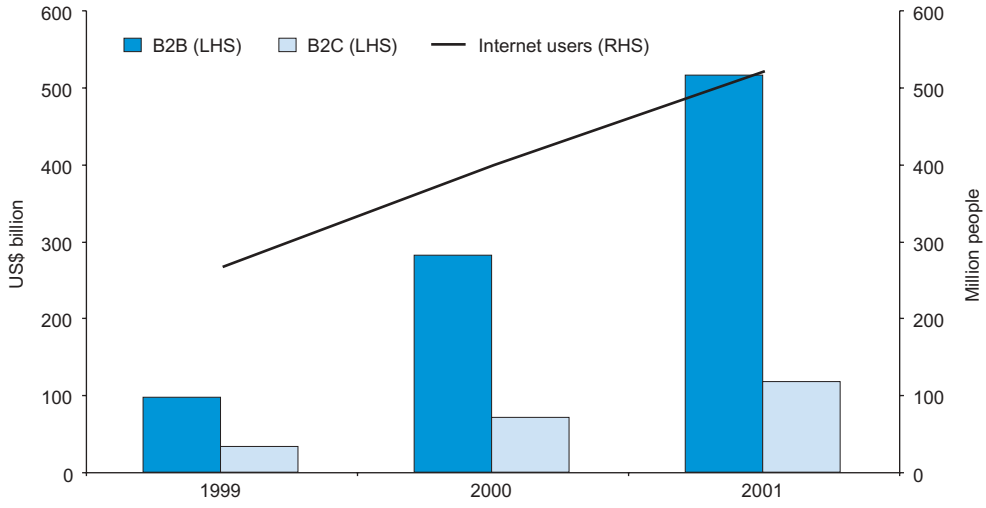
Developing East Asian economies have considerable scope to increase their ICT and e-commerce use to achieve greater productivity and economic growth. (See *Chapter 3 – East Asian Markets*.)

[7] The telecommunications services industry also is changing due to convergence between telecommunications and computing. This has produced dramatic innovations and increasing demand for new services, including Internet access, call back services, wireless and mobile services, wireless local loops and cellular telephony.

Figure A4.4

Internet Usage and B2B E-Commerce Surging Globally

Worldwide Internet Users and Internet E-Commerce, 1999-2001, Million and US$ billion



Source: International Data Corporation, 2002.

TRADE IN ICT AND E-COMMERCE

Partly reflecting growing production networks, over the 1990s, global ICT trade and investment grew more rapidly than overall trade.

International Trade in ICT and E-Commerce

Low trade barriers and the international division of production processes underpinned the rapid increase in ICT trade over the 1990s. Recognising their economies must tap low cost sources of ICT equipment through international trade to achieve rapid productivity and output growth, most regional governments have kept trade barriers to ICT imports relatively low, although non tariff barriers are more prevalent (Kirkman et al, 2002). (See Appendix 4.2 – *ICT Trade Reform and Market Access Initiatives* for a discussion of activities to reduce tariff and non tariff barriers to ICT trade.)

Trade in ICT Products

ICT goods trade is large and growing rapidly; in 2000, ICT goods exports totalled almost US$1.1 trillion.[8] The value of ICT trade is greater than that of world automotive, textiles and clothing

[8] ICT international trade data is derived from the United Nations' Database using the World Trade Organization's definition of Information Technologies and Telecommunications, IT&T. This includes commodities under HS code 8 and some under HS code 9, including semiconductors and semiconductor manufacturing equipment, computers and computer parts, software, telecommunications equipment and computer-based analytical instruments.

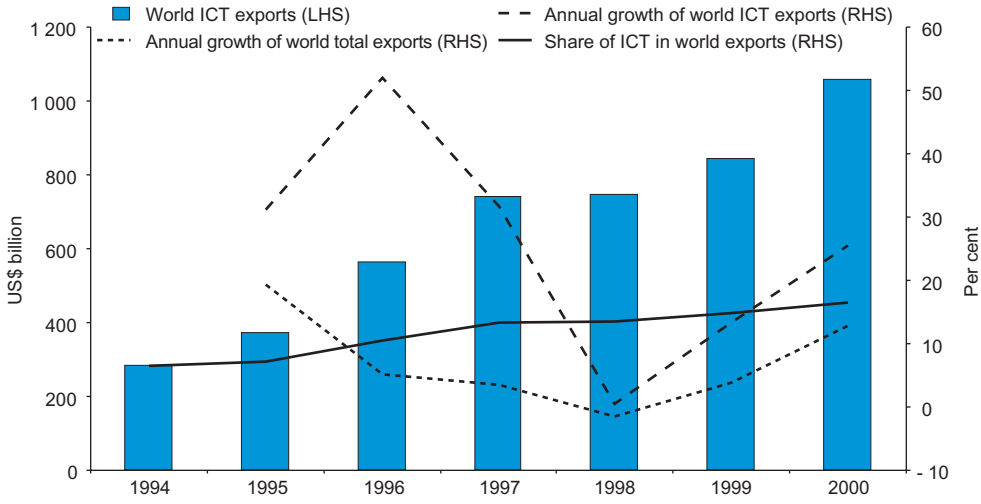
exports combined, a major achievement for an industry that was barely on the map 20 years ago (International Trade Forum, 2000). ICT goods trade is the most dynamic of all product groups trade.[9] From 1994 to 2000, global ICT goods trade grew 25 per cent per year, 18 percentage points faster than total merchandise trade and faster than trade in any other major product group (Figure A4.5).[10]

North America and Europe are the major ICT product exporters. The United States has a 14 per cent share of total ICT product exports, the UK 9 per cent, Germany 9 per cent, Sweden 8 per cent, Japan 7 per cent, France 7 per cent, Finland 5 per cent and Canada 5 per cent.

Figure A4.5

ICT Exports Recovering Post Crisis

World Exports of ICT Products, 1994-2000, US$ billion and per cent



Notes: ICT figures derived from the World Trade Organization's definition of information technology and telecommunications. (See Appendix 4.2 – *ICT Trade Reform and Market Access Initiatives* for the products covered under the Information Technology Agreement.)

Data include significant re-exports or imports for re-export.

Source: Department of Foreign Affairs and Trade, 2002; and World Trade Organization, 2002.

9 Between 1980 and 1998, exports of transistors and semiconductors grew by an average annual rate of over 16 per cent, computers increased by 15 per cent, computer and office machine parts by almost 15 per cent and telecommunications equipment and parts by almost 12 per cent (United Nations Conference on Trade and Development, 2002a). In 1998, ICT exports accounted for almost 13 per cent of world exports and over 19 per cent of developing economies' exports, up from only 4 per cent for both in 1980 (United Nations Conference on Trade and Development, 2002a).

10 For example, world exports in office machines and telecommunications equipment totalled US$827.5 billion in 2001, achieving an average annual increase since 1990 of 10 per cent (World Trade Organization, 2002).

While developed economies are the pre-eminent world ICT exporters, the volume and value of emerging economy ICT exports is increasing rapidly. East Asian economies in particular rank as significant ICT product exporters; the ROK, Malaysia, Taiwan and the Philippines together generated 41 per cent world ICT product exports in 2000, though their value added share was considerably less than this.[11] While most of the top 15 telecommunications equipment exporters still are developed economies, emerging economy exporters like the ROK, Mexico, China, Taiwan and Israel are becoming increasingly important (Kirkman et al, 2002).[12]

Reflecting East Asia's increasing links with global production networks, intra regional trade in ICT goods has increased significantly over the 1990s (Table A4.2). For example, the share of Japan's office machines and telecommunications equipment exports in its total exports of these goods to Asia increased to 45 per cent in 2001 from 27 per cent in 1990, while this share fell to Europe and North America over the same period. At the same time, other Asia's ICT exports as a share of world ICT exports rose significantly.

ICT Services Trade

The lack of detailed international ICT services trade data makes it difficult to identify trends in this sector. However, over the last decade, available data indicates services trade grew less strongly than merchandise trade. In 2000, total world services exports totalled US$1.5 trillion, growing 5.4 per cent per year between 1994 and 2000, while exports of 'other services' which includes ICT services, totalled US$623.6 billion, growing 7 per cent per year (International Monetary Fund, 2002).[13] The 2001 decline in total services of 0.5 per cent was due principally to falls in transportation and travel, as trade in other commercial services, which includes ICT services, increased by 1.3 per cent (Figure A4.6) (World Trade Organization, 2002).

11 In that year, emerging economies had a 38 per cent market share in electronic equipment and components exports, 35 per cent market share in office equipment and components exports, 30 per cent of exports of electrical equipment and machinery and 21 per cent of telecommunications equipment exports (Kirkman et al, 2002).

12 However, as mentioned previously, most ICT exports from emerging economies like China, the Philippines and to a lesser extent Malaysia are assembled from components imported from more technologically advanced economies like Japan, the ROK, Taiwan and Singapore (Department of Foreign Affairs and Trade, 2001; Economic Analytical Unit, 2003 forthcoming).

13 'Other services' covers services not included under transportation and travel; the category includes communication, construction, insurance, financial, computer and information, other business and personal, cultural and recreational services and royalties and licence fees. The World Trade Organization derives a 2000 figure for exports of 'other commercial services' of US$640 billion and a 2001 figure of US$655 billion, covering the same categories, which accounted for just under 45 per cent of world trade in commercial services (World Trade Organization, 2002 and 2001).

Table A4.2

Non-Japan Asia Taking Japan's Share of World ICT Goods Trade

Office Machines and Telecommunications Equipment Exports by Principal Region, 1990-2001, US$ billion and per cent

Region/economy	2001 (US$ billion)	ICT Trade share of (per cent)				Average annual change (per cent)
		Region's exports		World exports		
		1990	2001	1990	2001	
World ICT Exports	827.5			100.0	100.0	10
Asia to						
World	*382.2*	*100.0*	*100.0*	*45.9*	*46.2*	*10*
Asia	183.7	29.8	48.1	13.7	22.2	15
North America	103.8	37.9	27.2	17.4	12.5	6
Western Europe	74.8	27.3	19.6	12.5	9.0	7
All other regions	15.5	4.6	4.0	2.1	1.9	
Japan to						
World	*82.6*	*100.0*	*100.0*	*22.4*	*10.0*	*2*
Asia	37.1	26.7	45.0	6.0	4.5	7
North America	25.1	38.8	30.3	8.7	3.0	0
Western Europe	17.8	29.5	21.6	6.6	2.2	-1
All other regions	2.6	5.0	3.1	1.1	0.3	-2
Other Asia to						
World	*299.6*	*100.0*	*100.0*	*23.5*	*36.2*	*14*
Asia	146.6	32.7	48.9	7.7	17.7	18
North America	78.8	37.1	26.3	8.7	9.5	11
Western Europe	57.0	25.1	19.0	5.9	6.9	11
All other regions	13.0	4.2	4.3	1.0	1.6	15
Western Europe to						
World	*247.6*	*100.0*	*100.0*	*32.0*	*29.9*	*9*
Western Europe	171.1	76.2	69.1	24.4	20.7	8
Asia	28.0	6.5	11.3	2.1	3.4	15
North America	16.6	6.7	6.7	2.1	2.0	9
All other regions	29.8	9.4	12.1	3.1	3.6	
North America to						
World	*139.5*	*100.0*	*100.0*	*19.2*	*16.9*	*8*
Asia	51.2	33.7	36.7	6.5	6.2	9
Western Europe	29.6	32.6	21.2	6.3	3.6	4
North America	28.1	21.4	20.2	4.1	3.4	8
All other regions	30.6	12.3	22.0	2.3	3.7	

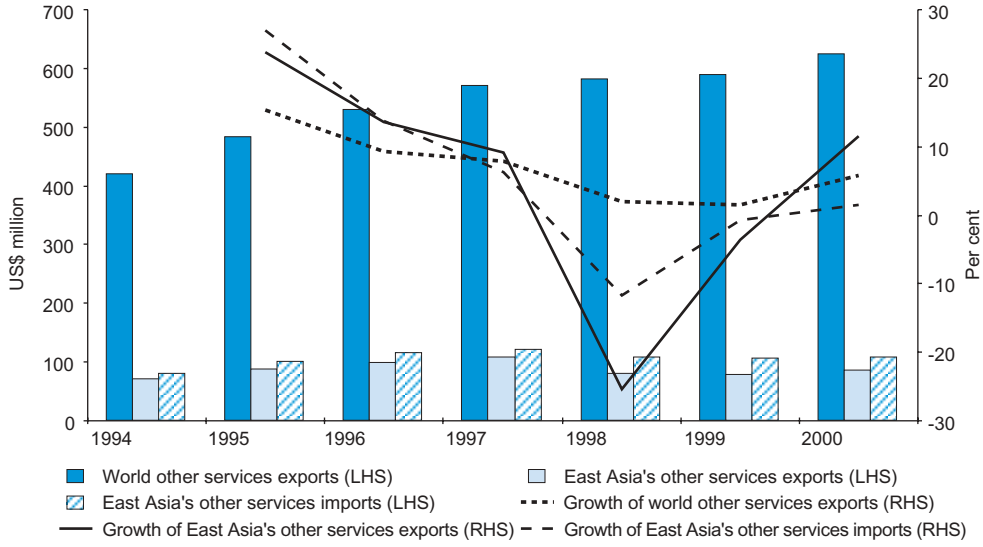
Note: Office machines and telecommunications equipment includes office machines and automatic data processing machines; telecommunications and sound recording and reproducing apparatus and equipment; thermionic, cold cathode or photo-cathode valves and tubes (SICTC divisions 75, 76 and group 776).

Source: World Trade Organization, 2002.

Figure A4.6

Other Services Trade Grows More Slowly than Merchandise Trade

World and East Asian Other Services Exports, 1994-2000, US$ billion



Source: International Monetary Fund, 2002.

East Asia's imports of other services grew more slowly than the world average, at 5.3 per cent per year compared to 7.2 per cent between 1994 and 2000.[14] In 2000, East Asia accounted for 18 per cent of the world's other services imports and 38 per cent of East Asia's total services imports were other services, which includes ICT services.

OUTLOOK

After the slowdown of 2001, the rapid growth of ICT and e-commerce spending, production and trade over the last decade looks set to continue in the 2000s. Data for the first quarters of 2002 indicate ICT production and ICT goods and services trade is increasing again, showing potential to drive a recovery in global output and international trade.

[14] 'Other services' data are not available for Hong Kong, Taiwan or Vietnam. As 2000 data is not available for Malaysia, an average of the previous two years was used.

APPENDIX 4.2

ICT MARKET ACCESS AND OTHER INITIATIVES

The Australian Government pursues ICT and e-commerce trade liberalisation through a range of international trade reform initiatives, bilateral free trade agreements, mutual recognition agreements and other trade reform mechanisms. These initiatives seek to improve international market access for Australian ICT goods and services producers by reducing tariffs and non tariff barriers to trade in ICT and e-commerce goods and services.

ICT TRADE REFORM INITIATIVES

Australia and other economies are pursuing ICT trade reform successfully through the WTO, Asia Pacific Economic Co-operation, APEC, the International Telecommunication Union and the Asia-Pacific Telecommunity.

WTO Agreements

After the WTO's Uruguay Round concluded in 1995, WTO negotiations aimed at liberalising ICT trade resulted in major breakthroughs in the form of the Information Technology Agreement and the Basic Telecommunications Services Agreement. In addition, the Agreement on Technical Barriers to Trade aims to ensure divergent standards and unreasonable regulations, testing and certification procedures do not create unnecessary trade barriers (International Trade Centre, 1999).[15]

WTO Information Technology Agreement

The Information Technology Agreement, ITA, which came into effect in 1997, requires most participants to eliminate their customs and other duties and charges on ICT products by 1 January 2000 on a most favoured nation basis.[16] These products include:

- computer hardware and peripherals, including complete computer systems, laptops and components such as central processing units, keyboards, printers, monitors, scanners, hard disk drives and power supplies

[15] The WTO supervises these agreements, the General Agreement on Trade in Services and the Agreement on Trade-Related Aspects of Intellectual Property Rights which also are relevant for ICT trade. The General Agreement on Trade in Services, GATS, which entered into force in July 1995, is a multilateral agreement with legally enforceable rules covering international trade in services. It covers all internationally traded services, including services relating to ICTs such as computer, telecommunication and professional services. GATS recognises the telecommunication services sector has a dual role as a separate sector of economic activity and as an underlying means of supplying other economic activities. GATS defines four modes of services trade; cross border supply (supply from one country to another), consumption abroad (use of a service in another country), commercial presence (a foreign company establishing in another country to provide services there) and presence of natural persons (supply by a foreigner in another country).

[16] 'Most favoured nation' means that benefits of the commitments under the Information Technology Agreement accrue to all other WTO members.

- telecommunications equipment, including telephone sets, videophones, fax machines, switching apparatus, modems, telephone handsets, answering machines, radio broadcasting and television transmission apparatus and pagers
- semiconductors and other electronic components, including chips and wafers of various sizes and capacities
- semiconductor manufacturing equipment, including a wide variety of equipment and testing apparatus used to produce semiconductors
- computer software, contained on media such as diskettes, magnetic tapes and CD ROMs
- scientific and analytical instruments, including measuring and checking devices, chromatographs, spectrometers, optical radiation devices and electrophoresis equipment
- other products, including word processors, calculators, cash registers, asynchronous transfer mode machines, indicator panels, capacitors, resistors, printed circuits, optical fibre cables, computer network equipment, flat panel displays, plotters, multimedia upgrade kits and certain static converters, electronic switches, connection devices, electric conductors and photocopiers (www.wto.org).

To become Information Technology Agreement participants, economies must reduce to zero tariffs on all products listed in the Declaration and bind all other duties and charges at zero. However, for sensitive items, an extended implementation period is allowable. The Information Technology Agreement can expand the product coverage and add further economies.

As of June 2002, the Information Technology Agreement had 42 participants, including Australia and the 15 members of the European Union participating as one bloc, representing approximately 93 per cent of world trade in ICT products (World Trade Organization, 2002). Most major East Asian economies are signatories, including Hong Kong, Indonesia, Japan, the ROK, Malaysia, the Philippines, Singapore, Taiwan and Thailand. China signed on with its accession to the WTO, committing to eliminate tariffs on two thirds of products covered under the Information Technology Agreement by 1 January 2003 and on the remainder by 1 January 2005. Indonesia, the ROK, Malaysia, the Philippines, Taiwan and Thailand also were granted flexibility in cutting tariffs to zero on a few products until 2005 at the latest.

The Information Technology Agreement is solely a tariff cutting mechanism; while the Declaration provides for the review of non-tariff barriers, it does not include binding commitments on them.[17]

[17] In November 2000, the Information Technology Agreement Committee approved a one year work program on non-tariff measures facing ICT products. An inventory of non tariff measures impeding ICT trade was compiled including standards, conformity assessment procedures and regulatory procedures and arrangements for the protection of intellectual property. Differing conformity assessment testing and certification regimes between countries impose large costs on trade; these include disparity in the level of testing, unreasonable demands for testing, excessive costs of destructive testing, asymmetrical functioning of some mutual recognition agreements and lack of recognition of industry mutual recognition arrangements by governments. Divergent national standards and technical specifications, as opposed to performance criteria, also add to costs. Regulatory procedures, such as type approval regimes, result in administrative processes imposing costs, particularly where transparency is lacking and where several bodies are responsible for administering regulations. Government procurement mechanisms also can be a barrier to ICT trade through lack of transparency in tenders, requirements for local content or the need to have a local partner.

In 1997, talks began on increasing the number of products for tariff elimination, called Information Technology Agreement II, but failed to produce a list acceptable to all participants. One proposal was to add electronic consumer goods used with computer products.

Modelling estimated the Information Technology Agreement would create significant benefits for member economies, ranging from $50 billion to $100 billion annually (International Trade Centre, 1999). Signatories expected the Information Technology Agreement to help create a single global ICT market, with competitive companies establishing operations in locations offering competitive advantages, such as low production costs and available skilled human resources; to a large extent this is occurring, with manufacturing bases expanding in several competitive economies including Singapore, Taiwan, Malaysia, the Philippines and China. (See Appendix 4.1 – *Global Market Trends*.)

WTO Agreement on Basic Telecommunications Services

In February 1998, the WTO's Agreement on Basic Telecommunications Services came into force; 72 economies including Australia, accounting for more than 90 per cent of estimated world telecommunications revenue agreed to open their telecommunications market to foreign competition (International Trade Centre, 1999).[18] In East Asia, Hong Kong, Indonesia, Japan, the ROK, Malaysia, the Philippines, Singapore, Thailand and Brunei Darussalam all signed the Agreement. On acceding to the WTO, China signed onto the Agreement, opening up its telecommunications market for foreign participation by 2005.

The Agreement's main objective is to liberalise trade in basic telecommunications services, taking advantage of advances in technology to develop global telecommunications infrastructure. It covers market access, national treatment and pro competitive regulatory principles.[19] The Agreement on Basic Telecommunications Services is expected to boost global economic growth by increasing investment opportunities and competition in basic telecommunications markets, thereby lowering prices, making services more widely available and increasing opportunities for telecommunications suppliers and downstream manufacturers.

Basic telecommunication services include all public and private telecommunications services transmitting customer supplied voice or data information. The Agreement covers foreign firms supplying telecommunications and services across borders by establishing a commercial presence, including by owning and operating independent telecommunications network infrastructure (International Trade Centre, 1999).[20]

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18 The market access commitments of the original 69 participating WTO members and the most favoured nation exemption lists were annexed to the Fourth Protocol of GATS. The deadline for accepting the Protocol was extended by 8 months and, in the meantime, three other countries joined. The Protocol and its annexed documents together form the Agreement on Basic Telecommunications Services. The schedules on basic telecommunications services became part of the General Agreement on Trade in Services schedules in force since 1995.

19 While the most favoured nation, principle applies to the Agreement, each signatory decided whether or not to file an most favoured nation exemption on a measure affecting basic telecommunications trade.

20 Value added services, or services where suppliers add value to the customer's information by enhancing its form or content, storing or retrieving it, were not formally part of the negotiations of the agreement but already form part of the commitments 50 countries made under the General Agreement on Trade in Services. Some telecommunications negotiation participants chose to include them in their offers. Examples of value added services are on line data processing, on line database storage and retrieval, electronic data interchange, email and voice mail.

Depending on their mode of supply, telecommunications services face different forms of trade barrier (Table A4.3).

Table A4.3

Many Barriers to Telecommunications Services

Barriers Faced by International Suppliers of Telecommunications Services

Mode of delivery	Example	Significance	Examples of trade barriers
Cross border supply	International telephone calls	Produces most revenue in the telecommunication services trade	Bilateral settlement arrangements[21]
Commercial presence	Foreign owned company offering telecommunications services	Offers scope for foreign investment	Foreign investment and licence restrictions
Consumption abroad	Mobile roaming	Development of global mobile communication services with the use of terrestrial and satellite based technology	Incompatible technical standards and lack of roaming agreements
Movement of staff	Consulting on telecommunications activities	Growing need for advice on sector restructuring and privatisation	Restrictions on work permits

Source: International Trade Centre, 1999.

Expected benefits of the Agreement on Basic Telecommunications Services include

- gradually eliminating traditional public integrated monopoly telephony providers in favour of competitive international providers, allowing household and business consumers to choose suppliers, obtaining improved quality and lower prices; global welfare gains could exceed US$1 trillion
- improving quality, including less waiting time for telecommunications services, lower call failure rates, less faults and increased digitised telephones coverage
- increasing economic activity in related fields including computer software development, data processing, off shore development and transaction oriented operations
- for developing countries, more rapidly obtaining digital networks that leapfrog old technology (International Trade Centre, 1999).

21 An agreed charge per minute from a carrier in one country to one in another country to 'terminate' outgoing traffic from the notional international mid point to the overseas called party; it is usually half the agreed accounting rate. Settlement rates are not necessarily related to the prices charged to end users for international calls or the costs for interconnection and it can be difficult to negotiate favourable commercial bilateral relationships with overseas carriers for international settlements where there is only one player at the other end and onerous regulation on foreign carriers; this reduces international service competition and restrains telecommunications trade.

The Agreement on Basic Telecommunications Services includes guarantees and safety mechanisms that increase the confidence of international investors, encouraging them to provide capital, technology and expertise to develop telecommunications infrastructure, including in developing economy signatories. In some cases, host countries need to strengthen their competition policies, laws and legal systems and introduce an independent and fair regulatory authority to maximise their benefits from Agreement.

WTO Agreement on Technical Barriers to Trade

The WTO Agreement on Technical Barriers to Trade aims to ensure incompatible and excessive technical regulations, industrial standards, testing and certification procedures do not create unnecessary barriers for traders and investors, including in the ICT sector (www.wto.org accessed 14 August 2002). The Agreement obliges signatories to use appropriate international standards as the basis for domestic technical regulations.[22] It also encourages them to recognise each others' testing procedures and establish national enquiry points for information on standards and technical regulations.

Regulations imposing mandatory standards may require telecommunications suppliers to obtain certificates of conformity from designated agencies. However, authorities can accept self-certification for voluntary standards. The Agreement on Technical Barriers to Trade has a code of good practice which national standardisation bodies should abide by in preparing, adopting and applying standards. At the international level, the International Electrotechnical Commission, International Organisation for Standardisation and the International Telecommunications Union lay down standards for ICT products.[23]

An important, related area is quality assurance. To achieve uniform quality, a universally accepted standard quality assurance system, ISO 9000, provides a benchmark for assessing a supplier's quality system. It also enables third party assessment, saving purchasers from carrying out individual evaluations and suppliers from undertaking multiple assessments. ISO certification involves five core standards and a range of supplementary standards; obtaining it is a costly and lengthy process.

Other Activities

Asia-Pacific Economic Cooperation, APEC, and the International Telecommunication Union also undertake a range of activities to liberalise ICT goods and services trade.

22 However, local regulatory authorities can adopt their own standards if they believe local climatic, geographical or technical factors make international standards insufficient, but they must publish a notice in advance to allow interested countries to comment on the proposed mandatory regulation. Procedures applied in deciding whether a product conforms with national standards or technical regulations must be fair and equitable and not give an unfair advantage to domestic supplies.

23 In Europe, the European Committee for Electrotechnical Standardisation determines electrotechnical standards; in the United States, the Federal Communications Commission and other agencies are responsible.

APEC Telecommunications and Information Working Group

The APEC Telecommunications and Information Working Group, APEC TEL, enables APEC member economies to exchange information, consult on policy and regulatory developments and develop cooperative projects in the telecommunications and information sector.[24] By the end of 2002, twelve APEC members will be implementing the Mutual Recognition Arrangement on Conformity Assessment for Telecommunications Equipment aimed at streamlining procedures for assessing standards conformity of internationally traded telecommunications equipment.

Major initiatives from the APEC Telecommunications and Information Ministers' Meetings are:

- agreeing on the key elements of a fully liberalised telecommunications services sector
- endorsing principles for enhancing universal access to members' telecommunications services and transparent funding of universal service obligations
- agreeing to a set of principles on International Charging Arrangements for Internet Services
- agreeing on APEC principles on interconnection policy in the APEC region
- adopting a Statement on the Security of Information and Communications Infrastructures.

Future APEC TEL work includes moving further towards the Asia Pacific Information Society by expanding cooperative development projects, continuing to support discussions between the private sector and member economy governments on International Charging Arrangements for Internet Services and encouraging information sharing.

e-APEC Strategy

In November 2000, the leaders at the Brunei Leaders' Meeting launched a wide ranging Action Agenda for the New Economy outlining programs to help APEC economies use advances in information technology to boost productivity, stimulate growth and extend services to the whole community. The Action Agenda includes ways to promote the right policy environment and build capacity to help create a framework to strengthen markets, e-commerce, infrastructure, knowledge and skills development and provide affordable and more efficient access to communications and the Internet (www.apecsec.org.sg). In 2001, leaders endorsed the e-APEC Strategy at the 13th APEC Economic Leaders' Meeting in Shanghai; the e-APEC Strategy identifies the necessary policy environment and specifies appropriate goals and actions, drawing upon the existing efforts of APEC. It develops a forward looking, long term and action oriented plan under three pillars:

- creating an environment for strengthening of market structures and institutions, that is, open markets and strong institutions

[24] APEC TEL upholds the Bogor objectives of free trade and investment by 2010 for developed economies and 2020 for developing economies by promoting e-commerce and other activities to facilitate business activities and advance human resource development in the ICT industry. APEC TEL cooperative projects also support developing the Asia-Pacific Information Infrastructure, APII, for both basic and advanced telecommunications services.

- facilitating an environment for infrastructure investment and technology development, that is, a favourable investment and innovation climate
- enhancing human capacity building and promoting entrepreneurship, that is, an emphasis on education and small and medium enterprises (www.apecsec.sg).

In 2002, the Shanghai Fifth APEC Ministerial Meeting on Telecommunications and Information Industry set the goal of building APEC towards a digital society, with higher growth, increased learning and employment opportunities, improved public services and better quality of life by taking advantage of advanced, reliable and secure ICT and networks and by promoting universal access.

International Telecommunication Union

The International Telecommunication Union promotes cooperation in developing telecommunications and harmonising national telecommunication policies and systems. Its three main areas of operation are radiocommunication, standardisation and development. Members from Government and the private sector negotiate agreements to set standards, facilitate equipment and systems interconnectivity, adopt operational procedures and design programs to improve telecommunications infrastructure. It has a key role in international agreement on telecommunications tariff and accounting rates. Its continuing role in managing the radio frequency spectrum ensures radio-based systems like cellular phones and pagers, aircraft and maritime navigation systems, scientific research stations, satellite communication systems and radio and television broadcasting are internationally compatible and provide reliable wireless services (www.itu.int).

The International Telecommunication Union has 189 members, including Australia and all major East Asian economies except Taiwan.

Asia-Pacific Telecommunity

The Asia-Pacific Telecommunity, APT, is a treaty based regional telecommunications organisation. Its membership comprises most of the governments of the Asia Pacific region, including Australia, but excluding the Americas. The APT seeks to foster the development of telecommunications services and information infrastructure throughout the region with a particular focus on the needs of less developed areas. In order to carry out this role, the Telecommunity

- promotes the expansion of telecommunications services and information infrastructure and the maximization of the benefits of information and telecommunications technology for the welfare of the people in the region
- develops regional cooperation in areas of common interest, including radiocommunications and standards development
- undertakes studies relating to developments in telecommunications and information infrastructure and policy and regulation in coordination with other international organisations, where pertinent

- encourages technology transfer, human resource development and the exchange of information for the balanced development of telecommunications services and information infrastructure within the region
- facilitates coordination within the region with regard to major issues pertaining to telecommunications services and information infrastructure with a view to strengthening the region's international position.

The APT has 36 Members. Eligible companies and organisations can be granted Affiliate Member status and participate in the activities and programs of APT.

E-COMMERCE

Several multilateral bodies including the WTO, APEC, the United Nations and the Organisation for Economic Co-operation and Development actively seek to develop e-commerce's potential to help liberalise international trade and investment.

WTO Activities

The WTO also has been active in promoting e-commerce, including negotiating a multilateral declaration and trade agreements dealing with constraints on the sector.

WTO Declaration on Global Electronic Commerce

In May 1998, the WTO adopted a Declaration on Global Electronic Commerce, directing the General Council of the WTO to establish a comprehensive work program examining all trade related issues arising from electronic commerce and report on its progress at the WTO's third Ministerial Conference in December 1999. This declaration included the statement that members should continue their current practice of exempting electronically transmitted goods and services from customs duties (www.wto.org).[25]

The progress report:

- identified three categories of on line services transactions: those completed entirely on the Internet, including selection, purchase and delivery; those involving traditional distribution services, with the product selected and purchased on line but delivered by conventional means; and those involving the telecommunication transport function including provision of Internet services
- determined most on line services transactions are covered by the General Agreement on Trade in Services and recommended member governments agree to apply this agreement to services supplied through electronic means. An unresolved issue is whether a book delivered electronically is a good, hence subject to the General Agreement on Tariffs and Trade, GATT, or a service.

[25] This new area of trade involves goods crossing borders electronically. Broadly speaking, this is the production, advertising, sale and distribution of products via telecommunications networks. The most obvious examples of products distributed electronically are books, music and videos transmitted down telephone lines or through the Internet (www.wto.org)

In November 2001, the Ministerial Declaration of the Fourth WTO Ministerial Conference at Doha stated the General Council should consider the most appropriate institutional arrangements for handling the e-commerce Work Programme and to report on further progress to the Fifth Session of the Ministerial Conference in 2003. It also extended tariff exemptions for electronic transmissions until the Fifth Session.

World Intellectual Property Organization

The World Intellectual Property Organization seeks to develop practical solutions to the challenges raised by the impact of e-commerce on intellectual property rights. Its digital agenda seeks to:

- broaden developing country access to intellectual property information, increase their participation in global policy formulation and expand their opportunity to use intellectual property assets in e-commerce
- promote adjustment of the international legislative framework to facilitate e-commerce
- establish rules for mutual respect and eliminate contradictions between the domain name system and intellectual property rights
- develop appropriate principles to establish rules determining the intellectual property liability of on line service providers
- promote adjustment of the institutional framework to exploit intellectual property in the public interest in a global economy (www.wipo.org).

Other Activities

APEC, the United Nations and other organisations also are active in promoting e-commerce.

APEC

APEC supports various activities to promote e-commerce, including through the e-APEC Task Force, the APEC E-Commerce Steering Group and the APEC Telecommunications and Information Working Group. In November 2000, at the Brunei APEC Leaders Meeting, the APEC Leaders launched an Action Agenda for the New Economy aimed at creating a digital society to maximise the benefits of the new economy for APEC populations. The leaders committed to develop and implement a policy framework which would enable the people of urban, provincial and rural communities in every economy to have individual or community-based access to information and services offered via the Internet by 2010; a first step toward this goal was to triple the number of people in the region with individual and community based access by 2005 (www.apecsec.org.sg). APEC's paperless trading initiative provides the potential for domestic efficiencies in supply chain management brought about by e-commerce to be extended to the management of cross border supply chains.

United Nations

The United Nations bodies responsible for standards and laws relating to e-commerce include the Centre for Trade Facilitation and Electronic Business and the Commission on International Trade Law. The UN Centre for Trade Facilitation and Electronic Business is a central repository of standardised e-business definitions, codes, document structures and context information. The UN Commission on International Trade Law is the core legal body within the United Nations system in the field of international trade law; the General Assembly tasks it to harmonise and unify international trade law (www.uncitral.org/en-index.htm). The Working Group covering e-commerce developed a Model Law on Electronic Signatures, adopted in 2001, which aims to increase additional legal certainty regarding the use of electronic signatures.

Global Business Dialogue on Electronic Commerce

Established in 1999, the Global Business Dialogue on Electronic Commerce is a leading private sector e-commerce initiative. It was created to improve industry cooperation on critical issues for the global on line economy and strengthen coordination between industry, government and international organisations to resolve conflicting policies, rules and regional regulations obstructing e-commerce. In consultation with governments and international organisations the Global Business Dialogue focuses on identifying solutions and providing input on regulation or business self-regulatory codes of conduct. Global Business Dialogue member companies participate in working groups to establish an international approach to crucial e-commerce issues. In 2002, it is concentrating on eight key areas including consumer confidence, convergence, cyber security, digital bridges, e-government, intellectual property rights, taxation and trade (www.gbde.org).

AFTA-CER Closer Economic Partnership

In September 2002, Ministers signed the Joint Ministerial Declaration on the Closer Economic Partnership, CEP, agreement between the Association of South East Asian Nations, ASEAN, and the Australia-New Zealand Closer Economic Relations, CER, agreement. Part of the agreement involves implementing a work program to reduce impediments and lower business costs in a broad range of areas including e-commerce, standards and conformity assessment. Australia has commenced identifying possible e-commerce projects to pursue under the CEP.

In 2001, in relation to e-commerce cooperation, the Hanoi Ministerial Meeting agreed that the CEP Initial Work Program should:

- investigate means by which forms of ICT and e-commerce cooperation between ASEAN and CER could be fruitfully pursued, including through links with e-ASEAN and other regional initiatives, examine paperless trading solutions to routine administration of trade flows and, through capacity building, seek to reduce the digital divide
- initiate joint programs to encourage small and medium enterprises to adopt e-commerce.

BILATERAL ARRANGEMENTS

The Australian Government has been active in concluding joint statements and memoranda of understanding on ICT and e-commerce with neighbouring East Asian governments.[26] The Australian Government also has included ICT and e-commerce issues in negotiations of free trade agreements, including with Singapore and Thailand.[27] These agreements should improve Australia's ICT and e-commerce industries' access to overseas markets.

[26] Australia has negotiated several joint statements and memoranda of understanding, MoUs, on ICT; the partner countries are China, the EU, Hong Kong, India, Indonesia, Israel, the Republic of Korea, Singapore and the United Kingdom. Australia also has a number of joint statements and memoranda of understanding with various countries on e-commerce to encourage international cooperation on e-commerce and on line issues and projects; the partner countries are Canada, China, the EU, Ireland, Japan, Republic of Korea, Taiwan, the United Kingdom and the United States.

The joint statements and memoranda of understanding identify a range of key areas for bilateral cooperation such as delivery of government services on line, e-commerce, broadband networks and applications, software and multimedia content development, security and management of information and communications technology, taxes and tariffs, developments in international forums, business and consumer confidence, electronic authentication, privacy, consumer protection, intellectual property rights, infrastructure, postal services and telecommunications.

[27] Australia negotiated a free trade agreement with Singapore which includes e-commerce and telecommunications commitments. Australia and Singapore agree to continue not to impose customs duties on electronic transmissions between them; undertake to make publicly available electronic versions of all existing public trade administration documents by 2005 and to cooperate to enhance the acceptance of paperless trading bilaterally and internationally; maintain e-commerce consumer protection and electronic authentication legislation to promote confidence and trust in bilateral e-commerce; work towards the mutual recognition of electronic signatures; encourage the interoperability of digital certificates by business; and take measures for personal data protection. In telecommunications, regulators must operate in a transparent manner and properly explain decisions in relation to such matters as the approval of commercial terms and conditions and standards and the adjudication and resolution of disputes; parties aggrieved by regulatory decisions will be able to appeal to an independent authority; telecommunications companies having major supplier status in a particular segment of the market must provide other suppliers with interconnection on terms that are non-discriminatory, in a timely fashion and at cost oriented rates; maintain effective sanctions to enforce competitive safeguards and regulatory decisions; and facilitate consultation with industry participants, including in the development of industry standards. In May 2002, the Prime Ministers of Australia and Thailand agreed to launch negotiations on a Closer Economic Relations free trade agreement. Thailand has expressed interest in including ICT related provisions in the agreement, primarily from a capacity building perspective, and is currently considering an Australian proposal.

APPENDIX 4.3

Appendix Table A4.4

Australia's ICT Goods Exports to East Asia Grow Moderately, Imports Strongly

Australia's Gross ICT Trade with East Asian Economies, 2001, Main Commodities and Average Annual Growth, 1991-2001, A$ million and per cent

Economy	Australian ICT goods exports to (A$ million)	Average annual growth	Top 3 ICT goods exports	Australian ICT goods imports from (A$ million)	Average annual growth	Top 3 ICT goods imports
China	49.7	9.3	Telecommunications parts Computer parts Personal computers	951.7	62.4	Other input output devices and peripherals Computer parts Other computer hardware
Hong Kong	166.2	9.5	Computer parts Coaxial cables Other telecomm-unications and transceiving equipment	358.0	12.4	Electronic components Computer parts Other computer hardware
Indonesia	21.2	2.9	Telecommunications parts Personal computers Electronic components	72.4	105.8	Other input output devices and peripherals Computer parts Laser and other printers
Japan	73.4	-6.0	Computer parts Telecommunications parts Electronic components	1 150.9	6.2	Computer parts Portable computers Mainframes
ROK	25.4	-0.2	Computer parts Other computer hardware Electronic components	1 097.9	36.1	Mobile phones Other input output devices and peripherals Personal computers
Malaysia	89.1	13.4	Computer parts Electronic components Telecommunications parts	1 221.4	62.8	Personal computers Electronic components Computer parts

Economy	Australian ICT goods exports to (A$ million)	Average annual growth	Top 3 ICT goods exports	Australian ICT goods imports from (A$ million)	Average annual growth	Top 3 ICT goods imports
Philippines	15.1	0.8	Computer parts Other computer hardware Telecommunications parts	212.9	55.6	Portable computers Electronic components Other computer hardware
Singapore	209.0	12.6	Computer parts Coaxial cables Other computer hardware	1 445.6	21.7	Other computer hardware Computer parts Electronic components
Taiwan	68.2	8.7	Telecommunications parts Other telecommunications and transceiving equipment Computer parts	938.4	11.2	Portable computers Computer parts Electronic components
Thailand	59.1	6.6	Telecommunications parts Insulated optical fibre cable Computer parts	139.0	32.3	Other computer hardware Laser and other printers Other input-output devices and peripherals
Vietnam	6.9	8.2	Computer parts Telecommunications parts Other computer hardware	2.5	93.0[a]	Other telecommunications and transceiving equipment Computer parts
Total East Asia	783.3	6.1	Computer parts Telecommunications parts Electronic components	7 545.9	19.0	Computer parts Mobile phones Other computer hardware

Note: [a] Average annual growth between 1993 and 2001.

Source: Department of Foreign Affairs and trade, 2002.

APPENDIX 4.4

Table A4.5

East Asian Restrictions on ICT Business Ownership

East Asia's Foreign Ownership Restrictions on Telecommunications and Other ICT Sectors

Country	Approving Agency	Main legislation	Provisions
China	Ministry of Foreign Trade and Economic Co-operation and other agencies	Regulations on Foreign-Invested Telecommunications Enterprises 2002 Regulations on the Administration of Foreign Invested Telecom Enterprises 2002	Foreign ownership may not exceed 49 per cent for basic telecommunications services (excluding wireless paging) and 50 per cent for value added services. The foreign equity limit on mobile voice and data services is 25 per cent; for Internet, paging and other value added services, it is 30 per cent in companies located in Beijing, Shanghai and Guangzhou. The Chinese Government will allow 49 per cent foreign ownership in mobile services within 3 years in 17 major cities and within 5 years for all of China; 49 per cent in international and domestic fixed line services within 6 years; and 50 per cent in value added services within 2 years. Foreign equity investment limitations for Internet service providers and Internet content providers mirror the timetable for value added services in the WTO agreement; 30 per cent upon accession, 49 per cent within one year after accession and 50 per cent within two years after accession.
Hong Kong			No restrictions.
Indonesia	Capital Investment Coordinating Board, BKPM, and other agencies	Law promulgated in the 1960s	In 1998, the Government opened formerly restricted sectors to foreign investment, including telecommunications; it committed to a maximum foreign investment limit of 35 per cent for telecommunications services. Currently foreign investors can invest freely in Internet-related sectors, including portals, Internet service providers, Internet content providers and e-commerce firms.

Country	Approving Agency	Main legislation	Provisions
Japan	Ministry of Finance	Telecommunications Business Law 1997	Foreign ownership limits on telecommunications businesses abolished, with the exception of Nippon Telephone and Telegraph which is capped at 20 per cent of outstanding shares.
ROK	Ministry of Commerce, Industry and Energy	Foreign Investment Promotion Act 1998 Telecommunication Business Act	Foreign ownership on facilities based service providers, such as wire and wireless telegraph and telephone and other tele-communications, is restricted to 49 per cent. No ceiling on special or value added service providers.
Malaysia	Ministry of International Trade and Industry		FDI in the manufacturing sector aimed at the domestic market is usually restricted by a foreign equity cap of 30 per cent; a limit of 30 per cent applies in computer and software services consultancy and database services. Until 31 December 2003, 100 per cent foreign equity is permitted in new facilities and in expanding and diversifying existing manufacturing concerns where the companies do not compete directly with local producers. 49 per cent foreign equity limit on telecommunications or 61 per cent for five years on a case by case basis.
Philippines	Securities and Exchange Commission Bureau of Trade Regulation and Consumer Protection	Philippines' Constitution	Telecommunications entities, including Internet service providers, limit of 40 per cent on foreign equity ownership.
Singapore			No restrictions.

Country	Approving Agency	Main legislation	Provisions
Taiwan	Ministry of Economic Affairs		Foreign investors in the telecommunications sector are limited to 60 per cent ownership (up from 20 per cent), including a 20 per cent limit on direct foreign investment. The Government plans to relax this restriction by raising the foreign ownership limit on FDI to 49 per cent while keeping the 60 per cent total cap.
Thailand	Board of Investment	Alien Business Act 2000	Limits on foreign ownership generally do not affect projects established with Board of Investment promotion privileges and will not supersede provisions of bilateral treaties.
Vietnam	Ministry of Planning and Investment	Law on Foreign Investment	Strict regulation of foreign investment in strategic sectors, with foreign ownership or management of telecommunications networks prohibited. Vietnam will open its telecommunications market to foreign investors under the Bilateral Trade Agreement between Vietnam and the United States.

Sources: United States Trade Representative, 2002; Coudert Brothers LLP, 2002.

IMPLICATIONS FOR BUSINESS AND GOVERNMENT

KEY POINTS

- East Asia's prominence in the information and communication technology, ICT, equipment industry complements Australia's vibrant IT services and advanced technology equipment segments.
- A key challenge for Australia's dynamic but relatively small and service oriented ICT industry is promoting its products in a regional market dominated by large foreign firms.
- To maximise export opportunities, Australian ICT firms need to keep informed of a diverse array of regional government ICT and e-commerce policies and activities.
- Business opportunities in industrialised East Asian economies focus on advanced IT services, such as systems integration, games and e-commerce applications, and specialised ICT equipment. Developing East Asia should provide growing commercial opportunities in ICT infrastructure provision and ICT services such as upgrading financial sector systems, integrating computing environments and in developing software and applications for telemedicine and remote education and e-learning.
- The Australian Government's efforts to reduce trade barriers on ICT goods and particularly services in multilateral, regional and bilateral forums and agreements is important for Australian exporters and investors to access opportunities.
- Australia assists East Asian governments increase ICT and e-commerce take up and reduce the digital divide, including through APEC related capacity building and the Virtual Colombo Plan.

East Asia's ICT and e-commerce markets offer robust opportunities for Australian traders and investors. ICT and e-commerce export opportunities are expanding, with East Asian business and household take up growing as regional governments encourage ICT usage, lower trade barriers and implement other regulatory reforms. However, the region's ICT and e-commerce regulatory and business environment still presents some barriers to potential ICT goods and service exporters.

IMPLICATIONS FOR BUSINESS

Australia's relatively small but highly skilled and dynamic ICT industry can grasp opportunities in East Asia as the markets grow and open up to competition over the next few years.

Key Business Challenges

The key business challenge for Australian ICT firms is building a strong early position in potentially huge regional ICT and e-commerce markets as their use of advanced ICT equipment, services and software takes off.

As most Australian ICT firms are small and domestically oriented, exporting will be challenging for many. To compete successfully in East Asia against often larger multinational companies, they could consider developing linkages with other Australian or foreign firms which already have a presence in the region, particularly for large projects. ICT and e-commerce technology, markets, products and service cycles change rapidly; such linkages, ICT and e-commerce conferences and regional government agencies provide a valuable source of information on general industry trends.[1] In particular, knowledge of regional government ICT and e-commerce activities and policies, new market competition and government investment initiatives can alert Australian ICT firms to potentially profitable opportunities. Major issues in the short term include high, although slower, ICT goods and services spending growth, growing ICT security concerns and increasing e-commerce use.

Sectoral Opportunities

Given the close complementarity of the Australian and East Asian ICT industries and the Australian industry's competitive strengths, prospects to increase ICT goods and services exports and investment in East Asia are sound.

Despite having a small ICT manufacturing sector, Australia is competitive in higher value added equipment and, particularly as Australia shares East Asia's time zone, advanced ICT services. Another Australian competitive strength is applications software development in the engineering, science, finance, banking, legal and government administration sectors, creating IT services export opportunities. The growth of e-commerce in East Asia opens opportunities to supply services and consultancies in this market segment, as well as to increase other Australian exports using electronic communications.

1 Conferences include those organised through the International Telecommunication Union, such as ITU Telecom Asia held every two years bringing together strategic telecommunications players (www.itu.int/ASIA2002, accessed 4 November 2002).

Industrialised East Asia's telecommunications and Internet related services are at a more advanced stage and should grow rapidly in future years. Opportunities for Australian suppliers exist in Internet and e-commerce applications including electronic payment solutions, multimedia, games software development, telecommunications, particularly wireless, ICT consulting, network and system integration services, product research and development, smart card systems, ICT security, business application software and industry specific application software.

In developing East Asia, rapidly expanding ICT industries and increasing technological diffusion often rely on foreign based technologies, providing opportunities for ICT services supply and cooperation. Significant opportunities should arise in application specific software, integrating and developing computing environments, software and applications for remote education and e-learning, financial and banking systems, government front end customer services and integration, and telecommunications equipment, technology and services.

Potential Australian services exporters to East Asia could be faced with difficulties in dealing with divergent regulatory regimes, red tape and technological standards and conformity testing hurdles.

IMPLICATIONS FOR GOVERNMENT

Helping developing economies access productivity and growth enhancing ICTs is important to prevent an international digital divide undermining these economies' growth prospects.[2] Lowering the digital divide is increasingly possible as computing prices fall. In some developing economies diffusion of ICT goods and services is much faster than previous key technologies. However, many impediments exist to ICT and e-commerce take up in developing regional economies.

Governments also can maintain the impetus to reduce barriers against ICT trade and e-commerce, which will create opportunities for Australian exporters and investors, and assist through capacity building in key projects.

Increasing Technology Take Up Through the Aid Program

Several international initiatives aim to reduce the digital divide between developed and developing economies and between regions or socioeconomic groups within developing economies.[3] Australia and other developed economies also provide bilateral assistance to East Asia to expand ICT and

[2] The digital divide refers to the gap between those with access to ICT tools and those who do not. A digital divide can exist both within a country and between countries. The gap between developed and developing countries is large; developed countries have around 15 per cent of the world's population but about 80 per cent of the world's personal computers and almost 90 per cent of its Internet users (World Bank, 2001). However, personal computer ownership is growing twice as fast in developing as in developed countries.

[3] These initiatives include programs operated by of the World Bank, the United Nations Educational, Scientific and Cultural Organization, the United Nations Information and Communication Technologies Task Force, the United Nations Development Program's Asia Pacific Development Information Program, APDIP the Group of Eight through its Digital Opportunities Task Force, the Asia-Pacific Economic Cooperation, the Asia-Pacific Telecommunity, the International Telecommunication Union, the Association of South East Asian Nations' e-ASEAN and the Asia Pacific Networking Group, APNG. The Organisation for Economic Co-operation and Development and the Asian Development Bank also have researched relevant digital divide policy issues.

e-commerce use. Although ICT goods and services are valuable tools to improve economic development, their contribution to development is not automatic. Governments need to identify ICT initiatives with the greatest developmental impact on the livelihoods of poor people. In particular, any technology introduced should be appropriate to the immediate needs of the economy, cost effectively provide direct benefits to low income individuals and communities and be easy to operate and maintain.

Activities increasing developing economies' ICT take up and reducing the digital divide include:

- investing in ICT knowledge and capacity building and establishing special ICT education initiatives in developing regional economies, such as establishing training programs in the skills needed in a knowledge economy
- helping create innovative ICT applications in health and education, to improve access to health care and education and reduce costs, especially in geographically remote areas
- expanding projects such as telecentres, the incubator initiative and Softbank, which provides seed money and legal, management and technological support for creating local Internet content in developing economies
- participating in initiatives to develop international agreements extending ICT tax exemptions, maintaining free cross border e-commerce, standardising technical standards, allocating domain names, achieving communications technology interoperability and protecting intellectual property rights
- helping establish an enabling legal and regulatory environment for ICT take up including improved access to markets, financial flows and debt relief (www.worldbank.org, accessed 21 October 2002).

Australia and the World Bank have developed the Virtual Colombo Plan initiative to employ ICTs to reduce global poverty. The Plan will use ICT based delivery methods to expand educational opportunities and access to knowledge in developing countries. It will do this by capitalising on Australian experience and innovation in distance learning, harnessing Australia's world class technology companies, research institutions and education providers to share their knowledge and skills with developing country partners (AusAID, 2001a). The Plan's first stage targets basic education and the infrastructure necessary to expand access to information in low income communities. Australia will provide ICT training for teachers, curriculum development for distance education, virtual scholarships for teachers, policy development training and, in some cases, computers. The Plan also will extend the World Bank's Global Learning Network, establish new distance learning centres and contribute specialist knowledge to the international Gateway Foundation, a new Internet site providing relevant information on development issues (AusAUD, 2001b). Under the Plan's second stage, Australia will assist in developing ICT public policy and delivering Australian content to relevant Internet sites and distance education systems; stage three will extend these initiatives to higher education (AusAID, 2001b).

Australia's aid program may be able to assist in removing further impediments to ICT take up, including by:

- providing appropriate infrastructure, particularly in lower income regional economies, allowing leapfrogging to cost effective, new technologies, in particular in telecommunications networks, which are paramount for ICT access
- advising on appropriate regulation of technology, including standards and regulations, taxation, regulation of e-commerce, antitrust and privacy protection
- providing IT education, including via on line methods
- advising on organisational change to gain full efficiencies from new technologies, including advising government and firms on how to deploy the new technologies effectively
- advising government on policy implications of new technologies, for example for fiscal policy, structural, trade, monetary, financial and education policies
- advising on collecting and improving statistics on new technology use
- strengthening the capacity of small business in the region to use e-commerce and become players in the global economy through cross border trading.

Improving Market Access

The Australian Government plays an active role in multilateral and bilateral negotiations to reduce trade and investment barriers against ICTs and e-commerce. The Government can ensure Australian ICT businesses can access trade and investment opportunities in East Asia by continuing to participate in extending multilateral arrangements and by negotiating further memoranda of understanding on ICT and e-commerce and trade agreements which include ICT and e-commerce initiatives.

Business delegations are another way to raise the profile of Australian ICT and e-commerce businesses in the region. Organised through relevant agencies, such as Austrade, these effectively bring Australian innovation, skills and ingenuity to the attention of regional governments and businesses. Regional conferences also are an effective means of selling Australia's ICT industry to key players in East Asia.

As state and territory governments, along with the Commonwealth, are active in supporting the ICT and e-commerce industry, promotional activities in the region should be coordinated, ensuring that each achieves optimal value and avoids poor sequencing and timing.

Other Initiatives

Australia is providing a lead in cross border paperless trading and actively is helping APEC economies reach paperless trading targets, including by building APEC capacity. It has commenced pilot projects, such as in electronic sanitary and phytosanitary certification. In October 2002, APEC ministers adopted a new web based system, E-Cert, which will transmit data directly between government agencies, increasing security, improving public health and food safety and reducing documentation costs (Vaile

and Truss, 2002). Further work in this area will help East Asian economies adopt more efficient electronic processes.

In pursuing the anti-terrorism agenda, the Government can work with regional economies to use e-commerce to protect trade. Valuable initiatives include monitoring shipping and cargoes electronically and implementing cyber security, such as protecting critical Internet and e-commerce infrastructure and providing training in these areas.

PROSPECTS

Although Australia's ICT trade and investment in East Asia currently is relatively small, enormous opportunities will present themselves over the next few years as the ICT and e-commerce markets in the region grow and become more sophisticated and as further trade and regulatory reforms occur. Main opportunities exist in high value added ICT equipment manufacturing and in computer services.

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