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Dew on the wires: the Australian telecommunications industry's response to the global market place — a case study in corporate organisational change

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Dew on the Wires: The Australian Telecommunications Industry's Response to the Global Market Place—A Case Study in Corporate Organisational Change

Ann Hodgkinson
DEW ON THE WIRES:
THE AUSTRALIAN TELECOMMUNICATIONS
INDUSTRY'S RESPONSE TO THE GLOBAL
MARKET PLACE — A CASE STUDY IN
CORPORATE ORGANISATIONAL CHANGE

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ABSTRACT

The Australian telecommunications equipment sector appears to have shown a marked improvement in international competitiveness since the mid-1980s. This paper analyses the causes of this growth in terms of responses to changes in the global—particularly the Asia-Pacific—market and market developments in Australia. This improved competitive position has resulted in organisational change within multinational firms based in Australia, with evidence of corporate specialisation, growing intra-industry trade and strategic alliances emerging which will link the local industry more closely with global developments.
1 INTRODUCTION

Recent reports from the Department of Foreign Affairs and Trade have emphasised the rapid growth in exports of elaborately transformed manufactured products from Australia to East Asia. These reports have identified the telecommunications equipment industry as one of the sources of this growth. Telecommunications supply now represents the type of industry towards much of Australian industry policy has been orientated over the past decade—efficient, export-oriented and internationally competitive (DITAC, 1989, p. 25). Australia also has one of the most sophisticated telecommunications infrastructures in the Asia-Pacific region, which provides it with the opportunity for regional leadership in this industry (BTCE, 1990, p. 12).

Yet, until the mid 1980s, the Australian telecommunications equipment manufacturing industry was inward focused being composed of multinational subsidiaries and local firms whose main market was the supply of equipment to Telecom. While Telecom demanded high standards and leading edge equipment, most of this involved imported components with local firms mainly responsible for adapting these to meet local technical standards and product assembly. Little exporting occurred and local R & D expenditure was well below international standards (Allen Consulting, 1991, pp. 72–73).

Recent improvement in international competitiveness can be explained with reference to the substantial changes in the corporate structure and market strategy undertaken since the mid 1980s by the firms which comprise the Australian industry. These changes in organisational structure are occurring in response to changes in the world telecommunications market which have encouraged global firms to position themselves in order to capture new growth
opportunities. Australian firms, as subsidiaries of global corporations, have been affected by this restructuring process and are taking on new roles within their parents' production and distribution networks.

The modern corporation appears to be undergoing a significant transformation. The early twentieth century was a period of integration and advance, the middle decades were marked by diversification and the latter decades are characterised by both integration (via merger) and disintegration (via divestiture), coupled with a marked acceleration in the frequency and complexity of collaborative arrangements (Pisano, Russo & Teece, 1988, p. 23).

There has been an increasing interest in recent economic and business literature in the processes by which this transformation is occurring and its implications for national economic development and industry policy. The previous view of the corporation as a giant, centrally controlled, vertically integrated hierarchical organisation is becoming outdated. The vertically integrated, diversified 'megacorp' typified in the works of Alfred Chandler, Jr. (1977) and Alfred Eichner, Jr (1976) controlled a tightly integrated global production and distribution system which sourced raw materials and located plants throughout the world to maximise the benefits to the corporation as a whole (Cohen, et al, 1979). In this form of industrial organisation, Vernon's (1977) product cycle model was usually adequate to explain location decisions. New, high-risk innovation occurred near head office, while in its more mature stages, production was allocated to plants in least-cost, often cheap-labour, locations.

Industry policies until the mid 1970s tended to be protectionist. As a consequence, multinational corporations developed a network of national subsidiaries. Often these had
only simple assembly, sales and distribution functions. In some countries, local procurement requirements led to the establishment of small-scale manufacturing plants in which products were adapted to meet national technical specifications. This 'multi-domestic' (Porter, 1990) pattern characterised the telecommunications equipment sector in Australia until relatively recently.

Contemporary literature increasingly analyses corporations within a decentralised, co-operative organisational structure which focuses on the strategic nature of business behaviour in a changing and uncertain environment (Best, 1990). This approach owed its initial popularity to management discipline texts such as Michael Porter (1990) and Keniche Ohmae (1985). However, it is also increasingly evident in the economic, industrial relations and political literature. To a large degree, this reflects attempts to explain the international success of Japanese corporations in recent times (see Johnson, Tyson & Zysman, 1989; Best, 1990; Kenney & Florida, 1993).

Japanese multinationals appear to represent a very different model of industrial organisation to the large hierarchical, US multinational. They also appear to represent a form of industrial organisation which is more successful in competing in uncertain and rapidly changing international markets than the previous form.

In this paper, I want to briefly formulate the characteristics of this new form of industrial organisation by synthesising the ideas of a number of economic and management analysts who have addressed this topic. I then wish to address the issue of whether the Australian telecommunications equipment manufacturing sector is in the process of restructuring from the earlier multinational form towards a new form of industrial organisation. Under the earlier structuring, Australian facilities played a relatively insignificant corporate
role predominantly related to meeting Telecom's domestic procurement requirements. In this paper, however, it is argued that this new structure offers opportunities for Australian operations to develop a more autonomous role within the overall global corporate structure and to develop functions which are consistent with Australian government industrial policy priorities regarding our position in the Asia-Pacific region.

2 NEW FORMS OF INDUSTRIAL ORGANISATION

In discussing this new form of industrial organisation, it is useful to conceptualise the corporate structure as operating at two levels. Firstly, global corporate strategy development is still firmly controlled by head office. The global strategy function has evolved from the 'general office' functions of the earlier large-scale, vertically integrated organisational form. This structure involved the centralisation of strategic planning, resource allocation between divisions, and monitoring and control of production decisions (Willis-mason, 1985, p. 281). The new strategic functions primarily address geographic market expansion and research and development policy. They thus incorporate the key areas of firm interdependence, strategic manoeuvring and business rivalry identified as essential for international competitiveness. Firms have increasingly utilised strategic alliances and other forms of co-operative ventures to overcome the high fixed costs of product development adaptation, and to achieve their strategic objectives relating to market expansion, including compliance with government regulations and maintaining a presence in all major product and regional markets (Pisano, Russo & Teece, 1988, p. 24).

At a second level, however, local branches which developed
as semi-autonomous operationg divisions in the previous multi-divisional firm are provided with 'mandates' which allow them to develop a more autonomous decision-making role than previously in order to exploit opportunities within the local market and government incentive regime. This feature is referred to as 'insiderism' in the management literature (see Ohmae, 1987; Porter, 1990). It provides nationally based firms with business opportunities associated with procurement contracts, entry after deregulation or access to new product markets on more beneficial terms than imports or foreign based firms.

The older form of industrial organisation encouraged a multi-domestic location pattern for subsidiaries. A strategically orientated corporation would require the reorganisation of these subsidiaries into regional groupings and the development of a regional office to undertake regional production and sourcing, specific R & D and product innovation and brand promotion policies. National activities would thus be rationalised to provide for increasing specialisation in the production of specific goods and value added services in each subsidiary in order to meet corporate strategy objectives (Ohmae, 1985, pp. 184-188). The impact of this regional restructuring would thus be an increase in intra-industry (including intra-corporate) trade both with the region and on a global scale.

Changes in the telecommunications equipment sector are illustrative of more general trends in the international economic system. International market growth and the global integration of previously disparate national economies have resulted in substantial corporate organisational changes and restructuring. This has affected the global corporations which dominate this industry world-wide, and are now moulding the nature of Australian operations.
3 THE GLOBALISATION PROCESS

The major factors explaining the growth in the market for telecommunications equipment include regulatory change in the carrier market and the geographical expansion of multinational corporate activity and its demand for value added services (both of which have expanded the size of the equipment market), together with technological innovation and convergence (which has expanded the product range). These factors have opened up major new market segments to both carriers and equipment manufacturers which have become the focus of inter-firm competition. It has also been associated with the rapid integration of national markets into one global telecommunications market. These market changes have forced firms to adopt new organisational forms which facilitate more effective competition.

Regulatory changes in the telecommunications services sector have led to significant restructuring in the equipment manufacturing sector. The telecommunications carrier sector consists of the public and private providers of communications services to the public, public authorities and private corporations involving telephony, or basic voice communications, and value added services. The telecommunications carrier sector operated as domestic State monopolies until relatively recently, except in the USA where AT&T had a private monopoly until 1984.

By the 1980s, several countries including Australia, introduced new carriers into their domestic markets. This forced their national carriers to globalise their activities in order to maintain their competitive position. As a consequence, a number of major international carriers have entered the Australian basic voice, reseller, network and value added services market segments (BTCE, 1993, pp. 19-27). The eventual effect of the new carriers and reseller operations on
Telstra’s financial performance has yet to be determined and will be affected by its capacity to expand into the regional market.

The equipment supply industry evolved in a close relationship between national firms and the public carriers in Northern America, Europe and Japan. The major equipment manufacturers established subsidiaries in foreign markets primarily to meet the domestic demand of national carriers. In most national markets procurement was opened to outside firms by the mid 1980s, in conjunction with the liberalisation of the carrier market, although substantial policy changes occurred in the USA as early as 1968. The consequence of these moves was an increase in the number of equipment suppliers competing in each major market. These regulatory changes facilitated an expansion in market size, range of value added services and trade with manufacturers moving towards a more ‘global’ production and distribution system (Pisano, Russo & Teece, 1988, pp. 35–35).

The most significant of the factors causing organisational restructuring in the telecommunications industry has been the geographical expansion of the market as a response to the internationalisation of other industrial sectors, particularly manufacturing, transport and finance, which require

1 The Australian telecommunications services sector has undergone major restructuring following the Ministerial policy statement of May, 1988. This involved the amalgamation of Telecom and OTC International into AOTC in February 1992 and renamed Telstra in April 1993, and the sale of AUSSAT to the second licence holder, Optus. The convention followed in this paper is to refer to Telstra whenever possible but to cite past actions to the actual organisation name relevant at that time. Telstra continues to trade domestically as Telecom.
telecommunications services as a major input into their productive processes to link the various operating centres of the corporation throughout the globe. The demand by multinationals for faster, more secure and more versatile communications systems has resulted in the growth of global transmission networks, private and virtually private networks, innovations in value added voice, image and data transmission, and digitalised switching services. Thus, the global market has expanded both geographically and in the range of services provided as a consequence of corporate demand (Mansell, Holmes & Morgan, 1990, pp. 55-56).

The combination of satellite and submarine optical fibre cables is upgrading the international communications system and ensuring the connection of all major economic centres to the global network. Optical fibre cable is facilitating the digitalisation of the telecommunications network. Digitalisation greatly reduces unit costs and allows greater capacity in terms of speed, volume, reliability and overall quality of service. It is consistent with the computerisation of telecommunications equipment and the transmission of data and image as well as voice. These factors have resulted in a demand for new services and greatly increased the demand for telecommunications equipment (Antonelli, 1993, p. 196). While optical fibre connections are initially being targeted to the locations of major corporations—that is, CBD districts of major cities—the eventual extension of fibre to home networks will greatly expand the range of communication services available to all units in industrialised societies (ABM, Dec. 1991, pp. 136-137).

The growing corporate demand for more sophisticated communication services facilitated by the digitalisation of transmission lines has provided the incentive for the rapid technological development and new product innovation now
characteristic of the telecommunications industry. This has been assisted by the development of alternative transmission mechanisms, such as satellites, cellular telephones and microwave, which have proven very effective in overcoming deficiencies in the basic infrastructure services in many developing countries. As a consequence there has been a rapid increase in the demand for such services and equipment in these regions (Mansell, Holmes & Morgan, 1990, pp. 53–54). Australia has been able to develop a technological capacity in this type of product which now form a substantial proportion of its exports to the Asia-Pacific region (ABM, op. cit).

The need for consistent corporate global communication systems between subsidiaries, the provision of large-scale infrastructure which requires shared use by a large number of services to justify the expense and the need to recover massive R & D costs by large production runs are all creating pressures towards technical consistency for major equipment items. Modern large-scale telecommunications systems increase the interdependence between component suppliers, technical innovators and the network service users. This increases the pressure towards the development of technically compatible components and standardarisation within the system (Antonelli, 1992, pp. 13–14). This creates opportunities for large scale production and with it the introduction of cost based competition into the components segment of the industry. This would progressively advantage the large producer and distributor over the small specialist firms, relegating them to niche product markets in the 'leading edge' value added services and systems design areas.

Multinational corporate demand and regulatory changes have caused the rapid geographical expansion of the major telecommunications service providers throughout the globe and particularly into the newly industrialising regions which
has had major repercussions in the market strategies of equipment manufacturers. Corporate demand for more secure and sophisticated services has lead to technological innovation and a highly competitive environment for equipment suppliers which has resulted in rapid market growth in the equipment manufacturing sector. As a consequence, those firms are also extending their presence throughout the globe in search of new market opportunities. This has forced the major equipment suppliers to abandon their national market focus and move to global production and marketing strategies within a relatively short time period. New market opportunities exist in the newly industrialising regions and in new product development. However, firms need to speed both the innovation and market penetration process in order to capture these opportunities.

The co-existence of rapid product development and growing market demand creates its own problems. ‘(C)ompetitive advantage in such industries is a function of the rate of increase in knowledge ... . R & D costs and risks are much larger ... . Product life cycles are much shorter ...’ (Ciborra, 1992, p. 94). This diminishes the firm’s capacity to recoup these expenses and technological rents before that product has been superceded. All these features, it is argued, have caused firms in industries experiencing rapid technological change and riskier environments to utilise alliances as a means of controlling these problems (op. cit., p. 96). This has required them to move to a more strategically orientated corporate form (as outlined in section 2 above) featuring a growing use of collaborative business arrangements (Pisano, Russo & Teece, 1988, p. 34).
4 REGIONAL ASPECTS OF GLOBALISATION

Within this process of overall globalisation in the telecommunications industry there have been significant regional variations in growth rates and in the nature of the corporate response. Telecommunications spending only increased by 1.7 per cent in Western Europe and 3.0 per cent in North America between 1991 and 1992. By contrast, it increased by 13.7 per cent in the Far East and Pacific, 20.9 per cent in South and Central America and 33.2 per cent in Africa, although the actual magnitude of expenditure in the last two regions was quite small (Telephony, 6.1.1992, pp. 21–26).

Rapid growth in the Asian market is forecast with an emphasis on the provision of both basic carrier infrastructure and value added services to international businesses. This regional market is expected to grow from $US 60 Billion in 1990 to $US 200 Billion by the year 2000, making it the fastest growing region after Eastern Europe (East Asia Analytical Unit, 1992, p. 222).

Regional expenditure on equipment was $US 18.4 Billion in 1990 (Allen Consulting, 1991, p. 17) and $US 23.8 Billion in 1992 (Telephony, op. cit). Sub-regional growth rates vary from 9.2 per cent p.a. in ASEAN – Indochina, 7.9 per cent p.a. in Middle East, 6 per cent p.a. in China, 5.3 per cent p.a. in Western Asia, 5 per cent p.a. in Oceania and 4.6 per cent p.a. in the NICs (Allen Consulting, op.cit.). It is now a major growth market due to the lucrative contracts available in developing countries such as Malaysia, Indonesia, Thailand, Vietnam and China as they upgrade their infrastructure in anticipation of further industrial growth (East Asia Analytical Unit, 1992).

The competition for contracts to supply public switching and transmission facilities has caused increased activity from international carriers already established in the region, particularly from the USA and UK. Japanese firms such as
NKK have also taken an active interest in this market but with relatively less success in securing contracts (The Economist, 18.1.1992, p. 68). This in turn has expanded the market for equipment supply contracts which are now being actively competed for by the major European and Japanese firms, many of which have operations in Australia. North American firms including AT&T, Motorola and Northern Telecom (NorTel) have a major presence in the Asia–Pacific market, although they have a smaller presence in Australia.

5 RESPONSES BY AUSTRALIAN BASED FIRMS

If telecommunications firms are adopting more strategically orientated organisational structures, this should be evident in the rapidly growing Asia–Pacific region. The process should include increasing specialisation in production, growing intra-regional trade and potentially the emergence of regional offices in strategic locations. As Australia had one of the more advanced telecommunication structures in the region, the actions of firms located in Australia should provide a useful case study of the corporate restructuring process. A number of corporate responses have been identified, as outlined below, which provide evidence of industrial organisational change in Australia.

Outward Expansion

Firstly, firms have tendered for foreign contracts. Most of this activity has occurred in the carrier sector. Telstra (originally as OTC and Telecom International) successfully secured contracts in Sri Lanka, Pakistan, Cambodia, Philippines, Hong Kong, Thailand, Indonesia, Vietnam, the Cook Islands and Saudi Arabia. Most of these were structured as joint ventures with
local partners (AOTC, 1992[b]).

Contracts obtained by Telstra have played an essential role in the internationalisation of the local telecommunications equipment industry by providing opportunities for Australian manufacturers to also enter these markets. For example, Telstra’s (OTC) ten year contract to supply telecommunications infrastructure to Vietnam has involved more than 60 Australian companies including sales by telecommunications companies such as AWA, MM Cables, Connell Wagner, Ericsson Australia and Philips Australia (The Australian, 1.11.1993, p. 15).

Equipment suppliers have also submitted overseas tenders. Ericsson Australia submitted a tender for a large Indonesian contract for 350,000 lines of public switching capacity. Despite strong government support and a more competitive price, the Australian firm lost the contract to USA and Japanese firms (The Economist, op. cit). In order to improve the capacity of Australian based firms to compete for overseas contracts, the industry recently established the Telecommunications Export Task Force. This forum will be used to help co-ordinate the currently fragmented attempts to pursue contacts in Asia by supporting the formation of consortia of local firms to bid for major tenders against international rivals. Members include Alcatel Australia, AWA and Ericsson Australia. Government support for Australian companies will be given a high profile including Ministerial leadership of trade delegations and the provision of concessional export finance to local tenders (AFR, 3.12.1992, p. 5).

Secondly, Australian carriers are active partners in major global infrastructure projects. Telstra (intially through OTC) is a 50 per cent partner in the ‘PacRim’ consortium which is providing a optical fibre cable link between Australia and Hawaii, via New Zealand, and Guam. This cable thus links
Australia to the USA and Japan via high capacity, high security loops (OTC, 1990). Optus is a partner in the TPC Cable5 consortium. As a result of these initiatives Australian firms have become major suppliers of optical fibre cable throughout the Asia-Pacific region. The Australian based joint venture company Alcatel–TCC which was formed by Alcatel Australia and other Alcatel subsidiaries is manufacturing optical fibre cable at Botany Bay for the Tasman 2 and PacRim contracts. MM Cabling, Olex Cabling and Pirelli Cables have used their supply relationship with Telstra (Telecom) to secure overseas contracts to supply optical fibre cable to Thailand, India, Pakistan, Indonesia and China (The Australian, 23.8.1993, p. 13).

These factors illustrate the processes by which an outward expansion of the Australian industry into the Asia-Pacific region is occurring. They clearly parallel the internationalisation process in the global economy and suggest that the Australian carrier sector is actively becoming part of the global industry. A continued regional presence by Telstra and Optus is essential to ensure future expansion in equipment supply.

Regulatory Change and Market Growth

A third significant area where Australian firms are responding to global change is as suppliers to the domestic market. The regulatory changes and increased sophistication of the Australian telecommunications market has resulted in an increased investment in Australian facilities. The Australian market has changed rapidly in recent years with significant restructuring of the functions and finances of the national public telecommunications corporation, the entry of Optus in June 1992 and later the granting of the third mobile licence to
Arena GSM in December 1992. Other factors which have affected the Australian market have included the establishment of State Government networks (AC, Aug., 1992, pp. 15–18) and the upgrading of the Defense Forces network (Fist, 1992–93) and the provision of the ‘most liberal re-sale regime in the world’ which has resulted in at least 16 local providers of discounted services (McDonnell, 1993).

Public contracts and new licences have usually been tied to requirements for local supply, local R & D expenditures and training commitments. These arrangements have been formalised with the entry of most major telecommunication equipment suppliers into the Partners for Development Program. This program is aimed at larger multinational companies which have at least $A40 million in contracts with the Government. Its objective is to increase the presence of multinational companies in Australia by providing them with exceptions to local sourcing requirements in return for a seven year commitment to increase exports to at least 50 per cent of imports and to achieve R & D expenditure of at least 5 per cent of turnover (Stewart, 1990, p. 122). This scheme has the advantage to firms of allowing them to fully import some products and concentrate their local production in a few activities where they believe they can achieve international competitiveness. It is thus consistent with a global production and distribution system but aims to ensure a manufacturing presence for Australian subsidiaries within that system.

The market expansion associated with regulatory change and local purchasing policies have resulted in the entry of a number of new multinational firms into the Australian market. The major carrier entrants included the USA firms AT&T, MCI International and Sprint International who have entered via re-seller joint ventures, usually including an Australian partner. BT (Australasia) has also been involved in
re-seller projects and was the successful bidder to establish the
NSW government network. The new carrier licences resulted
in the entry of BellSouth (USA) and Cable and Wireless (UK)
with 49 per cent of Optus (AFR, 27.4.1992, p. 34) and Vodafone
(UK) as the foreign partner in Arena GSM (AFR, 15.12.1992, p.
1).

Associated with the expansion in the local carrier sector
there has been an expansion in manufacturing facilities.
NorTel and Nokia established local manufacturing activity in
co-production agreements with Australian companies. Both
have funded local R & D activity at the University of
Wollongong (AC, Oct., 1992, pp. 31-34 and Feb., 1993, p. 15) and
joined the Partnership for Development Program with, for
example, Nokia agreeing to achieve $120 million in exports
and expenditure of $25 million on local R & D over the next
seven years (AC, March 1993, p. 10). In addition, both NEC and
Fujitsu are expanding Australian production of their private
branch exchange equipment including sophisticated ISDN
related systems purportedly in response to new market
opportunities arising as a consequence of these regulatory
changes (AFR, 4.2.1991, p. 38). All these firms are achieving
export sales of their Australian manufactured products.

Cost Competitiveness and Local Mandates

The fourth area of interest has been the capacity of Australian
firms to be cost competitive with developing Asian countries
in the production of mature technology telecommunications
products and with Japan and Europe in the more innovative
product range. In Australia, production of items such as
telephone assembly and printed circuit boards is undertaken
utilising advanced automated technologies. Developing
countries such as China produce these products using labour
intensive assembly line techniques (Page-Hanify, 1992-1993, p. 61). Firms such as Alcatel and Exicom believe it is possible to produce standardised mature products such as telephone handsets and small business systems competitively in Australia and have successfully exported telephones to the Middle East, North America, Asia and the Pacific (Page-Hanify, op. cit., Exicom, 1992). Most multinational firms have found that Australian production costs are competitive with Europe while NEC has found them competitive with Japan. Australian producers can locally source components at prices which are competitive with their European parents (Allen Consulting, 1991, p. 45).

Consequently, local innovations are now being developed in Australia for global distribution. Siemens and Alcatel produced the QPSX under licence, a digitalised switching system for metropolitan area networking originally developed by the University of Western Australia in conjunction with Telecom, which has become the basic technology in this market niche (Fist, 1993, p. 71). Siemens has also given its Australian subsidiary a mandate to expand exports in Asia, particularly to Thailand, Taiwan and China (Siemens, 1992). NEC’s Australian subsidiary is expanding the range of products produced locally and also has a mandate to establish Australia as a key export platform to the South East Asian market in the telecommunications equipment sector. NEC has incorporated Australian developed software into paging systems and mobile telephones which it is now producing in Australia and exporting to South Korea and Taiwan as well as through other NEC subsidiaries (AFR, 4.2.1991, p. 38).

Thus while government procurement policies and ‘insider’ incentives have encouraged firms to establish facilities in Australia, cost competitiveness has been a major factor allowing the evolution of these subsidiaries into production
centres which can supply locally developed and manufactured products through their corporate global distribution networks. As well as the Alcatel, Siemens and NEC examples above, Ericsson Australia has contracts worth $200 million to supply mobile cellular telephones and radio base equipment to its global network (AFR, 6.6.1990, p. 29).

Fifthly, the capacity of Australian facilities to become significant contributors to corporate production and distribution networks critically depends on their ability to develop unique products of world-wide acceptance. Product development, in turn, depends on indigenous innovation. Requirements for increased local R & D have been built into all the Partners for Development and new licensing agreements with telecommunications companies. As a consequence, expenditure on R & D by multinationals such as Alcatel, Ericsson and Siemens has increased considerably. Most of their corporate design activity has related to computer linked communication services and software design and development for telephony, paging systems and to some extent higher value added services such as video telephones, optical fibre transmission and corporate network services (AFR, 21.5.1991, p. 30; BRW, 7.12.1990, p. 17). Nevertheless, a considerable proportion of local research and innovation activity continues to occur within local indigenous firms and this will probably remain the basis of any competitive edge in the local industry.

As suggested earlier, in industries experiencing rapid technological change, continuous innovation is essential to maintain competitive position. R & D is thus an activity most often assigned to the corporate strategic level of the global organisation. Successful innovation, especially when flexible manufacturing techniques are being utilised, requires close interaction between the research, production and marketing
areas of the organisation (Best, 1990). Thus research into the major ‘leading edge’ products will tend to be centralised in the major industrial locations of the corporation. Given the policy requirement for an increased local R & D effort and increasingly more stringent market conditions, the most effective approach has been to orientate Australian research towards niche, end user specific products to meet local and regional specific requirements utilising local engineering and software skills. Thus the trend as to the nature of R & D being performed within Australian multinationals is consistent with the regional restructuring process highlighted earlier (Ohmae, 1985, p. 186).

Sixthly, further evidence of the industrial organisation process can be found in the response of some companies to establish Asia-Pacific regional headquarters in Australia. Ericsson was the first manufacturer to move in this direction giving the local subsidiary a ‘mandate’ to rapidly expand the corporation’s Asian presence and prove that the Melbourne facilities can become their Asia-Pacific headquarters. While Ericsson also has factories in Malaysia and South Korea, they are not as well developed as their Australian facilities (AFR, 21.5.1991, p. 30). Australian governments have promoted the concept of a regional headquarters. When the third mobile carrier licence was granted to Arena GSM, Vodafone (UK) agreed to relocate its Asia-Pacific headquarters in Australia and transfer Australian expertise to its business relationships in India, South Korea, and Hong Kong (AC, Feb. 1993, p. 15). As a consequence of gaining the NSW State network contract, BT agreed to establish its regional centre in Sydney (AC, Feb. 1993, pp. 13–14).

Thus the Australian subsidiaries of many international companies show indications of moving towards a more autonomous role within the corporate production and
distribution system. The development of this role has been facilitated by the capacity of local firms to be internationally cost competitive within specific product areas and to access locally designed software and innovations. Nevertheless, acceptance of a regional role for Australian subsidiaries must be seen as predominantly a response to Government pressure associated with public procurement and licencing arrangements, the full economic implications of which will only become evident in the long term.

**Evolution of Strategic Alliances**

There is only limited evidence of the local use of strategic alliances, the second major feature of the new organisational structure, and then primarily by indigenous Australian companies in order to strengthen their market position.

Alliances have been used by multinational firms to enter the Australian market. In June 1991, Exicom and Northern Telecom of Canada (NorTel) signed a strategic agreement for Exicom to manufacture under licence and service NorTel products for the Australian market and to export locally manufactured products through NorTel’s global distribution network (Exicom, 1992). Exicom recently announced a five year export arrangement worth $30 million in its first year, to supply business telephones to Canada and the USA through Northern Telecom (*The Australian*, 16.8.1993, p. 10). Nokia, the Finnish multinational, originally entered the Australian market via a marketing joint venture with Datacraft, and now has a collaborative agreement with ERG to locally manufacture Nokia products for the Australian market. Nokia has also established R & D facilities in Australia (AC, March 1993, p. 10).

Telstra (AOTC) has a policy of seeking long-term supplier relationships for its planned $10 billion of local equipment
purchases. These agreements establish a framework for networking involving ongoing discussion and consultation with suppliers to assist product development. It has also identified areas such as synchronous digital transmission, fast packet (ATM) switches and intelligent networks and services, where Australia has world technical leadership as opportunities for Australian firms to jointly develop new products (AOTC, 1992[a], pp. 16–17). These agreements have been extended into strategic alliances between carriers and suppliers to build on complementary strengths in research, design and the operation of telecommunications systems as the basis of expansion into the Asia-Pacific region (The Australian, 15.11.1993, p. 16).

**Intra-industry trade**

Changes in organisational structure should be reflected in changes in the pattern of trade. Table 1 shows Australian imports and exports of telecommunications equipment. Both imports and exports have grown substantially throughout the past 12 years. Exports have grown at three times the rate of imports but from a much smaller base. In 1980–81 the Import/Export Ratio was 7.68. In 1992–93, it was 2.31 suggesting a marked improvement in the trade balance over this time. However, the sector has still been in substantial overall deficit during this period although this has stabilised and slightly declined since the mid 1980s.
Table 1  Trade in Telecommunications Equipment, 1980-81 to 1992-93 $'000

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<th>Exports Current</th>
<th>Imports Current</th>
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<td>106,422</td>
<td>889,175</td>
</tr>
<tr>
<td>1989-90</td>
<td>207,680</td>
<td>162,250</td>
<td>980,591</td>
</tr>
<tr>
<td>1990-91</td>
<td>293,033</td>
<td>235,936</td>
<td>975,949</td>
</tr>
<tr>
<td>1991-92</td>
<td>284,285</td>
<td>239,903</td>
<td>1,118,640</td>
</tr>
<tr>
<td>1992-93</td>
<td>470,809</td>
<td>379,073</td>
<td>1,292,641</td>
</tr>
</tbody>
</table>

Average Annual Growth Rate

<table>
<thead>
<tr>
<th></th>
<th>Exports</th>
<th>Imports</th>
<th>Trade Deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth Rate</td>
<td>15.96%</td>
<td>14.09%</td>
<td>8.31%</td>
</tr>
</tbody>
</table>

Source: ABS. Cat. No. 5435.0 Merchandise Imports: Foreign Trade, Australia, various years.
ABS. Cat. No. 5424.0 Merchandise Exports: Foreign Trade Australia, various years.
ABS. Cat. No. 6405.0 Exports Price Index, various years.
ABS. Cat. No. 6414.0 Import Price Index, various years.

In addition, Australian exports of telecommunications equipment has a strong regional focus as shown in Table 2 and Figure A below. This indicates that Australia is developing a strong regional trade role, focused on the developing countries within the Asia-Pacific region.
Table 2  Imports and Exports of Telecommunications Equipment (SITC 764) by Region, 1991/92 and 1984/85 $A'000

<table>
<thead>
<tr>
<th>Country by Region</th>
<th>1991/92</th>
<th>1984-85</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Imports</td>
<td>Exports</td>
</tr>
<tr>
<td><strong>Europe</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium-Luxembourg</td>
<td>30,953</td>
<td>487</td>
</tr>
<tr>
<td>France</td>
<td>69,502</td>
<td>2,372</td>
</tr>
<tr>
<td>Germany</td>
<td>29,852</td>
<td>3,931</td>
</tr>
<tr>
<td>Sweden</td>
<td>33,315</td>
<td>3,991</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>42,210</td>
<td>15,638</td>
</tr>
<tr>
<td>Other Europe</td>
<td>31,795</td>
<td>14,918</td>
</tr>
<tr>
<td><strong>Total Europe</strong></td>
<td>237,627</td>
<td>41,337</td>
</tr>
<tr>
<td>%</td>
<td>20.9%</td>
<td>14.4%</td>
</tr>
<tr>
<td><strong>North America</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>46,114</td>
<td>1,189</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>282,112</td>
<td>24,266</td>
</tr>
<tr>
<td>Mexico</td>
<td>280</td>
<td>746</td>
</tr>
<tr>
<td><strong>Total N.America</strong></td>
<td>328,506</td>
<td>26,201</td>
</tr>
<tr>
<td>%</td>
<td>28.9%</td>
<td>9.1%</td>
</tr>
<tr>
<td><strong>Asia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>25,002</td>
<td>13,846</td>
</tr>
<tr>
<td>Indonesia</td>
<td>700</td>
<td>14,284</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>13,353</td>
<td>8,074</td>
</tr>
<tr>
<td>Japan</td>
<td>387,485</td>
<td>9,325</td>
</tr>
<tr>
<td>Korea, Repl.</td>
<td>27,003</td>
<td>13,914</td>
</tr>
<tr>
<td>Malaysia</td>
<td>16,669</td>
<td>4,370</td>
</tr>
<tr>
<td>Singapore</td>
<td>19,958</td>
<td>6,285</td>
</tr>
<tr>
<td>Taiwan</td>
<td>37,451</td>
<td>8,303</td>
</tr>
<tr>
<td>Thailand</td>
<td>12,693</td>
<td>5,047</td>
</tr>
<tr>
<td>Other Asian</td>
<td>7,692</td>
<td>14,432</td>
</tr>
<tr>
<td><strong>Total Asia</strong></td>
<td>447,986</td>
<td>97,880</td>
</tr>
<tr>
<td>%</td>
<td>39.4%</td>
<td>34.9%</td>
</tr>
<tr>
<td><strong>Pacific</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>11,773</td>
<td>28,296</td>
</tr>
<tr>
<td>Other Pacific</td>
<td>1,915</td>
<td>19,187</td>
</tr>
<tr>
<td><strong>Total Pacific</strong></td>
<td>13,688</td>
<td>47,483</td>
</tr>
<tr>
<td>%</td>
<td>1.2%</td>
<td>16.5%</td>
</tr>
<tr>
<td><strong>Central and South America</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>1,180</td>
<td>3,675</td>
</tr>
<tr>
<td><strong>Middle East</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>6,015</td>
<td>5,638</td>
</tr>
<tr>
<td><strong>Africa</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>104</td>
<td>6,143</td>
</tr>
<tr>
<td><strong>International Waters</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>-</td>
<td>58,187</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>508</td>
<td>263</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,135,614</td>
<td>287,074</td>
</tr>
</tbody>
</table>

Source: A.B.S. Foreign Trade Statistics, unpublished data.
### Figure A  Indicative Analysis Of Export Direction From Australia

<table>
<thead>
<tr>
<th>Item</th>
<th>NICs</th>
<th>Other Asian</th>
<th>Indian Area</th>
<th>Pacific</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microwave sys</td>
<td>Vietnam</td>
<td>Malaysia</td>
<td></td>
<td>Papua NG</td>
<td>Qatar</td>
</tr>
<tr>
<td>Data network sys</td>
<td>Taiwan</td>
<td></td>
<td></td>
<td>N. Z.</td>
<td>N. Am</td>
</tr>
<tr>
<td>Tele. headsets</td>
<td></td>
<td></td>
<td></td>
<td>Tasman</td>
<td>Sweden</td>
</tr>
<tr>
<td>Cable (fib op)</td>
<td>Malaysia</td>
<td>Pakistan</td>
<td>India</td>
<td>Link</td>
<td></td>
</tr>
<tr>
<td>Paging Systems</td>
<td>Indonesia</td>
<td>Malaysia</td>
<td></td>
<td>PacRim</td>
<td></td>
</tr>
<tr>
<td>Mobile radios</td>
<td>H. K.</td>
<td>Thailand</td>
<td></td>
<td></td>
<td>Saudi</td>
</tr>
<tr>
<td>Telephone Infrastruc.</td>
<td>H. K.</td>
<td>Vietnam</td>
<td></td>
<td></td>
<td>Arabia</td>
</tr>
<tr>
<td>Mobile telephones</td>
<td>S. Korea</td>
<td>Vietnam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satellite stations</td>
<td></td>
<td>Taiwan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network management</td>
<td>Cambodia</td>
<td>Philippines</td>
<td></td>
<td>Cook Is</td>
<td></td>
</tr>
<tr>
<td>Switching systems</td>
<td>Singapore</td>
<td>Indonesia</td>
<td></td>
<td>Pacific</td>
<td></td>
</tr>
<tr>
<td>Transmission equipment</td>
<td></td>
<td>Cambodia</td>
<td></td>
<td>nations</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Laos</td>
<td></td>
<td></td>
<td>Nauru</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thailand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Malaysia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vietnam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>China</td>
<td></td>
<td>Papua-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N. G.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N. Z.</td>
</tr>
</tbody>
</table>

Sources: *Australian Communications*, various issues, newspaper reports.
These examples are also indicative of the type of product being exported by Australian based subsidiaries. Optical fibre cable, mobile radio and telephone systems (for which Australia's geography has provided a development incentive), satellite related equipment and network management (particularly through OTC International) all feature in the list. However, mature mass produced items such as telephone handsets are also being successfully exported as an adjunct to obtaining large volumes of domestic output (Allen Consulting, 1991). This pattern illustrates that Australia has specialised in software enhanced products for regional export, often associated with mobile telephony. Significant developments of these products is still occurring and Australia has proven a successful innovation centre in this area.

Simultaneous growth in imports and exports is indicative of the increasing internationalisation of this market and, in particular, increasing intra-industry trade. This pattern is suggestive of a new industrial organisational structure, with local firms specialising in particular products for local supply and export while importing others through their corporate distribution networks. Specialisation in production within corporate networks will result in increasing imports as the Australian market grows and becomes more sophisticated thus increasing the demand for high value added services. However, a more decentralised structure provides an opportunity to offset this import growth with increasing exports. A successful production centre strategy should see the trade deficit in this sector reduce over time correlated with rising overall trade as a proportion of total activity.
6 IMPLICATIONS FOR ORGANISATIONAL CHANGE

The above analysis of responses to changes in the global market by Australian based firms can be summarised into three broad indicators as to the nature of organisational change in the telecommunications industry.

Firstly, there is a clear indication that global equipment manufacturing corporations are beginning to view their Australian subsidiaries as relatively autonomous innovation and manufacturing centres within their global production and distribution networks. However, a number of qualifications must be made to this general observation.

This devolution of activities to Australian subsidiaries is, in effect, a trial process in that the local branches will need to 'prove' their capacity to contribute to the overall system before they become semi-autonomous production centres. The Australian operations will need to establish that they are capable of indigenous research and innovation, of producing quality items in a cost effective manner and that these products are able to secure significant overseas sales through the corporate network. Early indications appear favourable in this regard.

Moreover, while a production centre structure is consistent with multinational firms' global strategies, the decision to establish R & D and manufacturing centres in Australia as distinct from other parts of the Asia-Pacific region has been largely induced by government purchasing and licencing requirements and industry policies, as outlined in the previous section. Nevertheless, if Australian subsidiaries proved their value within their corporate global networks, this role should become permanent. It must be noted that other Asian countries have similar policies in relation to their telecommunications industries. Most require foreign investors to establish local manufacturing facilities and/or joint
ventures with local partners as part of the awarding of national telecommunications contracts.

Consequently, unless such operations are protected or subsidised by national governments, they need to export some of the production in order to obtain efficient scales of operation. Thus this process is likely to accelerate the trend towards specialisation of production within national facilities with each subsidiary concentrating on producing a limited range of export quality products. Again this trend can clearly be seen in their Australian operations.

In addition, it must be recognised that the establishment of effective production centres which operate in a manner consistent with Australian government policies brings benefits to the global corporation. It provides them with access to the domestic tendering process and to export contracts obtained as part of Telstra’s overseas tendering process. It also places them so as to access innovations developed within smaller indigenous firms and research institutions which can potentially be developed into export quality products. Again many examples of these benefits of ‘insiderism’ can be seen in the operations of the Australian subsidiaries. Thus, provided the national Australian economy continues to offer such benefits to global firms, they will continue the process of developing local profit centres and be willing to develop their operations in a manner consistent with Australian industry policy.

The second type of organisational change observed is that there are indications that Australian subsidiaries may also develop a role as the regional headquarters for their corporation in the Asia-Pacific. Ericsson, NEC, Vodafone and BT are already moving in this direction as discussed above. The movement will be improved if Telstra is able to position itself as a major service provider to national governments in
the region. This would encourage suppliers to locate in Australia in order to gain access to the flow-on contracts for equipment and value added services.

For Australia to become the regional headquarters for major corporations, it must become one of the major switching nodes within the global communications networks currently under construction. Australia's technical leadership in optical fibre cable and reputation as one of the most highly technologically advanced nations in the region in telecommunications will attract major network switching capacity. However, geographically it is less well located as a regional node than Singapore, Malaysia and Hong Kong. Success in becoming the regional centre will depend critically on Telstra's capacity to expand its regional presence and upgrade its carrier network to meet the capacity requirements of multinational corporations operating in the region. It will also require substantial government support to encourage global carriers to switch their networks through Australia. In this area, the media requirements associated with the Olympic Games can be utilised to upgrade Australia's position within these global networks.

Finally, the type of organisation change occurring within the Australian industry indicates that alliances are being used but are not yet a major feature of the local industry except for Telstra and a number of small indigenous firms. Locally based multinational subsidiaries have not yet been involved in any significant externally orientated alliances in order to expand export sales, although they have been used as a means of entering the Australian market.
7 CONCLUSION

The Australian telecommunications equipment manufacturing industry is tending towards a strategic industrial organisation structure and is developing an improved competitive position within the Asia-Pacific region. The improved export performance of Australian firms can be directly related to the evolution of industrial organisation where the export activity in the multinational subsidiaries occurs predominantly through corporate distribution channels.

Such an organisational structure would be more beneficial for local economic development than a movement towards a more rigid vertically controlled corporation structure. Firms with this latter organisational form would be more likely to bypass Australia when developing their global production and distribution systems on both cost and technology intensity criteria and thus would be expected to import both CPE and new value added services and equipment into Australia, with little offsetting export activity.

As outlined above, such a corporate strategy would ignore the capacity of Australian firms to innovate and manufacture some of the product range on a global scale. A profit centre structure does not guarantee Australian firms ‘international competitive’ status in this industry. However, unlike more rigid organisational structures, it at least offers them the opportunity to develop such a capacity and demonstrate the value of the Australian subsidiary to the overall corporate system.
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