Chapter 2

Chains, Networks, Webs: the topology and geography of a global system of development

This chapter identifies continuities and discontinuities in the situation which faces both developed and developing regions. These differences determine the space for manoeuvre left for the developing regions excluded from the process of formation of key technical systems. Later chapters look more closely at the dynamics of the design of complex systems themselves. This chapter examines the characteristics of the emerging global system within which these are formed.

There have been significant shifts in characterisations of multinational corporations by both their proponents and their critics. The characteristics of the "new" multinationals and the emergence of production webs and networks have blurred the distinction between centre and periphery in the global economy. In response strategies to cope with trans-national production networks have emerged. The shifts in the nature of the global chain of production and consumption have undermined the view of international trade as a series of complementary flows of raw materials and products between centre and periphery, which are eventually followed by the development of production close to markets.

The technologies facilitating this change have created the potential for the co-existence and co-location of activities associated with different stages of production and consumption. These new adjacencies disrupt the orderly flows of technology from centre to periphery associated with earlier models of multinational development and technology transfer (see Hirsch, 1967, 1972).

This chapter introduces the notion of a dominant triad of developed regions within the world economy. This understanding has locational consequences for investment and economic activity. New forms of "periphery", no longer necessarily physically separated from the core and

new forms of exclusion are examined. In this context the promotion of what Kenichi Ohmae terms zebra strategies is problematic. Inward investment is directed at only the strongest parts of a regional economy, in order to create sufficient levels of formal economic activity for full inclusion in the world equation of production and consumption[1]. The contrast between such favoured regions and their neighbours may not be entirely black and white, but the consequences for economic and social equity within a nation can be stark, as illustrated in this chapter with data from China.

The emergent dimensions of micro (city scale) meso, (country/state scale) and macro (international) regional scales of exclusion from the "triad" of North America, North West Europe and North East Asia mentioned in Chapter 1 are discussed. The consequent stresses on the national state are touched on here and in the following chapters.

Global Production/Global Participation?

The complexity of our world has become better appreciated following the removal of what Ohmae (1995) terms the "bi-polar discipline" of the Cold War. This obscured differences within and between members of the Eastern and Western blocs and consigned the remainder of humanity to the disparagingly termed "Third World". The rapid and comprehensive collapse of the Eastern Bloc at the end of the nineteen-eighties led some in the West to attribute a key role in the erosion of monolithic state control to information and communication technologies. This led to accompanying assertions that a technically driven globalised economy would solve the remaining problems of global development. In the nineteen-nineties such simplifications were increasingly challenged with evidence of the exclusion of economically marginal performers from decision making, by the onset of simultaneous crises across the varieties of capitalism deployed by the developmental states of East Asia and by the subsequent dot.com bubble.

The post-Cold War era has seen rapid growth in global economic integration. Disparate national and regional cultures are increasingly interacting within networked and globalised organisations. Information technologies are facilitating these changes through the reduction of transaction costs and the alteration of the relative advantages and economies of size. However, this is leading to a complex process of layering of labour markets, both internal and external to the developed economies driving this process. The unevenness of development within and between economies threatens the achievement of sustainability as defined by writers such as Welford (1995) who cities the Bruntland report from the

World Commission on Environment and Development (Bruntland, 1987). This establishes a requirement to meet present needs without compromising future generations and emphasises the shift of focus in development from growth to sustainability.

The reorganisation of production around the integrated sectors of an emerging global economy seems to have left the world divided into three major regions, North East Asia, North America and Western Europe. This is the 'triad' described by Ohmae (1990) with localities within those regions restructuring rapidly in an attempt to obtain or ensure a continued prosperous place within the new system.

The foundations of an Asian node in the global economy were laid during the nineteenth century by the successful acquisition, adoption and subsequent re-export of externally developed technology by Japan (Morris-Suzuki, 1994). The focus of growth in Asia had shifted westwards to the East Asian mainland by the close of the twentieth century, but the very success of Japan and other Asian economies in transferring, transforming and re-exporting socio-technical systems has already provoked a response from older developed economies. The result has been the rapid cross-diffusion of innovations within an emerging globalised economy dependent on the widespread use of information and communication technologies. These key technologies underpin a global system of production, distribution and consumption.

Orru, Biggart and Hamilton (1991) examined organisational isomorphism in N.E. Asia reflecting a revived interest in “institutional” issues in Western organisation theory (e.g. Powell and DiMaggio, 1998). A better understanding of the dynamics of the strategies employed in East Asia has come through Kim’s examination of the significant differences between the historically connected business forms of *chaebol*, *zaibatsu* and *keiretsu* (Kim; 1996). Similarly Redding (1996) and Wong (1996) have provided a better understanding of the nuances of Chinese business practice to the West.

As noted above, the success of Japan and other Asian economies in transferring, transforming and re-exporting socio-technical systems inevitably provoked a response which resulted in the rapid diffusion of innovations in all directions. In many respects, the current unsettled state of several East Asian economies is a reflection of the closer interaction of systems based on conflicting assumptions and expectations. A de facto global system linking Keynesian developmental states to the neo-liberal hegemony of the Anglo-Saxon developed states is likely to exhibit instabilities.

Tensions and contradictions in development are not confined to the newer participants in the global system. The rapid pace of growth in

favoured areas also creates regional imbalances within any regions and nation states where available infrastructure and skills cannot support full integration into the global economy. Europe, North America and East Asia all contain the most advanced levels of economic development alongside developing economies. Each region faces the challenge of supporting balanced growth in peripheral areas which are not attracting private inward investment. While these inequities may be most marked within the most rapidly developing economies such as China, they exist to some extent in all economies.

At the same time there seems some degree of consensus that, in the post-Cold War era, difference and diversity are potential resources. For example, Delamaide (1994) explores the synergies flowing from the re-assertion of historical cultural and economic linkages, offering an alternative understanding to Ohmae's "zebra strategies" (Ohmae, 1995) which play to the relative strength of the most developed components of national economies in order to create regional synergies. Both are discussed below.

Although linkages between the advanced areas of developing economies are creating new regions irrespective of national boundaries, few national governments are prepared to relinquish responsibility for the development of the state as a whole. The "strong globalisation" argument that national or even international regional governments no longer have a significant role in development is now increasingly challenged. However, differentials in development are entrenched through dependence upon a global infrastructure constructed around the priorities of the dominant developed economies and the resulting inequities undermine the legitimacy of some national states.

The development of co-operative economic mechanisms such as the North American Free Trade Association (NAFTA) and the Association of South East Asian Nations (ASEAN) suggest that there are means of developing sufficiently large-scale development policies while retaining a role for national governments. However, the emergence of economic groupings as large as the Asia Pacific Economic Co-operation (APEC), with the addition of Russia, Vietnam and Peru to its original membership, or the further enlargement of the European Union to twenty-five members due in 2004, threaten the original coherence and logic of some of these associations.

Dicken (2003) and Dunning (1993) show that the majority of direct foreign investment is within and between members of the "triad" but the European Union is particularly keen to encourage European investment into Asia's developing economies. Initiatives such as "Asia Invest" are aimed at smaller and medium sized companies which may benefit from resource

sharing between European design and development and low-cost Asian manufacture, as mentioned in Chapter 1.. While this initiative is focussed on the actual and potential resources of the less developed Asian economies, the European Union is keen to direct investment to both developing and developed regions of Asia (EC/UNCTAD; 1996).

Chains, Networks and Webs

The geographical separation of a periphery providing raw resources and a basic market from a core containing transformation processes and sophisticated markets can be identified in European and earlier forms of colonialism. However, the emergence of a global market has led to the progressive relocation of basic manufacturing processes to the periphery and a consequent shift in focus in developed economies towards the end of the production chain where product differentiation and customer support can maintain demand for goods and services.

The integration of this emergent system can be overstated since specific markets and specific technologies are at different points in the cycle of growth, maturity and decline at any time. Consequently, the organisations and alliances which comprise the global production system are presented with the challenge of delivering continuous innovation at the cutting edge while ensuring effective diffusion and exploitation of more mature technologies. Innovation at the cutting edge increasingly requires cross-national collaboration to achieve the necessary levels of resources.

Dicken (2003) enumerates the repertoire of trans-national corporation strategies which include direct foreign investment, joint ventures with local companies and alliances. Alliances can be both permanent, as with the merger of Daimler-Benz and Chrysler in 1998, or temporally and geographically limited partnerships such as that between Siemens, IBM and Toshiba in relation to the European market (Castells, 1996). Such arrangements involve significant cross-cultural accommodation, as with the acceptance of German workforce representation at board level by the U.S. side of the merged DaimlerChrysler corporation.

Cores, Peripheries and Rims

The divisions within the emerging “global economic system” and the prospects for overcoming them are the focus of this book. These divisions create two particular problems which undermine the broader sustainability

of development. The newly industrialising countries that are aiming to catch-up with the most advanced regions are engaged in a process in which development and growth are synonymous. They are understandably sceptical of advice which suggests that they should adhere to higher standards than those applying at the equivalent stage in the development of the dominant established economies. However, repeating the short-term strategies of their predecessors may adversely affect their long term choices. Secondly, significant parts of the globe are excluded from this "global" system. Rather than aspiring to catch-up, these regions find difficulty in maintaining even modest economic objectives.

Exclusion from policy making processes or from influence over the emerging global production system reduces the ability of less developed regions to negotiate over the sustainable exploitation of the primary resources they have traditionally contributed to international trade. Just as colonial infrastructure was often aimed more at the exploitation of resources than development, the priorities of trans-national corporations are creating an emergent information apartheid within the global economy. Because of the asymmetry in bargaining power, the spatial strategies of virtual adjacency delivered by information and communication technologies threaten any prospect of integrated development. They allow the outsiders a "cherry-picking" approach to both the human and physical resources of developing regions. Infrastructure investment is driven by external criteria similar to those described by Headrick (1981) in his description of railway development in Africa.

The key twenty-first century communication technologies are in danger of mirroring the uneven development of the key nineteenth century transport technology, with the extreme case of the internationalised enclave of the Free Trade Zone mimicking the trading fort of the nineteenth century.

The Pacific focus of the global economy at the end of the twentieth century reflects the steady migration of the creative source of models of development and innovation from Western Europe. During the first and second industrial revolutions the focus of innovation and technical development moved to the east coast of the U.S.A and during the third and putative fourth industrial revolutions to its West Coast. As noted above, the basis for the subsequent shift in focus to the Western Pacific rim was the nineteenth century appropriation of Western technology by Japan (Morris-Suzuki; 1994). David and Wheelwright (1989) argue that such regional shifts can only be understood in the context of waves of capitalist development operating on a world-wide scale.

As noted in Chapter 1, Hirst and Thompson (1996) argue that the world economy was highly internationalised by the outbreak of the First

World War. The technologies of electric telegraph and steam navigation had delivered a new predictability and reliability to intercontinental communication essential to the growth of global trade. Nevertheless there are further qualitative shifts associated with the near-instantaneous transfer of almost unlimited amounts of information between almost any two points on the surface of the planet. The application of information and communication technologies (ICTs) to globalised financial markets has contributed to the internationalisation of economic decision-making and transformed the volume and flow of resources from David and Wheelwright's waves into tsunami. At the same time, a deeper understanding of the mobility of knowledge and intellectual capital in the production and value chain has developed.

The resulting complex interplay of interests and resources requires some form of representation akin to the logos used by Mintzberg (1979) to illustrate the influence of context on his organisational typology. A basic production chain model is used by Dicken to map a geographical hierarchy involving resources, manufacturers and consumers (Dicken; 1998, Figure 1.1). This metaphor is being superseded by the idea of global production networks. Research and development, routine manufacturing, final assembly and after-market support may all be present in the same location, yet each activity may be contributing to radically different product chains and sectors. As noted above, the orderly transfer of these functions from core to periphery across the product lifecycle described by Hirsch (1967) is replaced by an interpenetration of core and periphery in which market, processing and raw materials source, and production and consumption are increasingly co-located without being integrated into a self-sufficient economy. The re-distribution of these activities during each product life cycle further undermines the traditional concepts of centre and periphery.

Dicken (1998, 2003) demonstrates that information and communication technologies underpin the global system, offering opportunities for participation in the "information economy" to peripheral areas. Information and communication technologies have enabled the disaggregation of the production chain into a network by locating each activity specifically at its point of greatest comparative advantage. The ability to disaggregate the intellectual capital produced by the divergent stage of the design process from the convergent, focused discipline of the production process has been enhanced by the ability to control production lines from across national boundaries[2]. In some instances complementary manufacturing takes place at both ends of such relationships, however, as noted, Lipietz (1992) argues that this ability to separate production from consumption signals the end of the "Fordist compromise" which underpinned the Keynsian social-democratic paradigm.

Harvey (1990) points out that Ford significantly increased wages when he introduced his five-dollar, eight-hour day in 1914 in conjunction with his moving production line. Ford saw the workers as an integral part of a production and consumption process. However, the technical developments underpinning the current globalisation process have created interrelated labour markets, both internal and external to the developed economies. Harvey regards this post-Fordist situation as a regime of flexible accumulation which is tightly organised through its geographical dispersal and flexible responses to labour markets, and which is even more reliant on the creation of scientific and access to technical knowledge.

If Henry Ford implemented his $25 dollar weekly wage in part to create a market for the output of his production line, production workers remote from the destination market no longer need to be paid sufficiently well to consume the products of their own labour. The Fordist compromise was institutionalised in the international bodies created by the Bretton Woods Agreement of 1944. The transformation of these institutions, in particular the mutation of the General Agreement on Trade and Tariffs (GATT) into the World Trade Organisation[3] (WTO) is at the centre of debates over the meaning and nature of globalisation.

The current neo-liberal development agenda is driven by the requirements of capital flows, and backed by the twin resource providers of the International Bank for Reconstruction and Development[4] (World Bank) and the International Monetary Fund. Both lenders have a strong preference for very particular interpretations of both development and globalisation. The International Labour Organisation[5] (ILO) charged with ensuring that workers rights would converge with the standards achieved in the more advanced economies manages a much lower profile in the public debates and coverage in general news media. The results of the prevailing agenda are catalogued by Bello (1999) and Klein (2000) in their accounts of conditions in the free trade zones of less developed economies.

Despite the tight coupling and complex interaction of the globalising economy, a simplistic isomorphism re-appears in models of the development process which still reflects Rogers' (1995) model of diffusion of innovation from centre to periphery. The general dissemination of "lean production", and of models of science cities and science parks derived from specifically U.S. synergies between university and commercial research are evidence of the persistence of a "one-way" view of transfer processes. Both Route 128 and Silicon valley have been adopted as models for technology transfer and economic development, with varying success: Route 128 around Boston emerged as a centre of high technology industries in the 1960s. Saxenian has compared the developments of industries along Route 128 and in Silicon Valley (Saxenian 1994). The East Coast paradigm relied

upon established companies and a new relationship with universities and central government, the core of U.S. President Eisenhower's "military–industrial complex" (Eisenhower, 1961). The closed nature of these large, individual organisations contrasts with the densely networked environment of the more dynamic West Coast firms. Silicon Valley is dominated by the loosely networked companies which created and in turn were sustained by a new generation of information and communication technologies.

Military projects played a crucial role in the early development of Silicon Valley, but the availability of venture capital from within the region is a key to its continued prominence. Castells and Hall (1994) show that attempts to engineer such creative situations have produced very mixed results, both within their original cultures and beyond and this path dependent aspect of technical, economic and social development will be examined in Part II and Part III.

Castell's (1989) view of the creative milieu captures the complex web of relationships which is necessary to support the genuine innovation required for economic autonomy within an economy of flows. Castells (1996) describes a form of network enterprise which is composed of components of larger corporations, collaborating in specific spatial and temporal circumstances, while the main companies are still pursuing global strategies of direct competition. The framework of the network organisation appears to offer an opportunity for smaller players to access resources from and to compete within global networks. Inoue (1998) describes a "virtual village" in which small enterprises are able to form and reform alliances in order to provide high technology services to larger companies. However, the additional accessibility and flexibility offered to smaller players also allows larger firms to restructure in such a way that they can enter niche markets yet still draw on their wider resource base to maintain economies of scale not available to the smaller incumbent firms. The potential advantages to smaller players are thus offset by the ability of some larger firms to de-couple key business units better to target customers and markets traditionally served by much smaller firms.

Borders versus Hierarchies: the tensions in Ohmae

Dicken's (1998) use of the production chain to analyse the dynamics of the global economy was introduced in Chapter 1. The view of international trade as a series of developments from flows between centre and periphery, via multi-domestic production close to markets to reciprocal production webs has accompanied Ohmae's formulation of the end of the "bi-polar discipline" of the Cold War.

Organisations, whether commercial, regulatory or voluntary, are increasingly confronted with the need to operate across a multiplicity of boundaries, whether geographical, political or cultural, in order to function within the emerging global system. Some subsequent regional re-alignments, most obviously in the Balkans, have allowed the resurrection of earlier conflicts placed in stasis by external threats. However, recently colonised regions of Africa in particular are faced with regional shifts of even greater complexity. More positively, elsewhere in Europe, Delamaide (1994) has identified what he describes as "super-regions" with, for example a re-emergence of the characteristics of the Hanseatic league in current developments around the Baltic.

Delamaide offers a perspective on pre-existing historical and cultural linkages which predate both the recent Cold War divisions, and the emergence of current nation states. In many areas such as the Danube basin and the Baltic, these older linkages can be seen re-emerging in the pan-European context. Elsewhere, he draws attention to the pivotal role of Turkey as a link between Europe and the Turkic republics of the former Soviet Union. Such cultural synergies offer a means of retaining regional coherence in the face of continuing expansion of entities such as the European Union. Kirlidog (1997) demonstrates the implications for technical support through an examination of the impact of Turkish business practices on the implicit assumptions of imported executive information systems. Cultural inter-operability is likely to become as significant as technical inter-operability in the global economy (Kaye and Little; 1996). These issues are returned to in Part III where Chapter 10 examines the institutional and cultural dimensions of development through a comparison of Turkish and Japanese modernisation strategies and their outcomes.

The logic of the current wave of technology-driven globalisation has impacted on significant sectors of the developed economies themselves. It has been suggested that even countries such as Japan and Britain are finding that only specific geographical areas or economic sectors are benefiting fully from integration into the global economy. As with other forms of technology transfer premised on foreign direct investment, smaller local organisations and enterprises may gain little, finding instead that key resources are diverted to the support of incoming capital, hampering their own development (see Dicken, 1998).

Inward investors may "cherry-pick" demographically, establishing greenfield developments remote from existing competing companies and with a younger workforce entailing less expense in terms of health and retirement provision. Such tactics allow investors both the inducements offered by local governments and a workforce whose age structure represents a significant cost advantage over established indigenous

companies. The resulting regional "beauty contests" may result in supporting technologies, in particular the information and telecommunications infrastructure, optimised for these externally-driven actors, just as with the older technologies of more direct forms of colonial relationship described by Headrick (1981).

The differences and tensions between centre and periphery and between large and small scale economic activity become central to an understanding of the impact of globalisation and its supporting technologies. While Ohmae's "zebra strategies" combine the most developed components of adjacent national economies in order to create regional synergies, the resulting patterns of development are dependent upon a global infrastructure driven by the priorities of the dominant developed economies. This can only entrench inequitable development within national economies.

Implicit and explicit in Ohmae's zebra strategy is the view that national or even international regional government no longer has a significant role in development. While this view is increasingly challenged, there are differences of opinion over which level of government: regional, national or trans-national, is best equipped to deal with particular negotiations over a location's relationship to the wider economy.

During the nineteen-nineties the roller-coaster of events in the East Asian economies undermined confidence in their status as "miracle economies". Paul Krugman warned against the uncritical acceptance of the significance and sustainability of high growth rates over relatively short periods from very low base levels (Krugman, 1996). Unfortunately the immediate impact in the West was the out of hand rejection of the development strategies which had delivered substantive growth. This was coupled with a lack of awareness of the very different forms of crisis across the affected economies. As the range of responses from the governments and firms involved began to yield differential results, the diversity of former and current approaches within the region became more apparent to outsiders.

The crisis was in part a consequence of the success of the strategies which brought the growing economies to the point at which a paradigm shift from catch-up to sustained production of new technologies was required. At least part of the crisis in East Asia reflected the difference between the problems of technological leadership and those of catching-up with leading economies. Participation in the development of the intellectual resources necessary for this next stage requires more direct integration into the emerging world system and a greater institutional alignment within and between regions. The implications of this point for the technical design

process itself will be looked at in detail in Part II. The policy implications of this shift will be dealt with here.

The shift from catch-up strategies to leadership requires different socio-technical paradigms capable of sustaining development in the conditions of lower absolute growth encountered in relatively mature markets. Mature economies seeking to remain at the cutting edge of technology in a maturing global market are themselves shifting focus towards the end of the production chain where product differentiation and customer support can maintain demand for goods and services seems essential. This end of the chain requires closer adjustment to cultural variation among the users and customers and as a consequence of the search for added value the distinction between products and services becomes less obvious. James and Howells (2001) examination of the research and development facilities of Asian companies within the United Kingdom suggests that knowledge for every stage of the production process is being sought.

The Cold War concept of "Third World" identified the bulk of humanity through its exclusion from either superpower camp. The end of the Cold War has meant reduced attention from the former blocs. In some respects this has been beneficial, as major power confrontations are less frequently played out at the expense of third party proxies. However, there has also been a reduction in the flow of resources and technology, albeit often related to militarisation and its requirements. In the absence of this attention, the legacy of colonial infrastructures whose orientation may owe little to regional needs or potential synergies has become a central issue for development policies.

Realignments in a Emerging Global System

Throughout the emerging global system specific markets and specific technologies are at different points in the cycle of growth, maturity and decline. Rapid growth at favoured locations has created regional imbalances within regions and nation states. The notion of the dominant triad of developed regions within the world economy: North America, Europe and North East Asia, has become widely accepted in debates on the nature of globalisation (e.g. Mol, 2000; Ohmae; 1990; Rugman, 2001). Localities within each region of the 'triad' are restructuring rapidly in an attempt to obtain or ensure a continued prosperous place within the global system. The great majority of world trade is within and between these regions. Beyond it new forms of exclusion are arising along with new

forms of "periphery", no longer necessarily physically or geographically separated from the core regions.

Europe, North America and East Asia all contain the most advanced levels of economic development alongside developing economies. Each region faces the challenge of supporting balanced growth in peripheral areas where available infrastructure and skills cannot support full integration into the global economy. However, it is in the rapidly industrialising nations that the greatest disparities exist. In China the differences are even more striking. Using 1991 statistics, Ohmae (1995) shows that China's national average per capita GDP of US$317 masks regional variations in GDP ranging from US$164 and 197 in Guizhou and Guangxi to US$1,218 and 1,527 in Beijing and Shanghai. While continuing rapid economic development has raised all of these measures since 1991, the differentials remain, and are now openly acknowledged by the Chinese government (State Council of the P.R.C., 2001).

China, as East Asia's largest economy has the advantage of size and continuing scope for the established high growth paradigm. The attractiveness of its domestic market to foreign companies places both national and regional governments in a strong bargaining position. For example, in the automotive sector there are a number of substantial joint ventures. Rivals such as Ford and Nissan are happy to co-operate in order to access this market. However, by the late nineteen-nineties only the Shanghai Volkswagen Automotive Company's operation was judged profitable (Ishibashi; 1998) and this on the basis of substantial government and public sector and taxi fleet sales of their Santana model. This suggests that longer term market potential was the main motivation behind investment.

China's size also increases the problems of regional differentials in development. Ohmae celebrates such variation as evidence of the need to pursue his "zebra strategies" which play to the relative strength of the most developed components of national economies in order to create regional synergies. However, while linkages between the advanced areas of developing economies are creating new regions irrespective of national boundaries, few national governments are prepared to relinquish responsibility for the development of the state as a whole. The emergence of co-operative economic mechanisms in the Asian region, such as APEC and ASEAN suggest that there are means of achieving development which are acceptable to national governments. While the assertion that national or even international regional government no longer has a significant role in development is now increasingly challenged, differential development seems likely to be entrenched through dependence upon a global

infrastructure driven by the priorities of the dominant developed economies.

There is a danger of the development of two-tier technologies, addressing the less developed local markets and more demanding overseas markets separately, and adding little to indigenous capacity to enter the global market. The GM-Shanghai mid-size luxury Buicks designed and produced for the local market indicate that at least in the automotive sector, this is less of a concern in China. However, the sustainability of local demand will depend on continuing infrastructure development, both in support of manufacture, and of the use of the resulting automobiles, bringing in its train all of the issues confronting resource sustainability in the more developed economies.

Chains versus Networks

Picking up an earlier point, the organisations and alliances which comprise the global production system have to deliver continuous innovation at the cutting edge while ensuring effective diffusion of more mature technologies. For prospective participants, the infrastructure and skills necessary for full integration into the global economy may be lacking. The shift from catch-up development strategies to technological leadership of a globalising system of production requires socio-technical paradigms. Sustaining development in the conditions of lower absolute growth encountered in relatively mature markets is a very different proposition. The organisational forms of the late twentieth century world economy and corresponding emergent require adjustment if they are to deliver a developmental infrastructure. Historical and cultural particularities ensure both diversity and friction throughout the emerging global system Nevertheless, this heterogeneous system is too often presented as a seamless technological artefact.

This chapter argues that the idea of global production chains consisting of a geographical hierarchy linking resources, manufacturers and consumers is being replaced by the idea of global production networks in which research and development, routine manufacturing, final assembly and after-market support may all be present in the same location. The re-distribution of these activities during the product life cycle further undermines the traditional concepts of centre and periphery. Krugman (1996) points out that internal trade still dominates many major industrial countries, but linkages among members of the Triad account for the majority of global trade and have established a pattern which disadvantages

substantial areas and populations by excluding them from the global cycle of technical innovation and improvement.

The emerging global system is not a uniform network, it presents different challenges for the new century for each member of the dominant economic "triad" of Europe, North America and East Asia identified by Ohmae. Both proponents of globalisation such as Ohmae and more critical reviewers such as Dicken (1998) recognise that differences within individual national states may be at least as significant that those between them. As noted above, these may be most marked within the developing economies but the logic of the current wave of technology driven globalisation has impacted on significant sectors of the developed economies themselves. Japan and Britain are finding that only specific geographical areas or economic sectors may benefit fully from integration into the global economy. As with other forms of technology transfer premised on foreign direct investment, smaller local organisations and enterprises may gain little, finding instead that key resources are diverted to the support of incoming capital, hampering their own development. Key supporting technologies, in particular the information and telecommunications infrastructure, may be optimised for these externally-driven activities.

In addition, the challenges of technological leadership differ from those of catch-up growth. Economies such as South Korea which have been highly successful during the catch-up phase of development show that different socio-technical paradigms are needed to sustain growth in the conditions of lower absolute growth encountered in relatively mature markets. The greater emphasis on basic science and emerging technologies now evident in both Japan and South Korea shows the response that is being made[6].

European and North American companies have sought to emulate aspects of Asian strategies for some time and comparative advantage has been eroded as Asian methods, building on the Western industrial model have been re-exported to the original industrial core of Europe and North America. Japan's earlier lead means that the debate over new economic strategies has intensified further since the collapse of the bubble economy which was sustained by inflated share and property prices. However, consensus has not been achieved over exactly what changes should be made to the institutional structures which supported post war development.

Networks, Globalisation and Sovereignty

The idea of a global marketplace reflects economic developments which came to fruition in the second half of the twentieth century and are set to continue into the twenty-first. The new forms of internationalised business organisation which are now emerging represent the culmination of processes of downsizing, separation of core and peripheral activities through concentration on critical success factors, and the medium to long term effect of technical changes which have been visible for some time. The recent maturation of a number of capabilities within information and communication technology has allowed these processes to reach fruition. Computer-based information systems are now capable of facilitating or even substituting for organisational structures and standards. This phenomenon has been evaluated from a variety of social and organisation theory perspectives. For example, computer-aided design systems may substitute for organisationally enforced standards and alter the economies of scale in favour of smaller, flatter organisations. Standards for software and electronic date interchange (EDI) are increasingly presenting organisations with externally derived standards and procedures. The standards are increasingly the result of market-based de-facto processes and not of governmentally supported formally constituted committees.

The emergent concept of the "networked organisation" has focused attention on the development and maintenance of organisational relationships through computer-mediated communication. The prospect of organisations primarily dependent upon information systems for both structure and social cohesion also implies a new range of locational choices for business. More recently EDI and networking between formally separate organisations has produced a counter-trend to down-sizing and outsourcing by permitting coalescence into federated forms of organisation. Diverse human and material resources can be managed through the electronic adjacency delivered though ICTs. The outcome of these processes has been a marked shift in employment patterns with new opportunities and access reflecting new locational opportunities.

Telecommuting by some members of an organisation has become the corollary to the outsourcing of other activities to separate undertakings. More flexible forms of work contract are leading to the incorporation of households into formal business organisations in a way which recalls the pre-industrial household, as much as any post-industrial scenario. Home-based work offers an alternative to the enforced leisure of unemployment, however, in developed countries, the association between casualisation and home-based work raises concern for the quality of that employment. Gains such as improved employment access for women with dependent children,

or workers with disabilities, must be set against corresponding costs of isolation and fragmentation within this "virtual" workforce, and the potential loss of the social dimension of working life. Technologically optimistic accounts subsume these dimensions into generalised “resistance to change”. The reality of current achievements is far from the seamless visions of integrated technologies critiqued by Zimmerman (1986), but is likely to be experienced as incremental, fragmented adjustment and change. The remaining chapters of this section examine the origins of the technocratic view of the new spatial and organisational relationships, and the implications for the meaningful participation by regions, communities and households in the formation of global networks.

Notes

1 For Ohmae the take-off point is a per capita GDP of US$10,000
2 See Chapter 6 for a discussion of the model presented by Jones (1980) of a basic design cycle from divergent to convergent phases.
3 http://www.wto.org
4 http://www.worldbank.org
5 http://www.ilo.org
6 See for example the Korean Ministry of Science and Technology’s plan for science and technology development to 2025, MOST (n.d.), http://www.most.go.kr