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THE EMERGING INFRASTRUCTURAL ARENA IN PACIFIC ASIA SINCE THE EARLY 1970S

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We cannot understand the evolution of the modern economy without a proper separation of timescales [and geographical scales]. Infrastructure develops very slowly and constitutes the arena (or stage) on which economic market and political games are played. Thus, at each instance of time, the available infrastructure determines the economic and political equilibrium that can be established (Andersson, 1990: 57).

1. INTRODUCTION

Since the early 1970s, competition for technology and markets has generated a new wave of business strategy termed globalisation. This process has been accelerated by 'world view' firms seeking fresh markets to bolster their competitive advantage. As a result, a business world has emerged which is dominated by three large regional coalitions - North America, now stretching south of the Rio Grande to incorporate Mexico; a significantly-altered Europe; and Pacific Asia. The third region is a diverse area including Japan, the country with the largest capital surplus, and the successful Newly Industrialising Economies (NIES) of Hong Kong, Singapore, South Korea and Taiwan. Also, involved are the proto-NIES of Indonesia, Malaysia, the Philippines and Thailand, and Australia and New Zealand increasingly oriented towards the Pacific. Conscious of the availability of multimodal services and quality of transport and communications infrastructure internationally-competitive corporations are positioning themselves in these supra-regions in pursuit of global, strategic advantages. Increasingly, transnational corporations are willing to commit large investments to secure prime positions in each of these pivotal markets.

Before expanding on these changes it is useful to look at how infrastructural arenas have developed since the 1780s. Once their transient nature has been established contemporary developments can be discussed. Then it is possible to assess how new transport and communication modes are being established and existing modes are adapting to the changed situation.

Pacific Asia has the potential to lead economic and cultural development in the late twentieth and early twenty-first centuries. Planners face the task of effecting transport and communications systems within the region and between the region and its American and European counterparts. An understanding of the processes of change will better equip them to choose an appropriate system.

2. CHANGING INFRASTRUCTURAL ARENAS

Since the early 1970s a new land use/transport-communications system has emerged. As is evident from the work of Andersson (1990), it is but the latest in a series of infrastructural arenas that had their origins in medieval times. The then existing infrastructure restricted economic activity to feudal agriculture and limited-trading connections. A world economy had to await the development of shipping technology, harbour infrastructure and a banking system in the sixteenth century. It led to the creation of the East India Companies which tied Europe, America and Asia into a worldwide trading system.

Since then four time-scales have been identified in the evolution of the modern economy (**Table 1**). Each one represents the introduction of a new infrastructural arena to accommodate a different economic market and set of political games (Andersson, 1990; Gibson and Horvath, 1983). Invariably, the superimposition of new activities,

Table 1 Key Features in the Development of the World Economy and the Pacific Economic Zone Since 1970.

Time scale	Infrastructure networks Transport	Communications	Production	Urban form
Pre-capitalist/ transition 1780-1850	Man, animal, sail, river, canal	Mail	Individual proprietorship engaged in worker and outworker system (i.e., primitive accumulation)	Port city states
Industrial (competitive) production, 1860-1910	Steamship, Tramway, Elevator	Telegraph	Small-to-medium local firms and localised agglomeration of population (e.g., in villages)	Major port-cities
Corporate (monopoly) production, 1920-1970	Motor vehicle, Aircraft	Telephone Radio	Large-scale regional/ national business organisations	Metropolitan ports
Global production 1980-	Jumbo aircraft, Container ships, Bulk carriers	Computerised telecommunications	Large global network corporations controlling smaller production units exploiting local resources	Development Corridors

Source: Various

technologies and organisations on the existing land use/transport-communications system does not obliterate the previous arena before another major technological change is introduced. At any time, therefore, the arena is a mutation of past land uses, modes and transport organisations.

(1) A retrospective view

After 1780, the United Kingdom had an ocean-going merchant marine, canals and an embryonic mail system. This network supported a new mode of production based on individual proprietorships using both worker and outworker. The primitive accumulation of capital derived from this activity provided the basis for a new economic system - industrial production - a gradual process in the United Kingdom but one which occurred with revolutionary speed in Japan after the Meiji Restoration (1868).

Between 1860 and 1910, this new production system was accommodated by the creation of a new infrastructural arena. Typified by North America and Continental Europe its genesis was marked by the development of steamships, railways, elevators and the telegraph. By 1870, the railway accounted for 85 per cent of infrastructure in the United States with road and canal contributing less than 10 per cent. Within a few decades similar figures were recorded in both Europe and Japan (railways being a principal activity through which Meiji businessmen accumulated capital). The new modes facilitated the emergence of small-to-medium firms within one branch of an industry, such as iron and steel and textiles, and localised agriculture concentrated on villages. They relied upon a homogeneous workforce and a large reserve of surplus labour that had less than three years at school. Structurally-complex information (i.e., knowledge) was sparse and concentrated on a narrow range of people and places. Most activity was centred on the port city forging a link between ocean steamships and railways. The proceeds from this activity provided the capital for a new economic system - corporate production - in which economic power was concentrated in the hands of a few business houses (e.g., the pre-war *zaibatsu* in Japan).

Between 1920 and 1970, the emergence of this new production system was facilitated through the development of the motor vehicle and aircraft, and bolstered by the telephone and radio. Progressively, the road network grew at the expense of rail transport. By 1960, roads accounted for 85 per cent of total network length in the United States of America with the railways responsible for less than 10 per cent. The new road and air networks permitted large-scale regional and national organisations to emerge. These have produced homogeneous commodities across a range of industries (oil, motor car, appliances and petrochemicals) with little to distinguish their quality other than their country of origin (e.g., Made in Japan). The large-scale organisations have been aided by a segmented labour force, a dependent small-scale subcontracting sector and state assistance. Limitations on securing information led to them having hierarchical decision-making structures. Their headquarters have been based in metropolitan ports located at tangential points between intra-continental and inter-continental transport systems. Profits from corporate production have led to the emergence of a new infrastructural arena with a different structure and capacity.

(2) The emerging arena

Since 1970, a denser, multilayered communications and transport infrastructure has been progressively introduced accompanying the changeover to an information society. Computerised telecommunication is becoming its dominant network. The acquisition, processing and exchange of information is characterised by thin links and synergistic behaviour. Japan has become a leader in mapping out the contours of the emerging society.

Increasingly, the associated transport infrastructure is dependent upon global air connections at the expense of road transport. By 2040, a new set of airports will be in existence based on a set of superhubs capable of handling supersonic and hypersonic aircraft (**Fig.1**). Feeder links will be provided by: (a) super trains and high-speed, ground transport; and (b) tilt-wing or tilt-rotor aircraft which are able to take-off vertically (Hoyt, 1990). In 2040, air transport in the United States will contribute 65 per cent of the total transport network compared with less than 35 per cent for

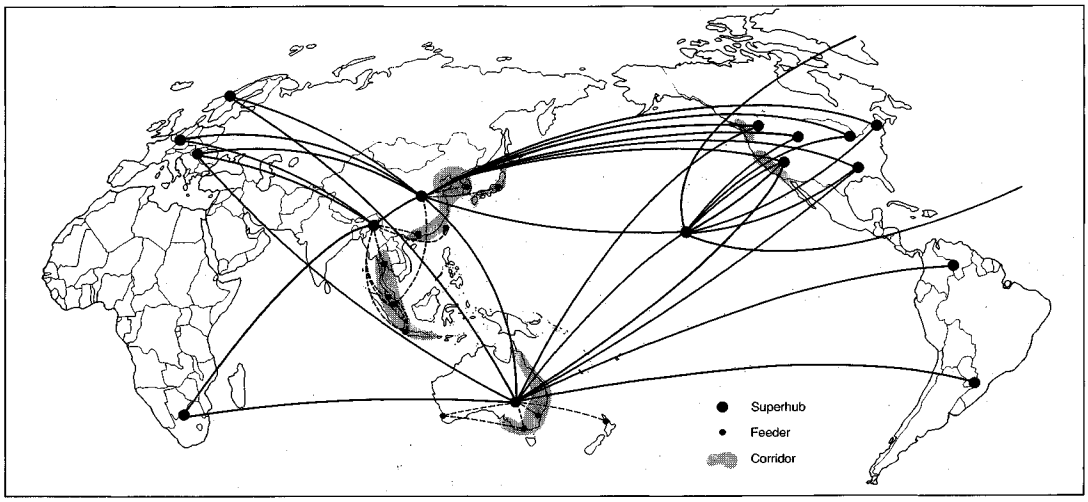

Fig.1 An abstract view of a future superhub air network (Based on Stoner, 1990:13; Hoyt, 1990).

road transport and a negligible contribution by an upgraded rail system. Through facilitating point-to-point contact between dispersed locations, firms engaged in information processing, telecommunications and air transport will have intensified the hub and spoke character of the world economy. Structurally-complex information will be spread more quickly.

The new infrastructure is permitting large global corporations to capture economies of scale by creating networks, marketing and product strategies in response to their R&D activities. They are better able to control smaller production and distribution units, use local resources (including universities) and exploit niche markets. This development reflects the growth of an international financial market and the new international division of labour. A key element is that the labour force of advanced capitalist countries has had more than twelve years of schooling. With this greater mental capacity the hierarchical structure of corporations can be reduced. There are now more locations with good potential. Profits from these activities are being concentrated in a global network of Development Corridors that provide a new innovative milieu for R&D and scientific collaboration.

Andersson (1990) has identified a Development Corridor in Europe stretching from Southeast England to the north of Italy. Also, he presumed that they are developing in the United States and Japan as part of a global network. Already, Rimmer (1989) has recognised four Development Corridors within Pacific Asia (**Fig.2**).

1. *Japan's Pacific Belt* stretching from Kanto to Kyushu.
2. The *Eastern Australian Corridor* running between Cairns and Adelaide.

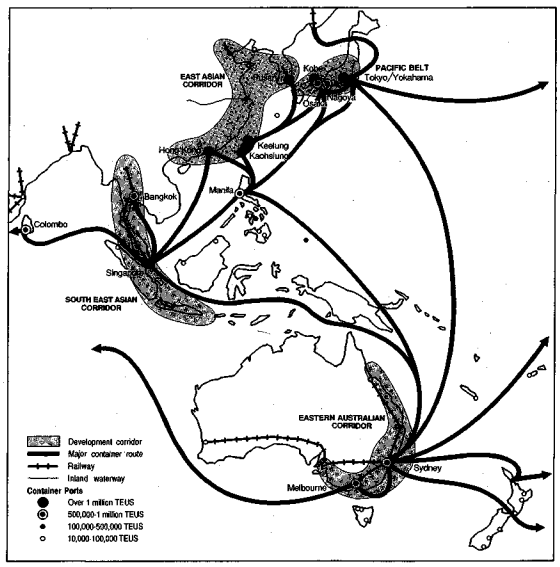

Fig.2 Location map of Pacific Asia showing Development Corridors, container ports and major container routes (*Source*: Rimmer, 1990a).

3. The *Southeast Asian Corridor* extending from Chiang Mai to Bali.
4. The *East Asian Corridor* ranging from Seoul via coastal China to Hong Kong (with possible extension to Nakhodka in the north and Hanoi in the south).

Outside these designated areas there are instances of minicorridors where resources are being invested in transport and communications (e.g., Metro Manila). Yet most new infrastructure is being concentrated in the Development Corridors. Within this innovative milieu, major nodes are benefiting from being financial centres, headquarters of network corporations and communications

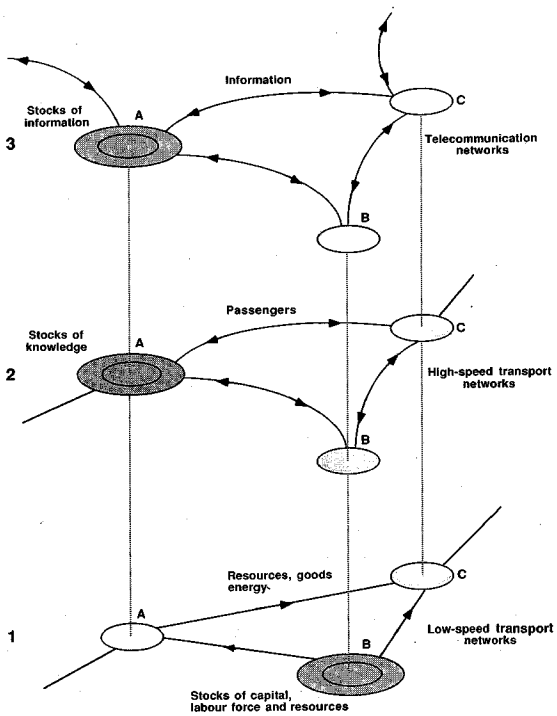

Fig.3 The multilayered transport and communications links (adapted from Kobayashi and Okada, 1989:244).

hubs. Before discussing the character of each Development Corridor there is need to standardise our approach by adopting a theoretical framework.

(3) A theoretical framework

The emerging infrastructural arena focused on Development Corridors can be analysed by extrapolating Kobayashi and Okada's (1989) theoretical work from the firm to the economy as a whole. All flows within an economy can be represented as occurring within a spatial network comprising nodes (i.e., towns, cities or metropolitan regions) and links corresponding to different transport and communications modes (**Fig.3**). Three different networks can be recognised:

1. *Slow-speed transport networks* designed for the movement of resources and goods from manufacturing nodes to consumers;
2. *High-speed transport network* geared to the movement of individuals so that synergistic face-to-face business contact involving negotiation can be facilitated and new knowledge generated by universities and research centres can be transmitted; and
3. *Telecommunications networks* intended for the transfer of uncomplicated and routinised information.

Technological advances have minimised the friction of distance on flows of goods and messages but it remains an important constraint on the movement of people.

Transport contacts can be replaced by telecommunications for standardised information but there is no alternative to face-to-face contact where information is complex. Commodity production can be decentralised because of a relative reduction in transport costs, the substitution of labour by robots and computerised production control. Where R&D facilities dominate and face-to-face contact is essential for the transfer of information, activities are centralised in metropolitan areas. These precepts enunciated by Kobayashi and Okada (1989) underlie the analysis of slow-speed transport networks, high-speed transport networks and telecommunications networks within Development Corridors in Pacific Asia. Preceding this analysis for each Corridor there is a review of the extent to which this new phenomenon has been recognised by urban and regional planners. This strategy brings out essential differences between Japan's well-developed Pacific Belt and the other Corridors which, as yet, are at an embryonic stage.

3. JAPAN'S PACIFIC BELT

Japan's Pacific Belt has been subjected to a series of urban and regional plans since the Great Pacific War. During the 1950s, Japan's regional development was based upon government-sponsored, Tennessee Valley-style, multipurpose river basin developments to boost food production, increase hydro-electricity and extend corporate markets. In the 1960s, industrial port complexes (oil, petrochemical, metallurgical, chemical and automobile industries) were catapulted into prominence as growth poles capable of communicating spread effects through the high-speed national transport network to engender high growth, investment, and exports. Throughout the 1970s, Japanese planners responded to the oil crisis and manifest, environmental problems by emphasising the need to complete fast-rail networks so that economic activities could be co-ordinated in a cellular pattern of over 200 residential areas (*teijuken*). In the 1980s, Japanese planners appreciated Tokyo's world city-status but were forced to revise their recommendations and plan for multipolar land use throughout the Japanese archipelago by concentrating on developing technopolises and resorts through a government partnership with the private sector. Much reliance in effecting these changes is being placed on developing slow-speed and high-speed transport networks and telecommunications. In the process the Pacific Belt will be transformed into the Japan Corridor running from

central Hokkaido to Kagoshima.

Slow-speed transport networks within the Pacific Belt are focused on six mainline foreign trade hubs - Tokyo Bay, Shimizu, Ise Bay, Osaka Bay, Hiroshima and Kita Kyushu. The existing slow-speed network sets the logistic standard for Pacific Asia with its just-in-time distribution systems (PHB, 1987). Inland transport will continue to be dominated by short-haul trucking, operating on well-developed arterial expressways (Japan Railways do not carry ISO containers). Another seven mainline, multifunctional ports (distribution, industry and residence) are planned outside the Pacific Belt in the 1990s to cater for decentralised economic activity - Central Hokkaido, Sendai, North Kanto, Niigata, Wakasa, Hiroshima, Hakata and Naha. These will be complemented by domestic distribution centre ports throughout the Japanese archipelago.

As ports within the Pacific Belt are restructured, areas occupied by obsolete activities will be used for city waterfront redevelopment centres to house leading edges of Japan's information society. They presage a switch from manufacturing to finance and ideas processing, and the subordination of transport to computerised telecommunications. Simultaneously, transnational corporations, caught in the economic downswing, have revitalised their physical distribution management systems to take full advantage of international sea container movements. With the aid of Japanese freight forwarders and multimodal transport operators using privatised terminals, these corporations have been able to service their investments in North America, Europe, and the NIES. In September 1985, investments in the NIES became a flood after the Plaza Accord revalued the yen. When the NIES experienced labour shortages and lost their preferential tariffs in the United States, Japanese funds spilled over into ASEAN (Yoshida, 1987).

Servicing these off-shore investments has put a premium on *high-speed transport networks* to cater for an upsurge in intercity business travel and air freight. Within the Pacific Belt attempts are being made to upgrade the high-speed Shinkansen and domestic air services by improving access to terminals to extend the area for daily return trips. These changes are being accelerated through the restructuring and privatisation of their operating organisations and expanding the number of operators on both domestic and international routes.The key international problem, however, is congestion at the New Tokyo International Airport at Narita. Although designed for 7.5 million passengers per year the volume of passengers has almost tripled from 6.4 million in 1978 to 18 million in 1988 (Damrot, 1990). As capacity is limited by the single runway, night curfews and the restrictive practices of air controllers, existing services have had to be rescheduled and the introduction of new ones postponed (Hansen and Kanafani, 1990).

The short-term resolution of the problem is: (a) to expand the existing international terminals at Osaka, Haneda (Tokyo International) and Narita by additional runways and new passenger terminals (though land acquisition at Narita has been slowed by political opposition and environmental concerns); and (b) to build the New Kansai International Airport. The latter $US7 billion, one-runway project is being constructed on reclaimed land in Osaka Bay and will be connected to the mainland by a two-lane bridge. It will incorporate a tri-level terminal building to integrate international and domestic flights and will operate twenty-four hours per day to accommodate additional passenger, charter and cargo flights. Its ultimate success will depend on traffic from Narita being diverted. This move means passing on Narita's higher terminal costs to passengers and removing some of the fifth freedom rights enjoyed by United States airlines which permits them access to the Japanese market en route to other Asian destinations (Hansen and Kanafani, 1990). Because Tokyo is at the apex of international chains of production services, particularly finance, there will be some reluctance to rundown Narita as the key to a creative cosmopolitan city is R&D and access to an international airport and telecommunications.

Japan will capitalise on its position in *telecommunications* by promoting an information-oriented transport system to match its electronics-oriented society. In particular, the Government has encouraged the adoption of electronic data interchange - the direct computer-to-computer exchange of standard business forms - with the central system acting as an electronic postal clearing house. Its banks will now accept electronic bills of lading and other documentation. Apart from in-house computer systems operated by carriers to satisfy the needs of Japanese exporters the main system is SHIPNETS (Shipping Cargo Information Network System) developed to simplify and rationalise foreign trade procedures (**Fig.4**). It automates bills of lading preparation for port users and intends to put the signing and transfer of documents on line. Through an on-line network provided by Nippon Telegraph and Telephone Corporation (NTT), shipping lines and agents, sworn measurers, tally clerks and freight forwarders are able to send and receive shipping cargo information with all major ports in Japan - Tokyo, Yokohama, Nagoya, Osaka and Kobe - using DRESS, a domestically-

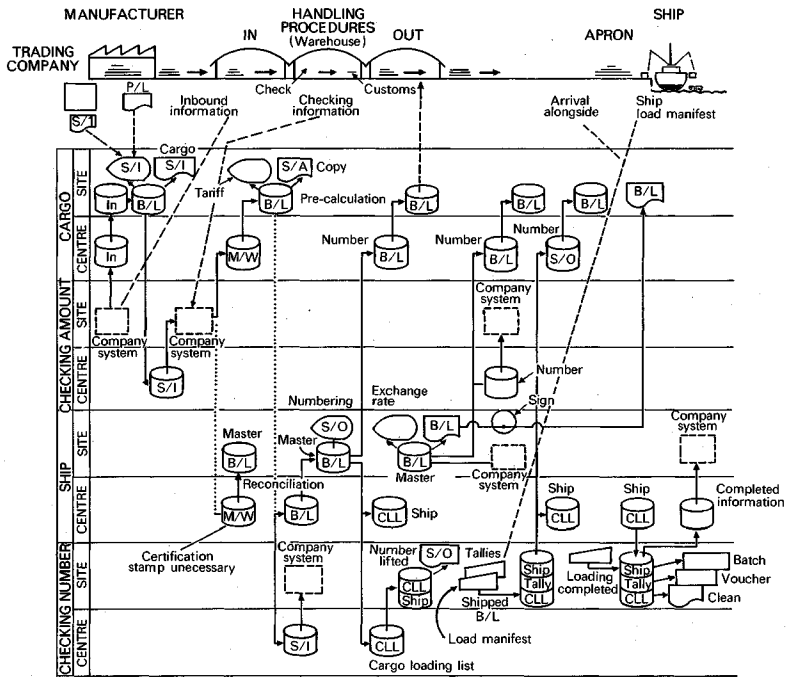

Fig.4 SHIPNETS: the port information exchange system (*Source*: Kokudocho keikaku, 1985:166).

developed protocol. Originally, it was thought that the diffusion of new information transmission media would bring about the decentralisation of private enterprises.[1] Instead, it has concentrated information and managerial functions in Tokyo and widened the gap between Osaka and the other metropolises (Terasaka *et al.*, 1988).

These developments are compounding the problem of determining an appropriate *urban form* for the Pacific Belt (or the emerging Japan Corridor). Although the Pacific Belt has long been recognised as the key area the emphasis has been on analysing Tokyo, Osaka and Nagoya as separate entities in discussing flows of industrial products and passenger movements. In order to balance this preoccupation with individual nodes it is necessary to understand the synergies occurring between them. This knowledge could provide the basis for determining infrastructure needs in the Pacific Belt. This proposition is exemplified by two schemes for rapid passenger transportation in Japan using linear motor technology: the Chuo Linear Express bridging the distance between Tokyo and Osaka in one hour; and the Quadruplet Capital City Project linking Tokyo's Chiyoda district to stations in high-tech cities of Kofu, Nagoya and Osaka which could host decentralised capital-city functions (Amano *et al.*, 1989). Also, as Japan has a capital surplus for investment overseas, attention has to be directed to engineering opportunities in other parts of Pacific Asia, notably in the Eastern Australian, Southeast Asian and East Asian Development Corridors. These Corridors are examined in turn.

4. EASTERN AUSTRALIAN CORRIDOR

Government has no comprehensive land use-transport and communications plan for the Eastern Australian Corridor. Yet the crucial issues - other than the macroeconomic problem of lifting savings rates - devolve on determining investment needs in

[1] SHIPNETS has proved more troublesome to implement than anticipated. Since its inauguration, only 86 of the 162 offices operated by 114 freight forwarders were on-line and only 50 were in commercial operations. Only two foreign corporations - John Swire & Sons (Japan) and C.K. Maritime - were hooked into the system. This failure has been attributed to the strong yen and continuing shipping depression. However, the IBM mainframes of major shippers - American President Line and Maersk - are located outside Japan and difficult to connect to the non-IBM-based SHIPNETS system. A data exchange device allows an interface between IBM users and SHIPNETS but initial participation was confined to Japanese IBM users. Also, local users have control over the 'black box' and host systems in Japan. If these systems are Fujitsu or NEC it is easy to connect DRESS to talk their language. Foreign firms, however, would have to invest in an interface between SHIPNETS and IBM. Although SHIPNETS is well developed to serve the port community it is limited in scope. It does not extend to bankers, buyers or sellers and does not have, as yet, international links.

transport and communications. The real danger is that the lack of investment in these facilities will narrow the choices available, particularly when coupled with Australia's dismal trade performance and low rates of investment in human and physical capital. Without a plan, the Federal Government is having to react to a series of propositions - Sydney's New International Airport, the Very Fast Train and Multifunction Polis, a high tech and high touch city proposed by the Japanese Government. Each proposal is being considered as an isolated phenomenon without any appreciation of their interrelationship with slow and high-speed transport networks and telecommunications.

Changes in Australia's *slow-speed transport networks* will have to occur if the Eastern Australian Corridor is to keep pace with economic developments in Pacific Asia. Physical impediments will have to be overcome. Already, the emphasis in the national road program has been switched to providing connections between urban centres, major ports, airports and industrial zones. If the Government is to be successful in transferring freight from rail to road, consideration will have to be given to a dedicated Fast Freight Train (FFT) that could perform the journey between Melbourne and Sydney in nine hours. There is also renewed interest in the Australian Landbridge linking Western Australia to the Eastern Australian Corridor with permanently-coupled double-stack trains.

Many obstacles have to be overcome before a container can be despatched from Sydney to Perth - three non-integrated rail systems; four changes of locomotives ; six different size loading gauges ; ten different engineering standards; and twelve or more hours at sidings/junctions for crew changes, fuelling and inspection. Not surprisingly a single body, the National Rail Freight Corporation, has been recommended to operate a national freight system. Other than the instances specified, transport infrastructure has not been seen as a determining issue in slow-speed transport networks within Australia. For instance, the lack of physical port capacity is not perceived as a problem - the real issue is inefficient work practices, poor industrial relations and inadequate co-ordination between rail and port monopolies. Similarly, air freight is not an infrastructural issue because it is subordinate to high-speed passenger transport in Australia.

Australia's Federal Government has responded cautiously to proposals for massive investments in *high-speed passenger transport networks* within the Eastern Australian Corridor. This is due to instances of past over-provision of infrastructure

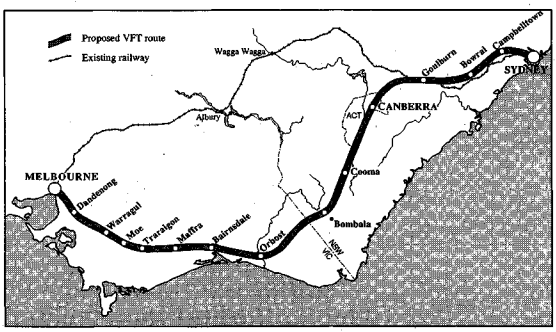

Fig.5 Location map of the Very Fast Train (VFT) showing the original route. This route has now been amended to follow the alignment of the existing railway.

facilities (e.g., Brisbane Airport and proliferation of new international gateways at Adelaide, Cairns and Townsville). Much reliance is being placed on the pricing policies of Government Business Enterprises (GBEs) to respond to market pressures so that better use is made of existing infrastructural resources at least cost and appropriate signals for further capital investment are provided (Commonwealth of Australia, 1986, 1988). This procedure has highlighted congestion problems at Sydney's Kingsford Smith Airport which the Federal Government hopes to relieve by the construction of a third runway despite the opposition of lobby groups. Also, a site has been chosen for Sydney's new international airport.

There is nothing visionary about this rational economic approach - it demands a case-by-case study to ensure that the right amount of infrastructure is provided at minimum cost. Where quantum changes are involved, such as the Very Fast Train which promises to reduce travel time between Melbourne and Sydney from thirteen hours to three hours, they have to be considered as separate issues (i.e., a new product)(**Fig.5**). The viability of the Very Fast Train, however, hinges on the acceptance of its tax proposals which seek to shift the burden of taxation away from the construction period to the operation stage, without reducing overall tax (VFT, 1990a,b; VFT, 1991). As accounting standards specify that interest costs incurred during the construction phase be treated as capital rather than expenses Treasury has not acceded to this request.

According to a survey by the Economic Planning Advisory Council (EPAC, 1988), the standard of domestic and international *telecommunications* in the Eastern Australian Corridor is adequate. The only exception is the failure to satisfy the needs of financial institutions requiring specific services (e.g., the integration of voice and data). Conse-

quently, much emphasis is also being placed on overcoming the legal and institutional barriers to trade by developing a community Electronic Data Interchange (EDI) system for paperless trading, named TRADEGATE. As the National Communications Working Party in Australia decided that EDI should be user-driven the lead has been taken by the Australian Customs Service, the combined Port Authorities and Qantas, the national airline, in establishing it. The promoters have been joined by: the Customs Agents Federation of Australia; Sea & Air Freight Forwarders Association; Australian Road Transport Federation; Australian National Maritime Association; Austrade; Australian Chamber of Shipping; and shipper groups. On completion of the international transport segment of the network 2000 Australian companies drawn from all relevant industry sectors will be subscribers/members of TRADEGATE Australia. Functions to be provided by the network are: message routing; store and forward; protocol conversion; gateway to other networks (e.g., airlines SITA system); encouragement of appropriate value added services; and the EDI facility itself. As well as automated processing of custom procedures a cargo tracking and status facility is seen as a key service. There is a pressing need, however, to determine the effect of EDI on regional developments.

Transport and communications developments in the Eastern Australian Corridor raise issues about its appropriate *urban form*. Should priority be given to constraining the development of low-density cities and suburbs to economise on the use of urban space? (As noted by Kenworthy and Newman, 1989 and Birrell, 1991 the concentration of immigration on Sydney and, to a lesser extent, Melbourne will continue to strain infrastructure.) Should limits be imposed on the growth of urban areas to free up investment for improving transport and communications? A range of outcomes available to the Eastern Australian Corridor should be examined because it offers greater potential for expanding economic synergy within and between polycentric settlements (Batten, 1990). This task highlights the need to comprehend the significance of the import and export of information reliant upon basic research and applied science (e.g., inventions, patents and publications) in the Eastern Australian Corridor. Also, these concerns are relevant to the Southeast Asian Corridor.

5. SOUTHEAST ASIAN CORRIDOR

There is no overall land use-transport and communications plan for the Southeast Asian Corridor. Indonesia, Malaysia, Singapore and Thailand have pursued separate national, urban and regional development policies. As one of the first tier Newly Industrialising Economies Singapore had a head start on the other countries. Although they developed their transport infrastructure during the 1970s it did little to diminish the heavy dependence on agriculture, river basin development and the export of primary products. In the 1980s, however, they mapped out their own import substitution and growth pole programs based on the diversification of activities from their capital city port-complexes - Bangkok (Thailand), Port Klang (Malaysia) and Tanjong Priok (Indonesia). Experiences with public investment in Johor Bahru and Kuantan (Malaysia) and Laem Chabang (Thailand) suggest that port-industrial development is difficult to implement when it is not integrated into an urban system and spatial strategies for regional development. In the 1990s, much will depend on coordinating slow-speed and high-speed transport networks and telecommunications within the Southeast Asian Corridor.

Traditionally, Singapore, the major entrepot port, has been the pivot of *slow-speed transport networks* in the Southeast Asian Corridor domin-

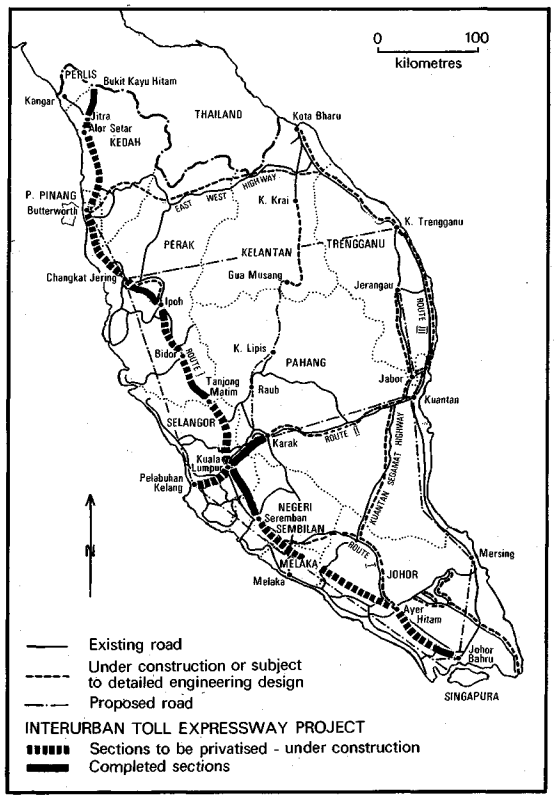

Fig.6 Malaysian road network: existing and proposed system.

Table 2 Actual and Estimated Container Movements for Asean Ports, 1988 and 2000.

Port	Actual 1988 thous TEUs	Estimated 1988 thous TEUs	Estimated 2000 thous TEUs
Singapore	3375	2140	4,092
Port Kelang	326	365	800
Penang	155	167	400
Bangkok	792	459	1,018
Manila	767	376	1,093
Tanjong Priok	336	462	1,666
Tanjong Perak (Surabaya)	n.a.	75	300

Source: CI, 1989; Osmers, 1985.

ated by feeder shipping services. As an alternative to feeder services with the hub port of Singapore, urban and regional planners in Indonesia, Malaysia and Thailand are endeavouring to develop Tanjong Priok, Port Kelang and Bangkok-Laem Chabang respectively. Their efforts are directed at: overcoming poor road and rail infrastructure as instanced by the development of the Malaysian highway system (**Fig.6**); introducting block trains of containers; establishing inland container depots; and streamlining documentary procedures (Akatsuka, 1989).

Bolstered by aid and soft loans, and the shift in industrial activity from East Asia, these improvements will involve Malayan Railways and the State Railway of Thailand in the further development of freightliners and inland container depots to attain forecasts of container movements in 2000 (**Table 2**). Of seminal interest will be the extent of private participation. In 1985, P&O Australia Ltd (a wholly-owned subsidiary of the Peninsular and Oriental Steam Navigation Company of the United Kingdom) and Kontena Nasional, its Malaysian partner, took over management of the terminal at Port Klang, Malaysia and sought to divert cargo handled previously by Singapore by using block trains. The company has taken a share in the operation of Bangkok's container freight station and tendered to operate Thailand's new port, Laem Chabang, in a bid to reduce Thailand's dependence on Singapore (Levy and Menendez, 1989). These challenges to Singapore's centrality in Southeast Asia have been met by an expansion in the number of its container complexes and the introduction of incentive tariffs (MICCOJ, 1988; Osmers, 1985; Robinson, 1985, 1989). Such developments have been favoured by the shift to larger vessels, high throughputs, fast turn-round and the decisions of major Trans-Pacific operators to extend their direct services and feeder coverage to the port.

Singapore's global cargo city ambitions have been favoured by its pivotal position in *high-speed transport networks*. It has enabled the development of sea-air connections in which, for instance, cargo is brought by sea to Singapore and moved by air to Europe. As yet, there are no plans for a high-speed train running between Chiang Mai and Singapore, though it would give some structure to land use within the Southeast Asian Development Corridor. Air transport is the main high-speed network within the Corridor with strong connections being forged between: (a) Kuala Lumpur and Singapore; and (b) Singapore and Bangkok. In international passenger transport Singapore has been challenged by Bangkok as the prime node in the Southeast Asian Corridor. Bangkok's position has been enhanced by virtue of its function as a refuelling base on the one-stop Australia flights. Singapore has responded by upgrading its airport and developing its Electronic Data Interchange (EDI) service.

In Singapore, the key *telecommunications* development has been the takeover of the Port of Singapore's Electronic Data Interchange service by the Government Computer Board. As TRADENET it is now a nationwide system for Singapore which integrates the import, export and transhipment documentation procedures for both air and sea cargoes. It links government agencies involved in the processing of documents and the port authorities with the private sector.This initiative is intended to give Singapore an advantage in the trading sector over its Southeast Asian rivals who have been investing heavily in 'hard' rather than 'soft' infrastructure.

Channelling funds into infrastructure within the Southeast Asian Corridor will dictate the nature of its *urban form* and connections to global markets. The full potential of this restructuring process will depend on dismantling barriers to allow market forces to work more effectively, and removing impediments to transport and communications efficiency which reduce the competitiveness of Southeast Asian products. It requires the abolition of customs checks, permission for trucks to travel throughout the Corridor and the free-flow of capital (i.e., on the repatriation of profits). Then the location of ports, inland terminals and distribution centres, airports, teleports and associated urban and regional development will have more to do with geography than political boundaries. For instance, once restrictions are removed on the national identity of truckers there will be more opportunity to find backhaul cargoes and to triangulate moves between ports and terminals to reduce empty kilometres travelled. Inevitably, this will benefit trucking and distribution companies operating on a Corridor basis and lead to their

consolidation into larger companies. It will facilitate load-centring as shipping companies will not be obliged to call at ports in each country. Also, it will attract deep-sea, shipping companies to reduce empty kilometres where international trade is unbalanced to minimise positioning costs. If these trends are realised in the Southeast Asian Corridor they are likely to be followed in the politically-fragmented East Asian Corridor.

6. EAST ASIAN CORRIDOR

The land use and transport-communications system in East Asia is the most difficult to comprehend. Not only does it encompass the Newly Industrialising Economies of Hong Kong, Korea and Taiwan but also China's Coastal Zone. Should foreign investment be secured for the technology to develop mineral and forestry resources, the boundaries of the East Asian Corridor could be extended to incorporate Vietnam in the south, and the Soviet Pacific container ports of Nakhodka and Vostochny in the north. Until then, developments in China hold the key. Hence, these are discussed separately from the three Newly Industrialising Economies.

An acid test of *slow speed transport networks* is their capacity to handle international standard containers at major ports and to move them to inland container depots by rail, road and water. As the basic infrastructure (e.g., container freight stations and inland container depots) and land-bridge services by rail were relatively undeveloped in East Asia, all major centres, with the exception of Pusan, depended upon complementary feeder ports and short-distance shipping services - a task well-suited to national carriers (MOSK, 1989). Congestion is the main problem experienced by ports in the Newly Industrialising Economies of Hong Kong, South Korea and Taiwan.

As exemplified by South Korea, container movements have been bedevilled by the design capacity of Pusan; the lack of handling facilities hampering the use of the Seoul-Pusan railway line; the absence of a container freight station within Seoul for packing and unpacking; the demand to augment the existing internal container depot network; and the pressure for an additional container port (KMI, 1988). In response, deregulation of government control over regional policy is anticipated together with increased private sector participation in the redevelopment of port areas and refashioning transport connections and terminals into a functional network system. Four-lane roads (and larger) will be built to link ports with local cities and industrial bases (with the possibility of an additional inland container depot in Korea at

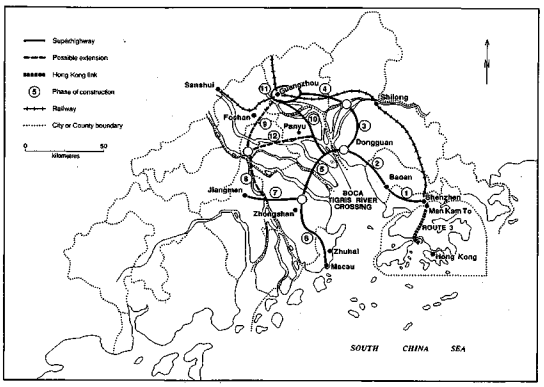

Fig.7 Guangzhou-Zhuhai-Shenzhen Superhighway and possible extensions (*Source*: Based on HHL, 1989).

Taejon). A new container terminal is under construction at Pusan; trade with Japan has been shifted to the neighbouring port of Masan; and a new container port is envisaged at Kwangyang Bay (Jon, 1988).

In contrast, China's difficulties stem from the absence of effective technology, co-ordination and management. Containerisation is largely confined to coastal provinces, particularly Zhejiang and Jiangsu near Shanghai and Guandong adjacent to Hong Kong (Koide, 1988). Its physical bottlenecks are aggravated by the poor performance of the state sector. SinoTrans, the state forwarder controlling inward container movements on behalf of the Ministry of Foreign Affairs, does not use equipment brought in by the China Ocean Shipping Corporation (COSCO), the state-shipping line controlled by the Ministry of Communications. Further, the Chinese Railways, directed by the Ministry of Railways, does not accept liability for containers belonging to the ocean carriers. Most multimodal transport, therefore, will have to be provided by joint ventures with foreign companies. Already, there is an inland container depot in Beijing connected to the port of Tianjin. Similar facilities at Nanjing, Changjiagang and Nantang are linked to Shanghai. At Harlim they are tied to the port of Dalian. Despite these developments China will have to rely on using feeder services to the mainline ports for its overseas container operations.

The question is whether the mainline ports will be in Japan, South Korea or Taiwan. South Korean ports could benefit from containerised feeder cargo from China at the expense of Japanese hubs as the shortest distance from Korea's west coast to the Shandong Peninsula is 190 kilometres. Already, Hong Kong continues to play a pivotal role in the Pearl River Delta (Rimmer, forthcoming).

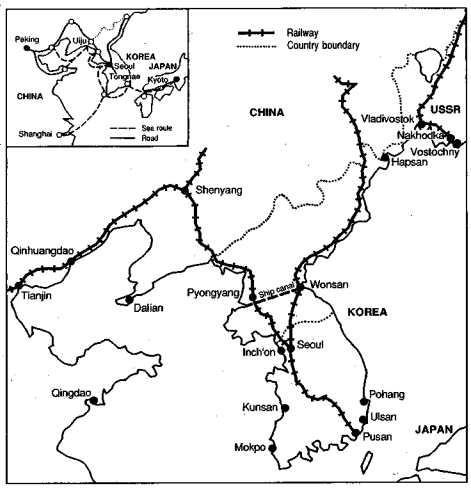

Fig.8 Location map of the Korean Peninsula (*Source*: Rimmer, 1990a).

Although it reverts to China in 1997 its position will be reinforced if the forecast thirteen container trains per day are handled by the Kowloon Canton Railway in 2006, and the plans for improved road connections in the Pearl River Delta are realised (**Fig.7**). If this is not the case, Taiwan's Port of Kaohsiung stands to benefit from any reorientation of traffic and possibly from trade with China stemming from the transfer of labour-intensive manufacturing there (Rimmer, 1991).

The likely continuation in double digit growth in air passengers has prompted the upgrading of East Asia's *high-speed transport network*. Most of these changes are focused on the three Newly Industrialising Economies to accommodate new passenger aircraft offering ultra-long-range, non-stop operations (e.g., Boeing 747-400, McDonnell Douglas MD1 and the Airbus A30). New hubs are being planned in both Hong Kong and Seoul. Together with the existing airport at Taipei they will have the capacity to accommodate the rapid growth in demand and the inevitable spillover of traffic from the New Tokyo International Airport at Narita. Also, China is upgrading its air facilities with new airports being constructed at Macao and Shenzhen to complement existing facilities at Beijing and Shanghai.

The development of computerised *telecommunications* (e.g., computers and satellites) in the East Asian Corridor is proceeding apace as major centres are linked into global, fibre-optic networks. These could see ports-cum-technology centres become pivotal points in economic space. The key requirement is the elimination of paper documentation, transfer and transmission, and its replacement by electronic data collection, analysis, communication and transaction. These changes are vital for freight forwarders, multimodal transport operators and the logistics management of corporations engaged in just-in-time deliveries to ever-widening markets.

The precise *urban form* in East Asia will be dictated by the availability of capital to overcome inadequate infrastructure. Much will depend on regulations permitting the free flow of capital to integrate productive activities into international logistics networks. Integration with the Hong Kong, South Korean and Taiwanese economies offers China and the Soviet Far East the prospect of blending capital, management and skills with low-cost labour in infrastructural developments. Also, Japanese interests are likely to be involved. For example, they have the money, inspiration and confidence to catapult Hapsan on the Tumen River, near the borders of China, Korea, and the Soviet Union, into the position of being a second Hong Kong - a supplier of high-value services and manufactured products for China and the Soviet Union (**Fig.8**). There is the prospect of renewed interest in a proposal for a tunnel under the Korea Strait connecting Shimonoseki and Pusan with a rail link through Pohang and Ulsan along Korea's east coast to Vladivostok. Although these propositions are speculative they do highlight that connections with other Corridors should be considered.

7. LINKING THE SUPRA-REGIONS

Any study of Pacific Asia's transport, communications and regional development at the beginning of the twenty-first century cannot be limited to connections within the Development Corridors. Consideration has to be given to transport and communications breakthroughs which underpin the form and strength of Pacific Asia's incorporation into the world economy. In discussing external pressures attention has to be concentrated on restructuring Pacific Asia's slow-speed and high-speed transport and communications connections as part of a policy of forging international links with their counterparts in the other two poles of the world economy - North America and Western Europe. It is convenient to discuss Inter-Corridor and North American connections in the same section.

(1) Inter-Corridor and North American Connections[2]

Interest in discussing *slow-speed transport networks* is centred on the emergence of regional hub ports. An examination of the pattern of container

[2] This section is based on Rimmer 1990b.

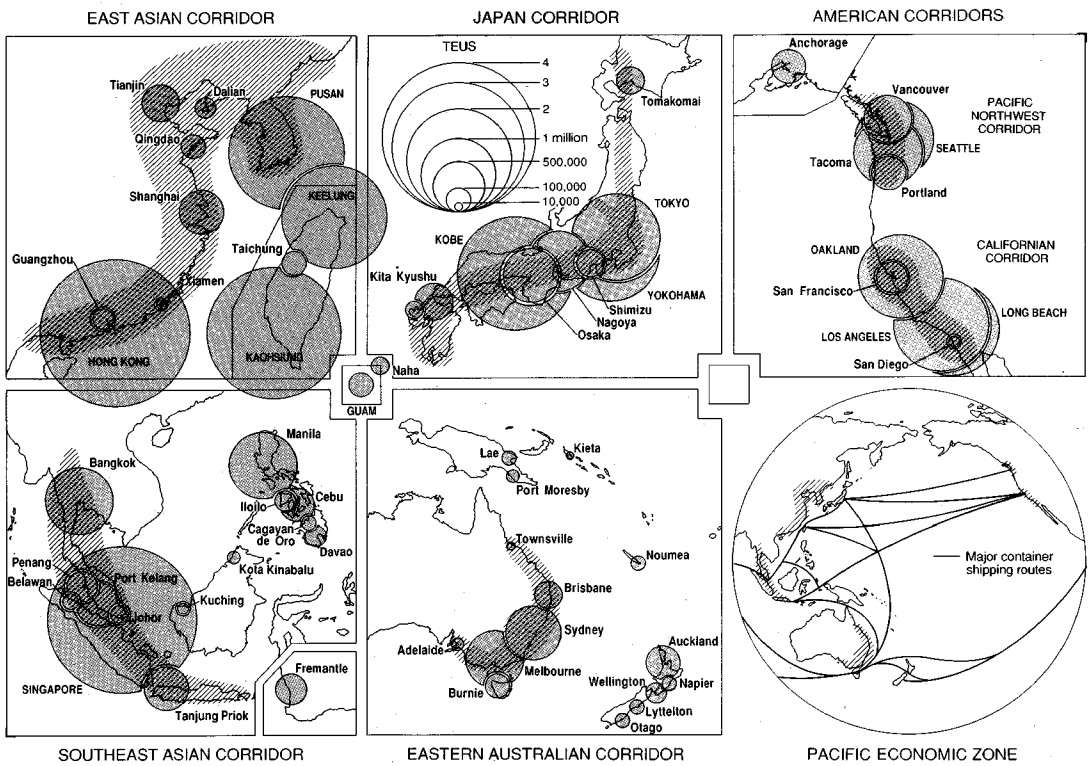

Fig.9 Container ports and major container shipping routes in the Pacific Economic Zone, 1988. Ports with more than 1 million TEUs are in capital letters (*Source*: Rimmer, 1990b).

Table 3 Movement of Full Containers between East and Southeast Asia and the United States, 1986 and 1987.

Country	Eastbound				Westbound			
	1986		1987		1986		1987	
	thous TEU	%	thous TEU	%	thous TEU	%	thous TEU	%
Japan	771	33.1	719	27.5	653	42.1	772	42.1
China	99	4.0	143	5.5	60	3.9	81	4.4
Hong Kong	222	9.0	246	9.4	133	8.5	156	8.5
Taiwan	827	33.6	887	33.8	288	18.5	342	18.7
Korea	311	12.6	368	14.0	229	14.8	266	14.5
East Asia	*1459*	*59.2*	*1643*	*62.7*	*710*	*45.7*	*845*	*46.1*
Indonesia	42	1.7	42	1.6	42	2.7	41	2.2
Malaysia	25	1.0	31	1.2	20	1.3	23	1.3
Philippines	46	1.9	50	1.9	50	3.3	68	3.7
Singapore	61	2.5	64	2.5	49	3.2	52	2.8
Thailand	60	2.4	72	2.7	29	1.8	34	1.8
Southeast Asia	*234*	*9.5*	*259*	*9.9*	*190*	*12.2*	*218*	*11.9*
Total	*2463*	*100.0*	*2621*	*100.0*	*1554*	*100.0*	*1835*	*100.0*

Note: Rounding errors occur in columns.

Source: Kaiji sangyo kenkyujo, 1989.

ports in the Pacific Economic Zone during 1989 highlights the concentration of cargo at a limited number of highly competitive major ports (**Fig.9**). Tokyo and Osaka Bays were the pivotal load centres in the Japan Corridor; Hong Kong, Kaohsiung, Keelung and Pusan were the dominant hubs in the East Asian Corridor and Singapore, the world's busiest container port, in the Southeast Asian Corridor; and no port in the Eastern Australian Corridor handled 1 million TEU per year. Load centring in the American Corridors was focused on the key terminals of Los Angeles, Long Beach, Oakland, Seattle, Tacoma and Vancouver, which offered landbridge services by double-stack trains and tractor and trailer combinations to other parts of North America.

As shown in the inset regular container services interconnect Corridors within the Pacific Economic Zone (**Table 3**). Japanese ports had benefited from being the closest to North America but with the shift of manufacturing activities to East and Southeast Asia much of the infrastructure development is likely to be concentrated in Hong Kong, Kaohsiung, Pusan and, above all, Singapore.

Singapore also figures prominently in air passenger flights illustrating *high-speed transport networks*. In August 1989, there were strong connections between the three Asian Corridors - Japan, East Asian and Southeast Asian - and increased links between them and the East Australian and two American Corridors (**Fig.10**). There was a 'main street' between Jakarta and Taipei. Hong Kong's pivotal position stemmed from connections with China, and Bangkok's prominence arose from its function as a fuelling base on the one-stop

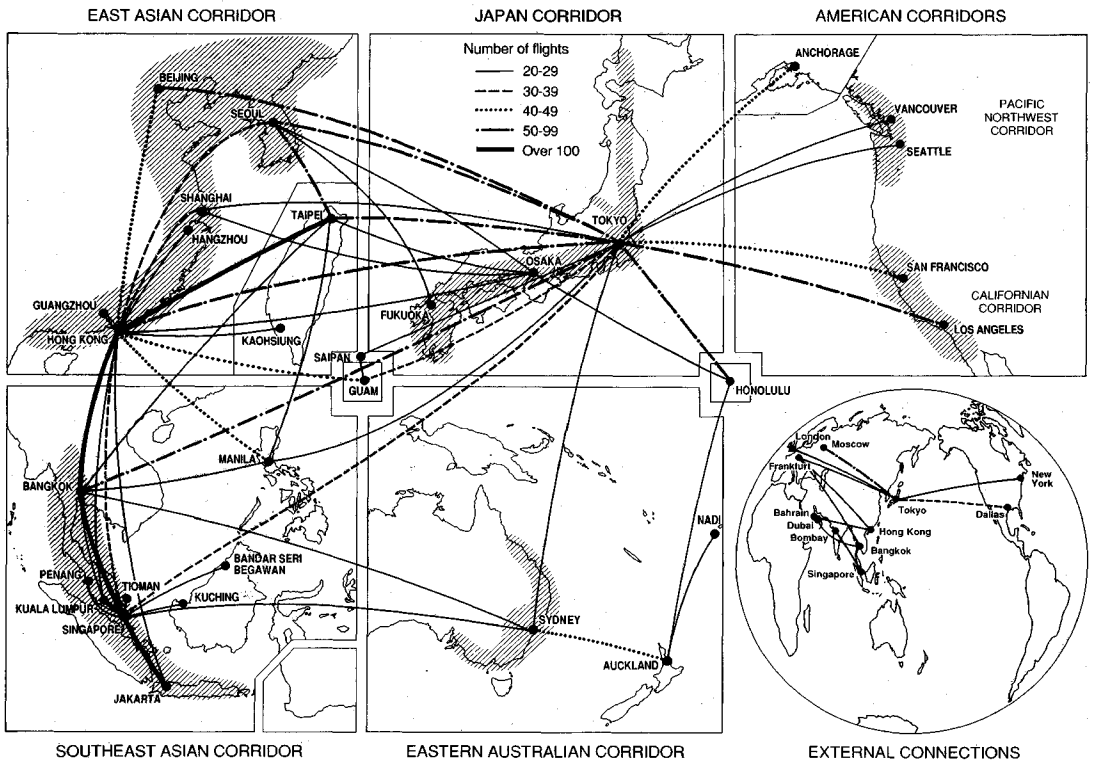

Fig.10 Twenty or more non-stop air passenger flights in the Pacific Economic Zone, August 1989 (*Source*: Rimmer, 1990b).

Australia-Europe flights. The key feature, however, was Tokyo's role as the dominant gateway to Pacific Asia resulting from its strong local market within the Japan Corridor and its being a fuel stop on trans-Pacific flights.

Tokyo's non-stop connections with major gateways in the American Corridors have been enhanced at the relative expense of Anchorage and Honolulu. Two factors have been responsible for Los Angeles overshadowing San Francisco in California, and Seattle and Vancouver battling for dominance in the Pacific Northwest. They are rapid service expansion, associated with increased hub and spoke developments on the domestic network created after the *Airline Deregulation Act*, 1978; and the subsequent consolidation of international passengers. The minimum threshold of twenty flights, however, masked an increase in the number of trans-Pacific flights to non-Japanese destinations resulting from: (a) the noted capacity constraints at The New Tokyo International Airport at Narita; (b) the growth in East Asian and Southeast Asian passenger markets; and (c) unsuccessful United States pressure on Japanese authorities to ease its economic regulation of international aviation. Other key features were the closer integration of the Eastern Australian Corridor with the Asian Corridors and the marked increase in non-stop, ultra long-distance flights. For instance, Tokyo has frequent flights to New York and Dallas as well as to key European destinations.

An examination of fibre-optic cables highlights investments in telecommunications infrastructure. These submarine fibre-optic cable networks are being laid to connect the Pacific Economic Zone's major cities. Following the explosion in the Zone's demand for international telephone calls the new network is designed to overcome a feared gridlock in satellite communication and microwaves (the Pacific Intelstat satellite is almost fully used and additional relief will not be available until 1993). It promises to overcome the slight, but significant, delay inherent in satellite transmission and facilitate the use of high-speed code transmission (MPT, 1988; Lee, 1989).[3] As shown in **Fig.11**, the entire network will interconnect Development Corridors within the Pacific Economic Zone by the mid-1990s. The twin American Corridors will be linked with the Japan Corridor which, in turn, will be connected to the East Asian and Southeast Asian Corridors through two different routes. Connections will also be made with the Eastern Australian Corridor and New Zealand and linked back to the Californian Corridor through Hawaii.

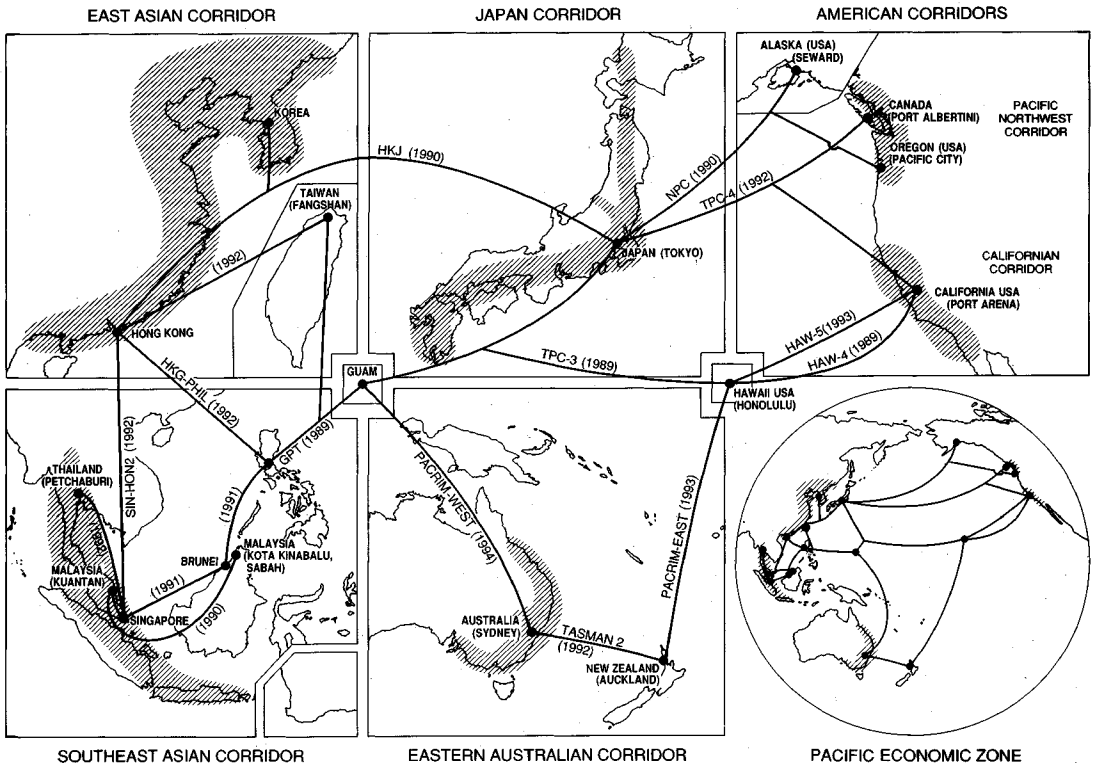

Fig.11 Network of fibre-optic cables in the Pacific Economic Zone, showing dates of completion (*Source*: Rimmer, 1990b).

Key corporate players are vying to provide these networks. For example, the major United States carrier, AT&T, and its twenty-two partners, linked Port Arena in the Californian Corridor through Hawaii Cable 4 and Trans-Pacific Cable 3 to Japan and Guam with a further link to Infanta in the Philippines and Taiwan. A rival venture, comprising Pacific Telecom Cable of the United States, Japan's International Digital Communications and Britain's Cable & Wireless, has provided the North

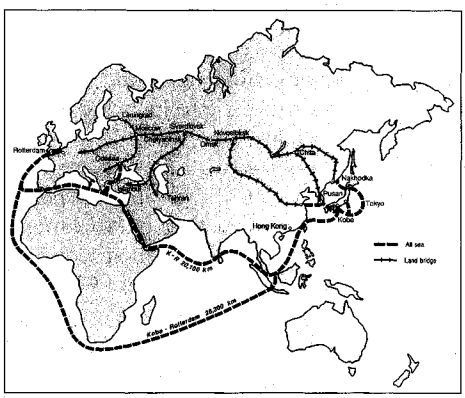

Fig.12 Alternative routes between Korea and Europe (*Source*: Rimmer, 1990a). Note the Baikal-Amur-Magistrale (BAM) branch of the Trans-Siberian Railway connecting the port of Sovetskaya Gavan is excluded.

Pacific Cable which supplies: (a) a direct link between Pacific City in the Pacific Northwest Corridor of the United States and Miura in Japan; (b) a spur to Alaska; and (c) an extension to Hong Kong and Korea. AT&T and its partners are endeavouring to match this development with an alternative fibre-optic cable, Trans Pacific Cable 4, which will provide a direct link between the twin

[3] Fibre-optic cables carry information using the transmission of laser-generated impulses of light through glass fibres. They can accommodate more telephone calls at a lower cost than the traditional 'analogue' submarine copper cables which carry information electronically. They guarantee crystal-clear quality for both voice and data transmission which eliminates the static and cross-talk of the copper cable and the echoes experienced when using satellites floating 36 000 km above the Pacific. Unlike satellite transmission, fibre-optic cables offer security for the transmission of sensitive data from banks and other institutions as they cannot be tapped. Also, they will be used for a variety of business services including the next generation of FAX (Group IV), high-definition television, international video-conferencing and enhanced, value-added services for global network corporations engaged in financial transactions and the use of computer-aided design.

Table 4 Comparative Distance, Time and Cost by Selected Routes between Kobe and Rotterdam, 1988.

Route	Distance km	Time days	Cost US$ per TEU
Sea	20,100	32	2,300
Trans-Siberian Railway	11,000	25	1,400
North Korean Railway	9,800	23	(1,200)
China Railway	8,800	20	(1,100)

Source: Chung Ang Kyong Jae Shin Moon [Central Economic Journal], 23 October 1988

American Corridors, notably California's Port Arena and Canada's Port Alberni, and the Japan Corridor. When completed this 'global digital highway' will connect Corridors in the Pacific Economic Zone with cities in the United States (interconnected by 40 000 km of cables) and through them to Europe through the Trans Atlantic fibre-optic link.

(2) European linkages

As incidental reference to connections with Europe have been made in discussing high-speed transport networks and telecommunications, attention is focused on the slow-speed transport networks linking it to Pacific Asia (**Fig.12**). As the Eastern Australian and Southeast Asian Corridors have little alternative to their existing arrangements these are of particular concern to the Japan and East Asian Corridors. Although much consideration has been given to the Trans-Siberian Railway (Kuroda, 1987) as an alternative to sea transport, there is renewed interest in the Japan - and East Asian Corridors in connections through China and North Korea.

An examination of the comparative distance, time, and cost by selected routes between Kobe and Rotterdam shows that sea transport is inferior (**Table 4**). Further, the North Korean route is superior to the existing landbridge provided by the Trans-Siberian Railway. The designated China route, however, is in the best comparative position. Much will depend upon the 'opening-up' of the two Koreas and the reunification of Korean railways (see **Fig.7**). The end result will be a route pattern reminiscent of the late Choson Dynasty, shown in an inset on **Fig.7**, when Korea provided a bridge from Japan to Northern China. In the future it could be the bridge to Europe.

8. CONCLUSION

As discussed in this paper, transport and communications infrastructure has to be seen within the wider context of Development Corridors and the emergence of three major trading blocs within the world economy. Given the development ambitions of Pacific Asian countries and the need for neighbourly cooperation, the theme of closer, economic cooperation and community is being mooted. Already there has been revived interest in a Western Pacific Rim forum (and a wider Pacific Basin-based community including Canada, the United States and Mexico) to produce systematic economic data and discuss trade policy (Nagatsuka, 1987). An Organisation for Economic Cooperation and Development-style structure has been proposed. Rather than a new bureaucracy, there is support for enlarging the existing informal Pacific Economic Cooperation Conference - a tripartite body comprising government officials (in a private capacity), business people and academics that has been in existence since 1980 (Drysdale, 1988). Another link is the series of discussions between Western Pacific Trade Officials which commenced in 1983. Arrangements for ministerial talks on economic policy issues in the Pacific Basin were instituted in 1989 though there were no arrangements for accommodating China, Hong Kong, and Taiwan. A constructive agenda for multilateral negotiations involving interdependence within Pacific Asia would include such neglected aspects as transport and communications infrastructure (Garnaut, 1989: 152).

Befitting the emphasis on access to markets, (i.e., trade liberalisation and structural change), dynamic industrialisation, and trade growth, the initial stress within Development Corridors has to be on the creation of the telecommunications and transport infrastructure necessary for economic expansion. Consequently, shipping, ports, and inland transport have to be accorded a pivotal role in the development of total logistics systems based on container movements and electronic data interchange. The implication for national planners is that the past preoccupation with short-term futures based on parochial unimodal interests in narrowly-defined hinterlands has to be abandoned in favour of strategic planning that takes into account factors pertinent to the Development Corridors. Within these Corridors network hubs are benefiting from being national and international financial centres and headquarters of global network corporations. They are trying to capture potential synergies and collective structurally-complex information (i.e., knowledge) inherent in the dominant communications and transport networks (e.g., telecommunications and air) (Batten, 1990). A higher proportion of their budget is being expended on nodes rather than links.

(1) Counterpoint

This vision of likely transport and possible communications networks will be seen as apocalyptic by many environmentalists. The need to construct rail and road systems to handle containers, particularly in the Southeast Asian and East Asian Corridors, will necessitate heavy expendi-

ture. Not only will the plan for superhub airports require high capital inputs in infrastructure and feeder links but will inconvenience passengers. The concentration of construction activities on Development Corridors will be perceived as wasteful in investment, prodigal in energy use and peripheralising people and places beyond their bounds. What, for example, will happen to people in Manila and Cebu in the Philippines and Port Moresby in Papua New Guinea? Are there alternative transport and communications networks that will generate a sustainable urban form? Are these counter forces strong enough to induce a swing away from the outward-looking functional integration towards at inward-looking territorial integration based on some form of cultural regionalisation?

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