THE INFORMATION INDUSTRY, MULTINATIONAL CORPORATIONS AND URBANISATION IN THE ASIAN PACIFIC COUNTRIES: A RESEARCH AGENDA*

R. Yin-Wang Kwok and Brenda Kit-Ying Au

The production of information has been accepted as a new economic factor for urbanisation, particularly in the industrialised world. It creates new urban employment opportunities, changes urban spatial patterns, transforms demographic structures and social patterns. This 'new' production activity has been introduced into the Asian Pacific region — often by multinational corporations — and now begins to make its presence felt in major cities. This paper investigates the nature of the information industry in general, the role of multinational corporations and attempts to understand especially the effects of international information demand on Third World urbanisation. More specifically, it attempts to assess their relationship to urbanisation in the Asian Pacific countries. Lastly, it hopes to formulate areas and issues for further research.

Keywords: information industry, Asian Pacific region, urbanisation, multinational corporations

INTRODUCTION

Apart from the international demand for the services of the information industry in Third World cities, there is substantial internal demand involving both the public and private sector. In the public sector, it responds to and operates as a communication mechanism for public policy. Government institutions, community organisations, information media and the education system are not only part of national development policy, but are also used to communicate policy decisions down to the communities and policy responses up to the government. The information industry is often considered a necessity for national politics, as it is essential for free speech, participation and democracy. Its existence and expansion are

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essential to national political development. In the private sector, it is a supporting and complementary economic activity for the production of physical goods,and this activity is usually referred to as services. As standards of living improve, demand for personal services, in particular, will also increase. These local demands contribute significantly to the development of the information industry. This paper, nevertheless, does not explore this aspect of internal demand, but concentrates instead on international demand.

This paper first reviews the theoretical position, then explores the operation of the information industry and multinational corporations in the developed and developing countries. Using the empirical information and data from Asian Pacific countries, it examines impact on urban development. Finally, some tentative conclusions and areas are identified for further research and investigation.

DEFINITION OF THE INFORMATION INDUSTRY

The information industry is concerned with the production of information, rather than the production of physical goods. Information industries are those with as sole or primary product a service that involves one or more of the functions of creating, processing, collecting, or communicating information.[1] Thus, information activity includes all the resources consumed in producing, processing and distributing information goods and services.[2] This is a definition that makes the information industry a distinctive 'new' or 'post-industrial' production technology. The definition, no matter how well based on theory, has to be modified by empirical studies dependent on arbitrary classifications and the availability of statistics.[3]

Two types of information activity can be identified: the primary information sector in which information goods and services are produced for the market; and the secondary sector in which information is embedded in the production of other goods. Even in information production, both physical and non-physical outputs are included. For the purposes of this analysis, only that part of the industry producing non-physical products will be examined; the production of information hardware is excluded. This definition covers the primary sector which purely handles and produces information, and the secondary sector — those information activities which are performed within a firm producing physical goods. The former comprises in turn both advanced corporate services (for example, finance, insurance, accounting, marketing, legal and consulting functions, and other types of business services) as well as personal services (for example, information, advisory and educational services). With this definition, office industry/white-collar occupations can be used as the key indicator of information activities.

THEORETICAL REVIEW

The theory of the information industry developed by Western scholars has been based mainly on conditions in advanced industrialised countries. This, the present analysis of the Asian Pacific region (largely within the Third World) is based mainly on studies of advanced industrialised countries. In other words, the characteristics of the information industry in developed societies are examined in the context of the Third World.

Technology and Urbanisation

The relationship of technology and urbanisation has traditionally been viewed from an historical-cultural perspective. The early work, even though rather unsystematic, reviewed the impact of technological changes on civilisation, population, the city and the Western urbanisation and suburbanisation processes.[4] Many cities came into existence primarily as the central nodes in the transport, travel, and communication networks of the social system. Historically, each advance in the technology of communication and transportation led to city expansion and growth, and increased the importance of their social roles.[5]

Parallel studies of advancing technology and metropolitanisation in North America from the 1940s onwards illustrated that the growth in automobile use, and the increased use of computers and advanced communication tools were accompanied by urbanisation-suburbanisation movements.[6] In particular, the significance of urban freeway construction and private vehicles gave rise to increased personal mobility. Locational decisions made by individual entrepreneurs induced a land use pattern that conformed to the motor car's operating characteristics — a dispersion of many traditionally central activities to outlying but highly accessible locations.[7] The impact of technology was also specifically felt in the emergence of office functions. Innovations in the communication process presented the opportunity for quantum leaps in the transmission of information within and between offices. The advent of skyscraper office buildings encouraged office concentration sufficiently intense to produce agglomeration effects and scale economies.[8]

Technology, especially that related to transportation and communication, has been accepted as a major force in urbanisation. That it facilitates urbanisation is well established historically. Apparently it exerts growing influence and plays a dominant role in large cities. Modern metropolitan growth, apart from being spurred on by its industrial and commercial functions, is now increasingly subject to the impact of transportation and communication technologies, and is heavily influenced by their spatial and factor

requirements. Cities, particularly the metropolises, in the Third World are subject to the influence of modern technological progress. As the Third World receives modern technological transfer, opening itself to international trade and exchange, its urban development will respond to the impact of these new inputs.

Office Industry and Its Urban Location

More methodical theorising of the relationship between technology and urbanisation broadly divides into two approaches. One major approach is concerned with location theories — the traditional industrial location theories in general, and the office location theories in particular. The other line of investigation emphasises the international division of labour as a result of technological change, more specifically the impact of the separation of labour processes and in turn on the globalisation of production processes.

Those taking the traditional industrial location approach restricted their analyses to single-plant location and locational advantages.[9] In many respects, location theory was still at the age of the Industrial Revolution and had not adjusted itself to the realities of the post-industrial stage in which office activities and large organisations, rather than single unit manufacturing firms, were the norm. This position has been given added weight in recent years by the influence of technological change. It has reduced the importance of the traditional location variables, such as raw material assembly, transport services, or certain aspects of labour supply.[10] The need to assemble information/knowledge and to disseminate it efficiently within and among organisations has become a paramount consideration in business. It is reflected in the expansion of elite white-collar occupations at the expense of more routine office employment which has been partly displaced by machines.[11] The function of information within the production plant has been recognised as an essential and necessary part of industrial production.

The output of the office industry is information, and linkages developed within and among organisations depend on the nature of the business. In the processing of information, the linkages are contacts generated by the participants, which can range from face-to-face meetings, telephone contacts and telex to more sophisticated forms of telecommunications, such as confravision, depending on the information to be processed.[12] The importance of communication and linkages is reflected by the clustering tendency of office activities. The empirical studies of Australian cities[13] and Capetown[14] have emphasised these clustering tendencies of functional groups of offices within the city centre. Empirical studies of legal and financial activities and of the New York metropolitan region also support the above assertion.[15]

Other factors, such as increased efficiency of communications, rising rents and taxes and labour recruitment difficulties in central areas, all act to encourage dispersal of central offices.[16] New automation technology in office processes permits more intensive use of downtown space, and also allows for effective operation at outlying locations.[17] Firms leaving the Central Business District for metropolitan suburban locations, however, are restricted to those which require little contact with central city functions.[18] In fact, processes of metropolitan centralisation and decentralisation are occurring at the same time, depending upon industries and functions.[19]

Locational advantages (and disadvantages) of any place are not so much given as created out of the internal productive and organisational dynamic of the enterprise itself. The technical and organisational maturation of an industry at a certain location is significant for agglomeration and polarisation. The dispersal of production units to suburban locations and the crossing of regional and international boundaries is becoming increasingly apparent. The economic benefits of obtaining and comparing information have made it more important for the detached office to be close to the information market rather than close to a production plant. The centrifugal force of the production units and the centripetal force of office functions have hastened the process of spatial separation between office and plant, but, at the same time, have encouraged offices of different firms to congregate.[20]

Throughout history, each technological change has led to greater division of labour and specialisation, and therefore to greater inter-dependency and need for more interaction and exchange of information.[21] Modern production activities must be promoted and supplemented by mechanical means; at the same time, the amount of interpersonal communication grows in absolute terms. The locational requirements of the information industry are more likely to be met or to be better established in large, international cities.[22] As these human activities are best carried out there, the large cities are strengthened in their economic role, which will continue into the future.

The location theorists' original emphasis was on the physical factors in manufacturing, but it has gradually given way to the concept of communication as a prevailing component in spatial decision. As communication becomes the dominant agglomerative element of urban economic activities, metropolises are coming to be acknowledged as the most suitable location for modern production. The Third World metropolises, in adopting modern production, are similarly affected by the influence of communication. The spatial development and pattern of the urban economy are more and more

directed by communications technology, which will gradually reduce the dominance of the manufacturing sector.

International Division of Labour and Multinational Corporation

The steady automation and the deskilling of production processes associated with recent technological change, have resulted in the growing use of unskilled labour, cheaply and abundantly available in the developing countries for production plant work. The deskilling of clerical work in contemporary industrialised society is regarded as the result of the constraints/requirements of the capitalist mode of production. Deskilling of the labour process permits the separation of production conception from execution, and allows control over labour.[23] Clerical deskilling parallels manual labour deskilling. Clerical deskilling involves the process of fragmentation, simplification and standardisation of work tasks, and the diminution of the clerical worker's role as an intermediary between management and manual workers. The role of the computer in the deskilling of clerical work enhances the polarisation of office employment and centralises control within the organisation — thus removing control from the lower echelons of the organisational hierarchy.[24]

The steady automation and deskilling of production processes is the result of technological change and the need to economise production.[25] Production deskilling creates conditions for decentralisation, and frees labour resources so that new forms of economic activities, such as office and service functions, may begin to develop and expand. The spatial separation of office and plants gives rise to further decentralisation across international boundaries, thus leading to the emergence of a new world-wide hierarchy of control and production activities.[26]

The nature of the international system for producing goods and services is reflected in the characteristics of multinational corporation operations. Multinational production responds to the advantages of internationalisation of ownership (such as possession of proprietary knowhow, management and organisational skills, economies of scale, and preferential access to particular markets), and these can be achieved by production outside the home country. This is more cost-effective than exporting domestic production. This decision is mainly influenced by the locational attractions of alternati e production sites. In the production of physical goods, footloose op· ·ations in the host countries usually decentralise their low-skill, lab·ur-intensive and routine parts of the production processes to the developing countries.[27]

The multinational corporation is partly a response to progress in production technology which allows capital accumulated by advanced

industrialisation to be reinvested internationally. Modern technological change also allows for the division in the production process which gives the Third World a key role. This development implicitly specifies a production function in Third World metropolises, which are now, with both the industrialised and developing countries, being tied into a global network.

World System of Cities

The global system of production provides growing importance to cities in the developing countries, particularly those of the newly industrialising nations.[28] Multinational corporations, taking advantage of the deskilling and globalisation of the production process, have created new demands for the advanced corporate services of, for example, banks, law firms and accounting firms. These new demands are linked to both changes in the nature of institutions providing these services and to the emergence of a series of cities which are globally linked. Such global cities act as centres of corporate control and co-ordination for the new international division of labour.[29]

The world cities occur exclusively in core and semi-peripheral regions where they serve as banking and financial centres, administrative headquarters, and centres of ideological control. The majority of corporate headquarters remain in the industrial or post-industrial core-region, which is the major market for world production (for example, Western Europe, North America, Australia, Japan). The semi-peripheral regions are in the rapidly industrialising areas whose economies are dependent on the core-region for capital and technological information. The peripheral region, where world cities have yet to emerge, comprises countries which are predominantly agrarian, technologically backward and politically weak.[30] Metropolises such as Tokyo, Bangkok, Singapore and Hong Kong in the Asian Pacific region are included as examples of world cities.

From empirical evidence, some newly-industrialising countries (such as Korea and Hong Kong) would seem to have the ability to set up their own multinational corporations. Increasingly they export technology to other less developed countries. Production knowhow, managerial, organisational and marketing skills are being transferred through their multinational activities in the form of direct foreign investment.[31] These world cities in the semi-peripheral region are technologically and economically linked closely with the cities in the peripheral countries.

The world city economy is chiefly the result of the growth of a primary cluster of high level business services which employ a large number of professionals and ancillary clerical personnel. These activities are the chief economic functions of the world city:

management, banking and finance, legal services, accounting, technical consulting, telecommunications and computing, international transportation, research and higher education. This primary cluster is in essence the same as has been referred to as the information industry in this paper. There is also a growing secondary cluster, which essentially serves the primary cluster and largely accommodates its derived demand. It employs proportionately a smaller number of professionals, and includes real estate, construction activities, hotel services, restaurants, luxury shopping, entertainment, private police and domestic serivces. A tertiary cluster of personal service employment is also found which centres on international tourism. The latter two are closely tied to the growth of the primary cluster and the growth of the world economy in general.[32] The growth of these three clusters is taking place at the expense of manufacturing employment, a large portion of which is being replaced by rapid automation and robotisation. Many manufacturing jobs in the next few decades are expected to disappear, as has happened in the American global cities.[33]

The linkages within the economy can be limited and the inducement effects on other types of activities can be restricted. The key to facilitate economic growth, linkages and multiplier effects is local human capital development. The imported production activities have often been characterised as 'enclave operations' when the local labour force cannot respond to the new employment opportunities.[34]

In the Third World cities, however, there exists another cluster — perhaps numerically the largest one — which embraces the 'informal', 'floating', or 'street' economy. The labour force has a trichotomized structure — a small corporate sector dominated by the transnational elite, a local family enterprise sector and an informal individual enterprise sector.[35] Under this tri-sector labour structure, the inability of the corporate sector to create enough jobs, the displacement of the family-enterprise sector by the internationalisation of the economy, combined with the acceleration of urban migration, may result in an urban employment crisis even when national income is expanding. The Third World cities are, therefore, constantly subject to drastic and rapid changes in employment structure. Sustained urban development depends upon the response of local labour conditions and human capital development to the requirements generated by the globalisation of the production process.

Human Capital Development

The continuing transformation of the structure of the economy from primary and secondary into tertiary industries, necessitates a shift of the labour force from manual to mental tasks.[36] A much heavier investment in human capital is one of the requirements associated with

contemporary urban development and economic change, at least in US cities. For the growth of information and other service activities, the necessary skills must be provided.[37] The need for universities and tertiary education to develop the skills and capabilities to perform these functions provides the basis for a symbiotic relation between the university and the city, making higher education an important urban function.[38]

The educational and social consequences of automation, which both causes and increases information needs, draw attention to the importance of adaptive industrial training as well as the enormous demand for college education. One reason is that as the need for workers in industry declines, the service industries build up simultaneously. The need for educated white-collar workers expands, and with it the college population grows.[39] The impact of globalisation of production process is not confined to the flow of technological hardware, finance, advanced corporate services, and local office development, but also involves human capital development.

A two-tiered labour market is identifiable in the service sector in a post-industrial society. Tier 1, (professional-managerial-administrative occupations) relates to the generation, collection, analysis and dissemination of data and information associated with the rise of the 'transactional' society. The people in this group possess formal educational backgrounds, or relatively advanced training in one or more specialised skills. Tier 2 (clerical office staff and other non-office service workers) normally performs more routine forms of work, receives less formal training and earns lower income.[40] While a reduced demand for unskilled labour is seen in the urban economy of developed countries, this may not be the case in the developing world.

The general trend in occupation structure of the newly-industrialising countries has been a gradual structural shift from production workers to the higher skill categories (technical, professional and managerial staff, etc.). It has been more evident in the last two decades. There is some evidence that in a number of developing countries, multinational corporations tend to employ proportionately more persons in the higher skill categories than local manufacturing enterprises.[41] In general, however, multinational firms are reluctant to employ host-country manpower in the highest level managerial and technical positions; these are still largely filled by source-country personnel.[42] Although multinational corporations maintain the control and supply of the highest level employment, the labour demand in the Third World in response to this sector has shifted towards better educated, highly skilled white-collar workers.

The effects of international development on communication needs in Hong Kong point to the need for human capital development.[43] Since most foreign investors are supplying a package of production

technology, a host developing country, by not providing the suitable human resources, will seriously limit its growth potential. Local human capital is very often reduced to simple administrative, clerical and low management decisions (Tier 2 occupations), while technological development (Tier 1 occupations) is concentrated in the source country of the transnational enterprises.[44]

The needs of national or foreign-owned enterprises in the Tier 1 labour market must be matched or satisfied by the supply of suitable personnel from the educational system. In the context of economic development through international transfers of technology, capital and commodities, educational and training systems should also develop in conjunction with local research and development activities, so that foreign technology will have a base on which to expand.[45] The concentration of Tier 1 occupations in the source country is partially the result of a bottleneck in the local labour market — the consequence of the inablity to train and educate higher level personnel. If higher level professionals are not supplied locally, they will have to be imported. As the metropolises have those particular characteristics suitable for the development of information activities, their educational institutions should offer the information producers and users qualified manpower training, and research development support. A suitable human capital pool, in turn, gives a production environment which further attracts the multinational corporations. Thus, whether manpower training and educational systems can respond to human capital needs is one of the major determinants of national economic development, as well as the scope of urbanisation.

Summary

From the above theoretical review, it seems clear that the information industry as a production technology is the new economic activity that can significantly affect the urbanisation process in the Third World metropolises. The information industry is concentrated in, and dispersed around, large cities. Third World production, apart from that directly linked to natural resources, usually takes place in metropolises: the information industry is no exception. Multinational corporations, as a result of the globalisation of the production process, have established a network of world cities. The metropolises of the semi-peripheral and peripheral regions are all subsumed within this system. Because of the global spatial linkage in production and business, flow of information is the key to this system. The existence of the information industry in the Third World metropolises thus becomes necessary and unavoidable.

The nature of the information industry in Third World cities effectively transforms the labour structure. At the same time, it generates specific demand for human capital development (education

and training). Because of the desire for technological control, high level personnel in the host country need to travel to the semi-peripheral and peripheral cities on business. The servicing of these international travellers induces yet another set of service activities. The empirical analysis that follows will examine the situation in some selected Asian Pacific countries.

EMPIRICAL ANALYSIS

The countries selected in Asian Pacific region are semi-peripheral and peripheral nations. While an attempt was made to provide representative countries, the final selection eventually depended on the statistics available. The analysis assumes that the size and nature of the information industry may relate to the level of development. The analysis will attempt to assess the level and the characteristics of the information industry at different levels of development. Wherever available statistics allow, inter-temporal analysis is applied to assess structural change and dynamics. In particular, information employment sectoral change is reviewed in order to establish general trends.

Based on the framework summarised in the theoretical review, the empirical analysis examines the demand for the information industry in Asian Pacific countries. This is essentially caused by the globalisation of the production process and by multinational corporations. It also investigates supply to the information industry. This is represented by local response to human capital requirement.

Table 1 shows the per capita gross national product (GNP) in selected Asian Pacific countries. Per capita GNP is, as in normal practice, adopted as a measure of development. Of the seven countries included, only Hong Kong and Singapore have a per capita GNP over $US 5,000. Both city states grew at around 7 per cent annually from 1960 to 1981, and both are 'newly-industrialising' countries. Of the rest of the peripheral countries, Malaysia and the Republic of Korea have per capita GNP of around $US 1,900, more than double that of the rest. Although the annual growth rate differs quite significantly from 4.3 per cent to 6.9 per cent, these are the 'more-developed peripheral' countries. Korea deserves special attention: although its per capita GNP was lower than that of Malaysia in the early 1980s, it is likely to replace the latter in rank in the near future given its rapid annual growth rate. If the annual rate of GNP growth is used as the sole criterion for demarcating the level of development, as in some other studies, Korea should now be regarded as a 'newly-industrialising' country. The third group (Thailand, Philippines and Indonesia) all had per capita GNP lower than $US 800 and the average annual growth rate was below 5 per cent. These are the 'less-developed

peripheral' countries. These three groups, indicative of different levels of development, are used as guides for later analysis.

TABLE 1

Per Capita GNP in Selected Asian Pacific Countries

Country	GNP per capita		Category
	US dollars 1983	Average annual growth 1960-1981 (%)	
Hong Kong	5,316	6.9	Newly-industrialising countries
Singapore	5,219	7.4	
Malaysia	1,961	4.3	More developed peripherial countries
Korea, Rep. of	1,884	6.9	
Thailand	794	4.6	Less developed peripheral countries
Philippines	656	2.8	
Indonesia	510	4.1	

Sources: Far East Economic Review, *Asia Yearbook,* 1985; World Bank, *World Development Report,* 1982.

Note: Figures for Hong Kong are GDP.

Information Employment

The structure of the information industry is represented by the 'white collar' category of employment. Table 2 shows the total economically active population and the information occupation population over the last decade. Most available statistics provide two temporal points — generally about 1970 and 1980 — thus allowing some comparison of structural change. Information occupations are further divided into professional workers (Tier 1), who require higher level training, and clerical and related workers (Tier 2), who generally need only secondary education with some further training.

Information employment over recent years increased in absolute terms in all the selected Asian Pacific countries. With the exception of Indonesia, employment in the information industry also increased in its proportion of the total labour force. The proportion of information occupations to the total economically active population, which varies from 27.4% (Singapore) to 5.1% (Indonesia in the late 1970s) — with the exception of Hong Kong — has a positive relationship to the level of development. The higher the level of development, the higher the proportion of the active labour force in the information sector. The level of the sectoral occupation change, which varies from −0.6% (Indonesia) to 8.3% (Hong Kong) over the recent decade, seems to be directly related to the level of development

— the higher the level of development, the higher the level of sectoral occupation change.

The drastic differences in the labour structure in these Asian Pacific countries may be accepted as a function of development. However, there are many external and domestic factors as well as governmental policies which finally determine the industrial structure. Further investigation on an individual country basis will be necessary to explain such divergence. At this juncture, it is reasonable to summarise some generalised patterns that have emerged in this cross-country analysis.

It seems clear that as Asian Pacific countries develop, the information sector will expand proportionately. The causal relationship between economic development and the information industry is not so evident in statistical correlations. Theoretically, it is subject to demand and supply in the information industry where demand is determined by the multinational corporation and supply by local human capital development. Both these aspects will be examined later.

The employment structure within the information industry — the professional workers (Tier 1) and the clerical and related workers (Tier 2) — shows an absolute increase over recent years in both categories in every country. Although the sub-sectoral occupation change over time seems to be broadly positively related to the level of development (the higher developed countries have a higher rate of change), there are too many exceptions in both subsectors to be conclusive. The information employment structure is determined largely by the various countries' educational policies and provisions.

Foreign Investment

Since the late 1960s, private foreign investment has become a leading channel for capital outflows to developing countries.[46] Although the industrialised market economy countries are recipients of a substantially greater share of foreign investment than the developing countries, the Asian Pacific gains considerably from foreign investment. This trend is likely to continue in th 1980s and probably thereafter.[47] Since the late 1960s, Japanese multinational corporations have accelerated their investment abroad. Over half of Japan's direct investment stock in 1975 was in developing countries, mostly in Asian Pacific countries. Thus far the amounts involved are smaller than those of other major countries, such as the US, the UK, France and West Germany,which have significant investment in the region.[48] Multinational corporations' investments in developing countries, however, are not evenly distributed, but concentrate in a few industries and in a relatively few countries — in the newly-

TABLE 2

Composition of Information Occupation in Selected Asian Pacific Countries

Country	Year	Total economically active population	Information occupation population[1]					
			Total[2]	Intertemporal sectoral occupation change[3] (%)	Information professional workers[2] (Tier 1)	Intertemporal sub-sectoral occupation change[3] (%)	Information clerical & related workers[2] (Tier 2)	Intertemporal sub-sectoral occupation change[3] (%)
Hong Kong	1971	1,654,907	247,835 (15.0)	+8.3	118,808 (7.2)	+2.2	129,027 (7.8)	+6.1
	1981	2,501,500	582,400 (23.3)		235,500 (9.4)		346,900 (13.9)	
Singapore	1970	726,676	151,461 (20.9)	+6.5	67,243 (9.3)	+3.8	84,218 (11.6)	+2.7
	1980	1,106,581	303,352 (27.4)		145,013 (13.1)		158,339 (14.3)	
Peninsular Malaysia[4]	1970	2,870,949	283,085 (9.9)	+4.7	149,744 (5.2)	+1.7	133,341 (4.6)	+3.1
	1979	4,374,500	640,700 (14.6)		303,000 (6.9)		337,700 (7.7)	
Korea, Rep. of	1971	10,165,000	1,174,000 (11.5)	+2.4	484,000 (4.7)	+0.7	690,000 (6.8)	+1.7
	1981	14,710,000	2,049,000 (13.9)		790,000 (5.4)		1,259,000 (8.5)	

Thailand	1970	16,850,136	720,933 (4.3)	+1.2	530,695 (3.2)	+0.6	190,238 (1.1)	+0.6
	1980	22,728,100	1,245,500 (5.5)		854,300 (3.8)		390,200 (1.7)	
Philippines	1970	12,296,583	1,190,265 (9.6)	+0.7	807,638 (6.5)	0	382,626 (3.1)	+0.7
	1978	17,362,000	1,789,000 (10.3)		1,124,000 (6.5)		665,000 (3.8)	
Indonesia	1971	41,261,216	2,343,557 (5.7)	−0.6	1,073,004 (2.6)	−0.5	1,270,553 (3.1)	−0.1
	1978	53,097,095	2,722,236 (5.1)		1,105,770 (2.1)		1,616,466 (3.0)	

Source: International Labour Organisation, *Yearbook of Labour Statistics*, Geneva, 1983.

Notes:
1. Percentage of the total economically active population in parentheses.
2. Total information occupations include the International Standard Classification of Occupations groups 1 to 3.
   Occupation group 1. Professional, technical & related workers
   2. Administrative and managerial workers
   3. Clerical and related workers
3. Difference of the intertemporal percentages in the previous column.
4. Excluding Sabah and Sarawak.

industrialising developing countries, instead of the least developed peripheral countries.[49]

Multinational corporations are among the most important users of information technology. Since statistics for transborder information flows are highly imperfect, it is possible to state only that these flows are already substantial and rising rapidly. The lack of specific statistics also applies to the more visible flows of international information services.[50]

The operation of multinational corporations, theoretically, creates demand for information which results in local employment opportunities. As multinational corporations tend to invest according to level of development, their impact in information employment should be more significant in the newly industrialised countries than the less-developed peripheral countries. The employment structure of the information industry (measured by the proportion of information employment of the total economically active population in Table 2) is compatible with the multinational corporations' investment pattern. Although it is not conclusive that multinational corporation investment is the only source of information employment in these countries, there is significant evidence that this investment is positively related to the size of the local information industry.

Education Development

Information in Table 3 on the proportion of GNP spent on education reveals that per capita educational expenditure is positively related to level of development — the more developed countries spend more on education. A general pattern emerges — lower income countries have lower per capita educational expenditure.

The newly-industrialising countries spend more on human capital development. Among the peripheral countries, Malaysia placed relatively more emphasis on developing human capital, but still significantly less than Singapore and Hong Kong. Although the per capita educational expenditure in Korea and the Philippines was relatively low, the student enrolment in the respective age groups was amongst the highest. Seemingly, both countries matched their human capital development closely with population needs. The low per capita educational expenditure indicates, however, that training facilities and quality may be low relative to other countries.

As the information industry becomes more dominant in the economic structures of the higher income countries, it creates greater demands for higher skill labour in professional occupations. The educational institutions respond to these demands. The newly-industrialising countries — Singapore, Hong Kong, and, to a lesser extent, Malaysia and Korea, all reflect these conditions. As the graduates supplied contribute to a suitable and relatively low-wage

labour pool, they provide an attractive and favourable climate for the multinational corporations. The human capital availability is both a demand of, and a condition for, the information industry. The newly-industrialising countries, because of their educational policy, have prepared the proper setting for information industry development.

TABLE 3

Educational Expenditure and Enrolment in Selected Asian Pacific Countries, 1978

Country	Total educational expenditure[1] as % of GNP	Per capita educational expenditure (US dollars)	Students in secondary school as % aged 12-17	Students in higher education as % aged 20-24
Hong Kong	2.7	82.1	57	11
Singapore	2.5	82.3	57	9
Malaysia	6.3[2]	50.4[2]	48	3
Korea, Rep. of	2.5	29.0	74	12
Thailand	3.4	16.7	28	7
Philippines	2.2	11.2	56	27
Indonesia	2.0	7.2	22	3

Sources: World Bank, *World Development Report,* 1981, 1982; United Nations, Department of International Economic and Social Affairs, *Statistical Yearbook 1981,* New York, 1983.

Notes: 1. Data on total educational expenditure refer to public expenditure on public education plus subsidies for private education. Total expenditures cover both current and capital expenditure.
2. 1975 figures.

Moreover, the linkage of the information industry to other parts of the urban economy is determined largely by the labour market. Without appropriate labour supply, information remains an enclave industry. The effectiveness of its integration into the urban economy, and its multiplier effects by which cities grow or decline, depends on the existence of an adapted labour force. In the newly-industrialising countries, labour supply is more responsive: as a result, the information industry makes a greater economic impact.

CONCLUSION AND FUTURE RESEARCH

The purpose of this paper is to attempt to understand the impact of the information industry through the multinational corporations on the urbanisation process in the Asian Pacific countries. There has been much diverse and unco-ordinated theoretical work which is not well complemented or attested by empirical studies. The lack of case

studies, suitable information and data is a severe obstacle to the understanding of reality. In view of these research problems, this paper seeks to construct a theoretical framework on which to demonstrate, with evidence from Asian Pacific countries, that a generalised pattern exists.

As the information industry is a production sector that has been growing in the Asian Pacific countries, its speed of development bears a positive relationship to the level of development. From the point of view of both the demand of multinational corporations and the local supply of human capital, the newly industrialised countries have more favourable conditions for its development, while the less-developed peripheral countries have greater disadvantages. The information industry concentrates in or around metropolises, and is the new production activity which contributes to their growth, apparently more significantly in the newly-industrialising countries.

Several questions which have arisen deserve further examination. As this is a comparative analysis, it has not taken into account the specific factors which affect technological adaptation and industrial development of individual countries. The role of the state — in public policy and international relations, for example — is an issue raised in the paper. This is an area which should lead naturally to further enquiry by national case studies.

The specific labour demand of the information industry requires local human capital development. Labour is also an agent to facilitate production effectiveness and integration in the urban economy. One area of future study may be the production relationship between the information industry and other local productive sectors, as well as the service provision needed for the labour force. There is ample evidence that multinational corporations' demand and local human capital supply conditions are important factors. However, it is not entirely clear to what extent they respond to and trade-off with each other. More empirical work in these areas will provide better support for, and understanding of, their effects on information industry development.

The information industry is a significant force for urban development in the Asian Pacific metropolises. Much more empirical and theoretical research, however, is still required. In the near future, it appears that study of individual countries will give more insight to the effect of the information industry on the urbanisation process.

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