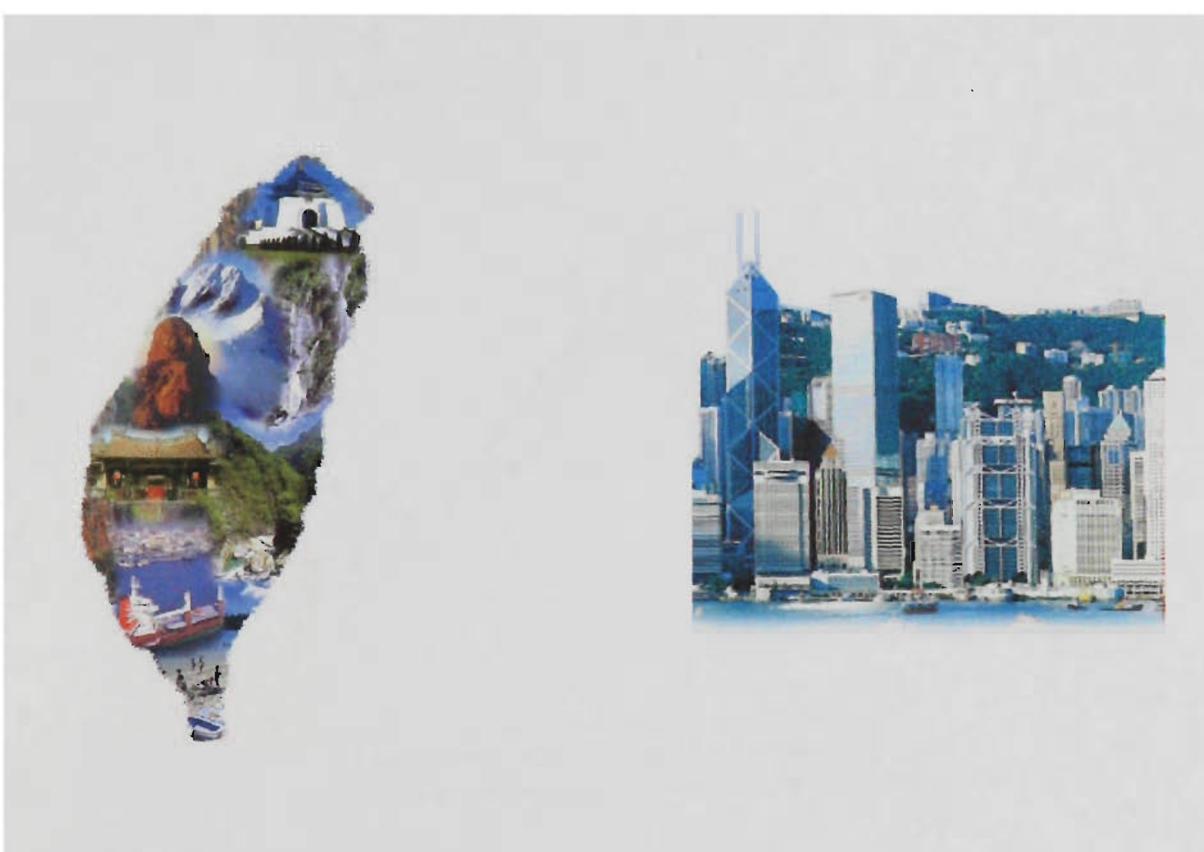
Human Capital Formation: A Study of the Development of Technical Education and Vocational Training in Two Asian Chinese Newly Industrialised Economies



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Human Capital Formation: A Study of the Development of Technical Education and Vocational Training in Two Asian Chinese Newly Industrialised Economies

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ABSTRACT

Hong Kong and Taiwan, similar to each other, have open economies, encourage foreign and multi-national investment and are dependent on externally oriented industries. To be able to find international markets, the two territories need to continue to improve efficiency and quality in production throughout the economy if they are to compete successfully in an era of rapid economic and technological change. Moving to high value-added production requires skills and adaptability. One way of raising productivity is through education and training.

The main purposes of this research are to identify the distinct features of the approach to technical education and vocational training in these two new industrial economies of Asia and to show how this has contributed to economic growth. The focus of study is to examine the development process as well as the nature and effects of government policy in this type of skill formation and to obtain a clear picture of its role in the wider human capital formation system of these two economies. Lessons from them may shed some light to Australia and other countries with open market economy when formulating human resource policies.

At each stage of economic growth new industries are established which demanded by different human skills and therefore one-off investments in education are not in themselves a sufficient explanation of skill formation to support growth. As the higher value added industries are established new and more complex demands are made of humans during their performance at work. To deliver the requisite skills means governments need to be in a position to identify the requisite skills required by the economy and have the means of amending and adjusting the content of the curriculum and the form in which education and training are delivered. This in term requires them to establish mechanisms to ensure that these adjustments are made and that the output of the education and training systems meets the needs of existing and emerging industries. This thesis hypothesises a model of skill formation to approximate the human capital development process in two Asian Chinese Newly Industrialised Economies – Hong Kong and Taiwan.

Findings from case studies of Hong Kong and Taiwan supported the features of the proposed skill formation model.

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ABBREVIATIONS

ADB	Asian Development Bank
APROC	Asian Pacific Regional Operation Centre
ASEAN	Association of South East Asian Nations
CAD	Computer-aided design
CAM	Computer-aided manufacturing
CEPD	Council for Economic Planning and Development, Taiwan
CIECD	Council for International Economic Co-operation and Development, Taiwan
EC	Education Commission, Hong Kong
EMB	Education and Manpower Branch, Hong Kong
EVTA	Employment and Vocational Training Administration, Taiwan
GDP	Gross Domestic Product
GNP	Gross National Product
HKAL	Hong Kong Advanced Level Examination
HKCEE	Hong Kong Certificate of Education Examination
HKPC	Hong Kong Productivity Council
HKTC	Hong Kong Training Council
HPAE	High performance Asian economy
IC	Integrated circuit
ILO	International Labour Organisation
IMF	International Monetary Fund
ITAC	Industrial Training Advisory Council, Hong Kong
KCR	Kowloon Canton Railway, Hong Kong
MDP	Manpower Development Plan, Taiwan
MOE	Ministry of Education, Taiwan
MOEA	Ministry of Economic Affairs, Taiwan
MPD	Manpower Development Department, Taiwan
NC	Numerical control
NIE	Newly Industrialised Economies
OECD	Organisation for Economic Co-operation and Development
PWD	Public Works Department, Hong Kong
TEVT	Technical education and vocational training
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VTC	Vocational Training Council, Hong Kong
WTO	World Trade Organisation

SECTION

I

The Research Problem and Background Information

CHAPTER 1

THE RESEARCH PROBLEM

Introduction

Since the Second World War, some East Asia economies have been among the most successful in the world. Hong Kong and Taiwan are two of the Newly Industrialised Economies (NIEs)[1] cited by many economic observers[2] that have experienced very high growth-rate of GNP in the world market economy – though whether this can be sustained remains to be seen. It is commonly believed that human capital formation has been a key factor contributing to these areas' growth.[3] In appraising the unprecedented economic development record of the NIEs, many studies also contended that one of the key strategies is their outward-looking policy in using the abundant factor of production-labour.[4] In meeting their need for industrial skills to sustain economic development, technical education and vocational training has been seen as an obvious solution to the shortage of skilled manpower. The achievement in economic growth

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[1] The other two are Singapore and South Korea.

[2] For example see Hofheinz, R. and Calder, K. 1982. *The East Asian Edge.* New York, Basic Books; Ranis, G. 1989. 'The role of institution in transition growth: the East Asian Newly Industrializing Countries' in *World Development.* Vol 17, No 9; Wade, R. 1990. *Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization.* Princeton, Princeton University Press; Castells, M. 1992. 'Four Asian Tigers with a Dragon head: A Comparative Analysis of the State, Economy, and society in the Asian Pacific Rim' in Applebaum, R. and Henderson, J. (ed) *States and Development in the Asian Pacific Rim.* London, Sage Publications; Root, H. Small Countries, Big Lessons: Governance and the Rise of East Asia. Hong Kong, OUP.

[3] For example see Asian Development Bank. 1989. *Asian Development Outlook 1989.* Manila, Asian Development Bank; World Bank 1993. *The East Asian Miracle: Economic Growth and Public Policy.* New York, OUP.

[4] For example see James, W.E., Naya, S. and Meier, G.M. 1989. *Asian Development: Economic Success and Policy Lessons.* Wisconsin, University of Wisconsin Press.

in these two dominantly Chinese populated NIEs has motivated this research study to identify the variables in the development of technical and vocational education which might help explain the role of this form of human resource preparation in the process of industrialisation and economic development in these two major Chinese communities outside mainland China.

The research thesis

Hong Kong and Taiwan, similar to each other, have comparable economies, they encourage foreign and multi-national investment, and they are dependent on externally oriented industries. To be able to find international markets, the two NIEs need to continue to improve efficiency and quality in production throughout the economy if they are to compete successfully in an era of rapid economic and technological change. Moving to high value-added production requires skills and adaptability. One way of raising productivity is through education and training.

The main purposes of this research are to identify the distinct features of the approach to technical education and vocational training in these two new industrial economies of Asia and to show how this has contributed to economic growth. The focus of study is to examine the development process as well as the nature and effects of government policy in this type of skill formation and to obtain a clear picture of its role in the wider human capital formation system of these two economies. Lessons from them may shed some light on Australia and other countries with similar market economies when formulating human resource policies.

The 1989 Asian Development Bank Report and the 1993 World Bank Report[5] suggest that investment in human resource development was one of the reasons for the success of the high performing Asian economies (HPAEs) in generating rapid economic growth throughout the last three decades. It was this rapid growth which differentiated them from the developing economies and enabled them to pull away from the rest of the developing countries. However, the two reports do not move beyond the confines of conventional human capital theory to explain how the investment in human resources has created growth. High levels of education attainment in primary and secondary school enrolments are recounted, and a simple correlation is made between economic and educational success. In their attempt to develop further the World Bank approach to analyse 'the key to the Asian miracle', Campos and Root[6] have elaborated on the suggestion that one of the mechanisms involved in translating the investment in human resource development into economic growth has been the larger investment the high performance Asian economies, notably Hong Kong and Taiwan, made in primary and secondary education during the initial phases of the industrialisation process. They stressed that

> 'All of the HPAEs have invested heavily in education and, unlike many other developing countries, have concentrated on primary and secondary schooling. The share of the educational budgets allocated by the HPAEs to basic (primary and secondary) education is significantly higher than the share allocated by other developing countries.... The benefits of focusing on

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5 Asian Development Bank 1989 and World Bank, 1993. *Op cit.*

6 Campos, J.E. and Root, H.L. 1996. *The Key to the Asian Miracle.* Washington D.C., the Brookings Institution.

> primary and secondary education are substantial. The higher the enrolment rate in primary and secondary education, the higher the growth in a country's per capita gross domestic product.'[7]

The argument I develop here is that in order to understand why the investment of human development resource in Hong Kong and Taiwan has been successful, we need to look beyond the spillover effects of initial investment in primary and secondary education postulated by the Asian Development and World Bank schools. A neglected aspect has been the two NIEs' role in developing appropriate systems of skill formation.

At each stage of economic growth new industries are established which demanded different human skills and therefore one-off investments in education are not in themselves a sufficient explanation of skill formation to support growth. As the higher value added industries are established new and more complex demands are made of humans during their performance at work. To deliver the requisite skills means governments need to be in a position to identify the requisite skills required by the economy and have the means of amending and adjusting the content of the curriculum and the form in which education and training are delivered. This in turn requires them to establish mechanism to ensure that these adjustments are made and that the output of the education and training systems meets the needs of existing and emerging industries.

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[7] *Ibid*, p56.

The hypothesis and statement of problem

My hypothesis is that to articulate the twin transformation of the economy and of human capital, the two NIEs have adopted a model to develop systems of skill formation quickly with particular reference to technical skill formation after compulsory schooling. This model provides institutions and mechanisms to link skill formation policy closely to specific stages of economic development. It also co-ordinates the supply and demand of skills to fit with the expected trajectory of economic development.

The important features of this model are:

i) There are clear mechanisms which ensure that the manpower requirement of the existing and future industries are used to guide the development of the technical education and training system.
ii) The government has strong control over the technical education and training systems which ensures a fast response to changes in the skill demands of industries.
iii) Changes in the technical education and training system are closely linked to changes in the economy.

This study will examine the question: To what extent do the distinctive features of this human capital formation model approximate the approach to technical education and vocational training (TEVT) development in Hong Kong and Taiwan?

Methodology

Multi-method qualitative and quantitative approaches will be used to examine the applicability of this model. These include, on the one hand, analysis of large numbers of reports, documents and statistics on the development of education and training systems in the two territories, and on the changing economy. On the other hand, field trips were undertaken to interview key persons, conduct field observations, and collect first hand primary information. Besides these, use is made of inter-library borrowings and World Wide Web searches to obtain updated documentation. In addition to English materials, a large collection of relevant materials in Chinese are also examined.

Organisation of the thesis

This thesis consists of five Sections. In each Section a number of Chapters are allocated to address the problems stated above.

The next Section is concerned with identifying existing theories about technical education and training development and their role in economic growth. The basics of a human capital formation model in education and training then set out. This model forms the framework for the analysis of the subsequent Sections.

The following two Sections provide detailed accounts of the development of technical education and training policy, institutions and provision in Hong Kong and Taiwan, with a time span from the period of post-war revival through to the mid 1990s. In each case the development is set against the backdrop of the changing economy.

The last Section will bring these accounts together to reveal the extent to which Hong Kong and Taiwan conform to the framework of the proposed human capital formation model in developing technical skills.

The five Sections can be summarised as follows:

Section I – The Research Problem and Background Information;
Section II – Theories, Issues and Literature Review;
Section III – Technical Education and Vocational Training in Hong Kong;
Section IV – Technical Education and Vocational Training in Taiwan; and
Section V – Conclusions and Postscript.

CHAPTER 2

BACKGROUND INFORMATION OF THE TWO NIEs

Economic development of the NIEs

The highly export oriented Asian Newly Industrialised Economies (NIEs) of Hong Kong, Singapore, South Korea, and Taiwan have been the fastest growing economies in the world since the 1960s. Within a period of 25 or 30 years, they have transformed themselves from poor, less developed countries to semi-industrial economies, on the verge of joining the ranks of the advanced industrial countries of the world. Since the 1960s, they have achieved rates of economic growth that are three or four times higher than any other countries in the world. Indeed, some NIEs have already overtaken some developed Western European economies in terms of per capita income and standard of living. Hong Kong and Singapore have been classified by the World Bank as high-income economies and have been grouped in the same category as the developed OECD countries.[1]

In the period under review in this thesis, the success of the Asian NIEs in export-oriented industrialisation since the 1960s earned them an important place in the international trading system. They have been some of the most outward-looking economies in the world. In 1965, the four Asian NIEs' share of world trade was 1.5%. Since then, this grew

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[1] World Bank. 1991. *World Development Report 1991*. New York, Oxford University Press.

steadily to reach 9.2% in 1992 and 13.7% in 1997.[2] Hong Kong and Taiwan together accounted for 7.4% of world trade in 1997.[3] This is a remarkable achievement by any standard. In terms of the total volume of trade, in 1997, Hong Kong was ranked fifth in the world (up from tenth in 1992) and Taiwan was ranked ninth (up from twelfth in 1992).[4] The importance of the Asian NIEs in world trade is also reflected in their exports. They accounted for 60 % of the total manufactured exports of all developing countries in 1976. From 1980 to 1988 the four NIEs collectively doubled their share in the world exports.[5] Hong Kong, through its production facilities in China, remains the world's largest manufacturer of toys and time pieces. Singapore is the world's largest producer of computer peripherals. Taiwan is the world's largest manufacturer of electronic mice, scanners and monitors for computers, while South Korea is the second largest producer of motor vehicles in Asia. In dollar terms, these four NIEs maintained an average annual export revenue growth of 14.7% in 1991-95 but experienced a sharp drop in 1998 due to the 1997 financial crisis. A negative export revenue growth of 0.9% was recorded in 1996-98.[6]

The rapid economic growth of the Asian NIEs from the 1960s until the late 1990s was accompanied by declining fertility, rising per capita incomes and improved standards of living. With regard to GDP growth these four economies enjoyed average growth rates of 9.2% and 8.1%

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[2] Source of figures: International Monetary Fund. *Direction of Trade Yearbook* (various years); Council for Economic Planning and Development. *Taiwan Statistical Data Book* (various years); Hong Kong Trade Development Council. *Major Trading Economics of the World 1997* (http://stat.tdc.org.hk/monthly/wtrade-97.htm).

[3] Figure compiled from data from Hong Kong Trade Development Council. *Major Trading Economics of the World 1997* (http://stat.tdc.org.hk/monthly/wtrade-97.htm).

[4] *Ibid.*

[5] Asian Development Bank. *Asian Development Outlook 1989.* Manila.

[6] The World Bank. 2000. East Asia: Recovery and Beyond. Washington DC, The World Bank.

for the periods from 1971 - 1980 and 1981 - 1988.[7] And 6.8% of GDP growth was recorded during the period from 1989 -1996.[8] In March, 2001, the level of per capita GDP valued to US$23,597 in Hong Kong, US$22,824 in Singapore, US$13,248 in Taiwan and US$8,581 in South Korea.[9] This achievement in per capita GDP is comparable to or even higher than Western developed countries such as Australia, Italy, Spain, Portugal and Greece.

In fact, all of the four demonstrated unprecedented high rates of export-led economic growth for a period of over three decades before experiencing a recession in 1998. With economic performance and per capital GDP as the basis, the respective year of 'take-off' for each of the four NIEs differs from each other, Hong Kong was the first to 'take off', followed by Singapore, Taiwan and Korea. Only Hong Kong and Taiwan will be discussed in this research.

Industrialisation of Hong Kong – an outline

The Communist victory over mainland China in 1949 caused fundamental changes in Hong Kong. The reorientation of China's trade toward the USSR and Eastern Europe, and UN's embargo against trade with China consequent to China's entering the Korean War damaged Hong Kong's re-export business greatly. The communist take-over of China also led to massive inflows of resources of labour, capital, and entrepreneurial skill between 1948 and 1951. These resources transformed the economy. As Edward K.Y. Chen said the transformation from an entreport to an industrial city was achieved

[7] *Asian Development Outlook. Op cit.*
[8] International Monetary Fund. 1997. *World Economic Outlook.* Washington DC, IMF.
[9] *Asianweek.* March 5-11, 2001.

'without planning or even premeditation.'[10] The role of the government was insignificant. The entreport was drying up, refugees from China had to learn to live by their wits. Equipped with some capital and knowledge of how to organise manufacturing activity, the refugees soon set up numerous small factories for producing labour-intensive products to export to industrialised countries. With co-operation from many existing trading companies in Hong Kong, manufactures had easy access to export markets. So Hong Kong became the first developing country to embark on this road and it was very successful.

Large numbers of small enterprises were created, using family members and part-time workers, with extensive use of subcontracting to other firms and even to households on a piece-rate basis. This was possible because of Hong Kong's physical compactness and highly developed infrastructure, which made transportation of goods and people not a problem. Capital equipment was used intensively with both day and night shifts. Unique arrangements developed, such as the contractual work-group system, which used capital intensively without requiring long term commitments to workers. Consequently, Hong Kong developed a capability to produce labour-intensive manufactured goods at low prices as well as an ability to provide quick delivery and fill orders at short notice. The distinguishing characteristic of Hong Kong's manufacturers was responsiveness and adaptability based on small, domestic entrepreneurs.

Despite rapid growth and increase in per capita income Hong Kong's production and exports of manufacturers remain labour intensive. The reason for this relates to the supply of labour and private entrepreneurs

[10] Chan, E.K.Y. 1984. 'The Economic Setting' in *The Business Environment in Hong Kong.* Lethbridge, D. (Ed), 2nd ed. Hong Kong: OUP.

in Hong Kong. Labour supply in Hong Kong is very elastic. This has been partly due to the steady inflow of new immigrants from the Mainland China, partly to the increase in the participation rate of women. Postwar baby boomers entering the labour force have also helped to sustain labour availability. Moreover, immigrants continued to come and there was even a new burst of immigration into Hong Kong following Deng Xiao Ping's new era in China in 1978.[11]

As a result of the rapid growth of the labour force, wage increases have been very moderate in Hong Kong. Between 1965 and 1973, real wages increased 4.9% per year, but labour productivity increased 5.1% per year. And between 1973 and 1979, real wages rose only 2.1% per year, while labour productivity accelerated to 5.7% per year.[12] However, as from the late 1980s, Hong Kong's manufacturing industry did face labour shortage problems when the unemployment rate continuously stood below 2%. This problem was solved by importing skilled labours from the neighbouring countries, mainly from Mainland China. Relatively speaking, labour has remained cheap in Hong Kong, and because of this, the economy has never gone into a phase of capital deepening, and its product composition has not changed much. However, there has been great improvement in product quality and design, but many of the production processes are still labour intensive. Furthermore, many industries have moved their production bases across the border to Southern China for cheaper land and labour costs since the 1980s.

[11] According to the 1981 Hong Kong census, 58% of the increase in population between 1976 and 1981 was due to net immigration.

[12] Chen, E.K.Y. *Op cit.*

Talking about industrialisation of Hong Kong, the government's administration is worth mentioning. It was mainly the things the government did not do that forced the private sector to begin producing manufactured goods in order to survive. It did not exercise a countercyclical monetary and fiscal policy; it permitted laissez-faire capitalism by having few restrictions on private ownership; it allowed free entry to the port; it had no exchange control, and it established few public enterprises. The skill that Hong Kong entrepreneurs developed to adjust to external forces has brought prosperity, with very little influence by the government.

Industrialisation of Taiwan – an outline

During the early postwar period Taiwan was still a predominantly agricultural economy, with more than half of its labour force employed in agriculture. Manufacturing activity accounted for only 11% of net domestic product in 1952. Exports accounted for 8% of GNP, and the share of manufactured exports in total exports was only 7.6% in 1955.[13] The major export items had been sugar and rice, comprising well over half the total exports up until 1959.

The postwar development of Taiwan can be divided into four phases, with 1952, 1961 and 1980 as the dividing lines. The first two phases were characterised by inwardly oriented import-substituting industrialisation; the third phase was characterised by outwardly oriented export expansion; the fourth phase was characterised by accelerated growth and hi-tech industrialisation. A broad base for

[13] Liang, K.S. and Liang, C.H. 1988. 'Development Policy Formation and Future Priorities in the Republic of China' in *Economic Development and Cultural Change.* Vol. 36, No. 3 April 1988.

economic development was laid by land reform that was carried out during 1945-53. During this phase, the diversification and expansion of industrial production placed primary emphasis on the domestic market. The government adopted an active role to promote production: loans were available on favourable terms, imported materials were directly allocated to manufacturers, and assistance was extended to the sale of products. This brought high production from 1950-58. By 1960 manufacturing activity accounted for 17% of net domestic product.[14] The food processing industry expanded first, followed by textiles and then electrical machinery.

To sustain high economic growth, the Taiwan government undertook a series of policy reforms to transform the import-substituting economy to an export-oriented one during 1958-61. Multiple exchange rate was unified, currency devalued, laws regulating investment and imports were liberalised. The emphasis of trade strategy was shifted from strict import controls to export promotion.

The growth of manufactured exports, coupled with rising domestic demands, accelerated the pace of industrialisation. The compound annual rate of growth of manufactured output rising from 11% during the period 1955-60 to 21% during the period 1965-70. The share of manufactured products in total exports rose from 28% in 1960 to 77% in 1970.[15] The rapid development of labour-intensive export industries thus allowed economic growth to be more labour absorptive and equitable.

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[14] *Ibid.*

[15] Source of figure from *The Trade of China*. Taipei: Inspectorate General of Customs.

The volume of exports grew at an average annual rate of 15.1% between 1952 and 1985,[16] accompanied by continuing shifts in the composition of exports. In the 50s, sugar and rice accounted for more than 70% of the total, but their shares had fallen to less than 1% by 1985. Their place was taken over by manufactured goods, the leading ones being electrical machinery and appliances, clothing and footwear, textiles, and plastic articles.[17] From 1965-91, rapid growth was achieved in exports of electrical products, transportation equipment, petrochemicals, machinery, computer products, and metal products. Structural changes in the pattern of exports over the period reflect a growing importance of high valued-added products from more capital- and skill-intensive industries. It is noteworthy that the expansion of employment in manufacturing had pulled workers from low-paying agricultural jobs to higher-paying manufacturing employment and that female workers had played an important part in the economic development of Taiwan as the rapid growth of labour-intensive industries induced large scale entry of women into manufacturing.

With regard to Taiwan's direction on economic development as from the 1980s, it was pointed out that the following considerations have been incorporated into strategic plans:[18]

- Low energy intensiveness;
- High technology intensiveness;
- High valued-added;
- High skilled-labour intensiveness;
- Strong defence foundation;

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[16] *Ibid.*

[17] Liang and Liang. *Op cit.*

[18] Kuo, Shirley, W.Y. *et.* 1981. *The Taiwan Success Story.* Colorado: Westview Press.

- High domestic linkage.

A number of related laws, regulations and other measures have been taken to promote those industries that best meet all of the above conditions. These were the prerequisites to continued economic expansion and hi-tech industrialisation in the 1980s and 1990s.

To sum up, factors such as strong and stable leadership, the commitment of the pragmatic bureaucracy to promote economic development and the growth of a reasonably well-educated and hardworking labour force, have all contributed to the success of Taiwan's industrialisation.

Human capital development in Hong Kong and Taiwan

Hong Kong and Taiwan are poorly endowed with natural resources. They lack fuel and metals, they have limited cultivated land, but they have ample supply of relatively cheap and well-disciplined labour.

The rapid growth of the two NIEs can be attributed to a large extent to the sound human resource and manpower development there. The Asian Development Bank listed human capital formation as the crucial underlying factor in these areas' growth.[19] Oshima in analysing East Asia's high growth also argued that in the interplay between technology and institutions, people is important. He claimed: 'The efficiency of institution depends on the quality of manpower since institutions may be viewed as groups of people working and thinking in patterned ways.

[19] Asian Development Bank. *Op cit.,* p153.

Hence the quality of manpower contributes to the effectiveness in the import, absorption, dissemination, and adaptation of technologies through institutions in the market, in the government, and elsewhere.'[20]

To the two NIEs, most new technologies are imported and the capacity to select the appropriate ones depends much more on manpower than the advance of new knowledge which is partly a function of time. If we classify resources into natural, capital and human resource, the latter is strategically important as it is people who manipulate other resources through institutions. Highly educated and skilled manpower became increasingly critical as these two economies approached industrial maturity.

After discussing the role human capital played in the growth, the human resource policy approaches in the two NIEs are next considered. Generally the levels of schooling in the two NIEs are high. They have

already achieved gross enrolment ratios of 100% at the primary level; and in terms of enrolment at the secondary level, they have achieved gross enrolment ratios above the average of the upper middle- and comparable to the average of the high-income countries. Table 2.1 shows the gross enrolment ratio by level of education.

[20] Oshima, H.T. 1988. 'Human Resources in East Asia's Secular Growth' in *Economic Development and Culture Change.* Vol. 36, No. 3, April 1988, pS106.

	Primary	Secondary	Tertiary
Hong Kong	102	75	13
Taiwan	100	88	38
Upper middle-income economies	104	67	20
High-income economies	102	93	39

Table 2.1 Gross Enrolment Ratio by Level of Education[21]

The mean year of schooling of the labour force in the early 1980s was 8.8 in Hong Kong and 8.6 in Taiwan.[22] These two NIEs are therefore able to attract investment in industries such as electronics and other hi-tech sectors precisely because they possess a workforce educated and trained to handle the technologies involved.

Because universal primary education has been achieved by these two economies, they have relatively slow expansion in primary school enrolment, rather rapid secondary school expansion, and very rapid growth of university and vocational education enrolment. This implies increase of unit cost. In the 1980s, Hong Kong and Taiwan increased their spending on education as a percentage of GDP and, due to the high GDP growth rates in those years, very large increases in educational spending were recorded. The large investment in quality education appears appropriate and is consistent with the economic strategy of developing and producing sophisticated, world market-competitive goods and services.

To meet the demands of industries for new skills, these two economies started establishing in the 1960s systems of technical education and

[21] Source: Foy, C., Harrigan, F. and O'connor D. (ed) 1998. The Future of Asia in the World Economy. Paris, OECD, ADB. P165, Table 7.
[22] Asian Development Bank. *Op cit.,* p160.

vocational training. For instance, Hong Kong established a great number of education and training programs under the Industrial Training Advisory Committee and later the Vocational Training Council. Public training centres were established to upgrade the existing workforce. Training tax was levied in Hong Kong and once in Taiwan for some industries to support vocational training.

Contribution of human resources

The importance of manpower development and utilisation has been shown in the rapid economic growth of the two NIEs under examination. Their industrialisation and ability to enter the markets of the advanced countries are better than many developing countries with lower labour cost and better natural resource endowments. The quality of their human resources must be the key to their success. It is certain that technical education and vocational training based on high levels of general education has contributed to quality human capital formation. This formed the nucleus of this research.

SECTION

II

Theories, Issues and Literature Review

CHAPTER 3

EDUCATION, TRAINING AND ECONOMIC DEVELOPMENT

Introduction

Among the factors that help to explain the economic growth in Hong Kong and Taiwan are *human resources*. Education and training, or to be more specific, technical education and vocational training are the two most important means whereby an economy's workforce acquires human capital.

There are a number of theoretical approaches concerning the relationship between education, training and economic growth. The human capital school's concept on the role of education and training to economic growth in general will be first discussed. And the Asian Development Bank as well as the World Bank's special research on the contribution of human resources to the economic development and transformation over recent decades in the Asian Newly Industrialising Economies will be reviewed next in this Chapter.

Human capital theory

The concept of human capital refers to the fact that people invest in themselves by means of education, training, or other activities, which improves their future income by increasing their lifetime earnings. Economists use the term 'investment' to refer to expenditure on assets which will produce income in the future, and contrast investment expenditure with consumption, which produces immediate satisfaction or benefits, but does not create future income. Assets which will generate income in the future are called capital. Traditionally, economic analysis of investment and capital tended to concentrate on physical capital such as machinery, equipment, or buildings which would generate income in the future by creating productive capacity. The origin of human capital theory can be dated back to the classical economist Adam Smith who, in his most successful book *Wealth of Nations*, pointed out that education helped to increase the productive capacity of workers in the same way as the purchase of new machinery, or other forms of physical capital, increased the productive capacity of a factory or other enterprise. This analogy drawn between investment in physical capital and investment in human capital provided a base for human capital theory.

The concept was not fully developed, however until the early 1960s when Schultz[1] and Becker[2] developed a neoclassical view of the labour market which suggested that skills are embodied in individuals in such a way that they develop a type of human capital. The theory of human capital entails a dual perspective. From one angle society can be seen as investing in human capital to increase economic growth. From another angle the individual can be seen as investing in education to increase personal income. If education is not seen from this perspective, Schultz argues, we will not be able to understand that

[1] Schultz, T. W. (ed) 1961, *Investment in Human Beings*, Chicago, University of Chicago Press.
[2] Becker, G. S. 1964, *Human Capital: A Theorectical and Emperical Analysis with Special Reference to Education*, Princeton, Princeton University Press.

> '... labourers have become capitalists not from a diffusion of the ownership of corporation stocks, as folklore would have it, but from the acquisition of knowledge and skill that have economic value.'[3]

Thurow defines human capital in a more rigorous way,

> 'Human capital is defined as an individual's productive skills, talents, and knowledge. It is measured in terms of the value (price multiplied by quantity) of goods and services produced.'[4]

There are two reasons why individuals' productive capacities are treated as a form of capital. Thurow explains, first, such capacities, like physical capital, can produce goods and services both now and in the future. Second, such capacities, like physical capital, can be increased by investment like education, training, health expenditure, etc.[5]

According to this theory, educated workers supply employers with human capital to increase productivity. In this way, it can be claimed that education is positively correlated with marginal productivity[6] and thus rewarded correspondingly in the form of higher wages. Karabel

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[3] Schultz, W. T. 1978, 'Investment in Human Capital' in Karabel, J. and Halsey, A. (eds), *Power and Ideology in Education*, New York, OUP, p314.
[4] Thurow, L. 1970, *Investment in Human Capital*, CA, Wadsworth Publishing Company, Inc., p1.
[5] *Ibid.*
[6] In economics, marginal productivity of labour is defined as the additional output that can be produced by employing one more unit of labour while holding all other inputs constant.

and Halsey further point out that this ideology is in harmony with the technological functionalism and utilitarian values of the classical 19th century economists.[7] It combines the technical function of education with the efficient use of human resources.

Linked to the human capital perspective has been the claim that education and training should closely respond to the needs of industry. Central to the instrumental view of vocational education is the assumption that education and training can operate as a means of social control whereby people are fitted, in the most efficient manner, into the various sectors of industry. The underlying principle is that the products of the education and training system should be adaptable and flexible so that they can respond harmoniously to the rapid rate of technological change and market fluctuations faced by industry. The emphasis in this argument is that technological changes in the work place will trigger changes in the skill requirements of jobs because of decrease in low-skilled jobs and increase in high-skilled jobs. Education and training develop specific skills or general attributes in people which are necessary for performing more skilled jobs. This functional view of human resources development was pinpointed by Collins in the 1970s that

> '... there is a general fixed set of positions, whose various requirements the labour force must satisfy. The fixed demand for skills of various types, at any given time, is the

[7] See Karabel, J. and Halsey, A. 1978. *Power and Ideology in Education*, New York, Oxford University Press.

basic determinant of who will be selected for what positions.'[8]

After examining the theory of human capital the next is to explore, within the human capital framework, how the educational contribution to economic growth was empirically estimated. In general there are two ways. One is the growth accounting approach, the other is to measure the rate of return to human capital and then compare it to the rate of return to physical capital. In the 1960s and 1970s, several empirical studies were conducted. Denison tried to explain the sources of the economic growth in the United States from 1929 to 1957 by using the growth accounting approach. This approach is based on aggregate production function, treating the labour force as a homogeneous input. He found that an increase in the physical capital and labour could only explain 31% of the growth. This left 69% of the increase in output as unexplained 'residual'. Denison attributed 38% of the increase to the increase of human capital, which are the improvements in the quality of labour force.[9]

The rate of return of different types and levels of education and training and the yield of investment in human capital have attracted a considerable amount of research work since the 1960s. Psacharopoulos reviewed the various attempts to measure the social and private rate of return to investment in education in 32 countries and published the results in 1973.[10] He later updated this survey of research on the

[8] See Collins, R. 1979. *The Credential Society: A Historical Sociology of Education and Stratification.* New York, Academic Press, p1007.
[9] Denison, E. 1962. *The Sources of Economic Growth in the United States and the Alternative Before Us.* NewYork, Committee for Economic Development.
[10] Psacharopoulos, G. 1973. *Returns to Education: An International Comparison.* Amsterdam, Elsevier.

returns to education by analysing the results of cost-benefit analysis of education in 44 countries and released the findings in 1981.[11] His findings revealed that the estimate of social and private rates of return to educational investment, based on surveys of the earnings of workers of different educational levels in these 44 countries from 1958 to 1978, unfurled the following patterns:

i) the returns to primary education (whether social or private) are the highest among all educational levels,

ii) private returns are in excess of social returns, especially at the university level,

iii) all rates of return to investment in education are well above 10% of the opportunity cost of capital,

iv) the returns to education in less developed countries are higher relative to the corresponding returns in more advanced countries.

Argument of human capital theory

The concept of human capital suggested that education and training raised the productivity of workers and hence increased their lifetime earnings by imparting useful knowledge and skills. However, recent developments in labour market theory have led to the development of an alternative to the human capital framework, the so-called screening hypothesis and the associated theory of credentialism. This approach asserts that education does not so much increase productivity as offer employers a convenient criterion for selecting the best workers under

[11] _____ 1981. 'Returns to Education: An Updated International Comparison' in *Comparative Education*. Vol 17, pp 321-41.

conditions of inadequate information. The employer is often assumed to have only partial information about the employee's knowledge and productive capacities, whereas the employee is fully informed about his own qualities and deficiencies.[12] Schooling is nothing more than a screening device, the best available indicator the employer can use to 'filter' different applicants for jobs. Machlup[13] talked about a triple filter contained in schooling. One is in the school's selection process at entrance, another is the failing/passing of examinations, and the third is the self-selection of students in the decision to apply for schooling. The last filter is probably the most important one because it indicates the particular individual's motivation and determination, which are precisely the qualities searched for among potentially useful workers.

Human capital theory suggests that the labour market will continuously absorb workers with ever-increasing levels of education provided that education-specific earnings are flexible downwards, whether by employing the more educated into lower paid occupations or by reducing real earnings by occupation. This mechanism requires that employers always prefer more educated to less educated employees, other things being equal, but human capital theory offers no explanation as to why employees should hold such a preference. The

screening hypothesis suggests that education is nothing more than a diploma which signals to potential employers that the applicant has the required personal qualities or a certain trainability and is able to

[12] See Stiglitz, V.E. 1975. 'The Theory of "Screening", Education, and the Distribution of Income' in *American Economic Review,* Vol 65, No.3, pp283-300.
[13] Machlup, F. 1984. *The Economics of Information and Human Capital.* Princeton, Princeton University Press. p534.

acquire knowledge in a reasonably short period of time.[14] That is to say, education simply confers 'credentials' that employees can use to select workers and to determine relative wages and salaries.

This argument has attracted considerable controversy, but has been refuted by economists who argue that while a 'weak' version of the screening hypothesis is undoubtedly true (since employers do use educational qualifications in selecting employees), there is no evidence to support the 'strong' version of the hypothesis that education has no direct effect on productivity.[15]

Moreover, it was also argued that technical education, rather than basic education, specifically augmented industrial employability and productivity as it brought recent technology to bear. Yamada and Ruttan[16] for instance found that technical education alone accounted for 15 - 25% of the difference between the United States and Argentina, India, Denmark and Turkey in output per worker in agriculture, and this was addition to the contribution they found from basic education. This was important because the modernisation and mechanisation of the agriculture sector in most agro-based developing countries is part of the industrialisation process.

[14] See Stiglitz, V. E. *Op cit*; Wolpin, K. 1977. 'Education and Screening' in *American Economic Review*. Vol 67, No 1; Machlup, F. *Ibid*.
[15] See Psacharopoulos, G. 1979. 'On the Weak Versus the Strong Version of the Screening Hypothesis' in *Economic Letters*. Vol 4; Weiss, A. 1995. 'Human Capital vs Signalling Explanations of Wages' in *Journal of Economic Perspectives*. Vol 9, No 4, pp133-154.
[16] Yamada, S. and Ruttan, V. 1980. 'International Comparisons of Productivity in Agriculture' in Kendrick, J. W. and Vaccara, (ed) *New Development in Productivity Management and Analysis*, Chicago, Chicago University Press.

The reason why the screening hypothesis is important is that it has focussed attention on the precise way in which education or other forms of investment in human capital influence productivity, and has served as a reminder that education does far more than impart knowledge and skills. The reason why employers continue to prefer educated workers is that not only does the possession of an educational qualification indicate that an individual has certain abilities, aptitudes, and attitudes, but the educational process helps to shape and develop those attributes. In other words, it is now increasingly recognised that education affects attitudes, motivation, and other personal characteristics as well as providing knowledge and skills.

This means that the concept of investment in human capital is still valid, but it must be extended to include activities which affect personal attributes as well as skills and it must recognise that such activities increase workers' productivity in complex ways.

Human capital's effect on Asian economic growth

It is now increasingly recognised that human capital has dynamic effects in the growth rate of an economy. The source of this dynamic effect is partly found in the theory of technological progress. It is argued that both advancement of knowledge and innovation, and the diffusion of new methods of production, are aided by higher levels of education. There is now substantive evidence derived from data on a large number of Asian countries to support the proposition that human capital has this dynamic role. In a research study examining the association between human capital provision and economic growth in the Asian countries, Mingat[17] found that the variables characterising educational policy at the beginning of the period, or a decade before, are reasonably associated with the intensity of economic growth during 1960 - 1992. He related the initial (1950 - 1960) enrollment rate statistics of Asian countries to their growth of per capita output over the period 1960 - 1992. The result showed that, on average, a country whose primary education coverage was 10% higher than it was in the initial period would have, according to the estimated relationship, a growth ratio of 0.7.

In contrast, the coefficients associated with secondary and higher education enrollment rates were all negative and statistically non-significant. This does not mean that secondary and higher education are not worth developing when economic growth has created more demand for more educated workers.

These results point to the fact that the High Performance Asian Economies (HPAEs), which include Hong Kong and Taiwan, who in the very early stage of their economic development process have strongly prioritised primary education are significantly more likely to obtain high development outcomes thereafter. This fact will be elaborated nest with the work of the Asian Development Bank and the World Bank.

[17] Mingat, A. 1998. 'The Strategy Used by High-Performing Asian Economies in Education: Some Lessons for Developing Countries' in *World Development*. Vol 26, No.4.

State theory

The state theory argues that economic and industrial policies are effective in producing industries able to compete internationally and in promoting comparative advantage and steering shift to higher value added production.[18] A major tenant claim of this theory is that rapid economic growth can be achieved through coherent economic policies. The concept of the development state addressed the problem of how the relatively autonomous states in East Asia promoted development.[19] In explaining how to achieve policy coherence Johson[20], Amsden[21], and Wade[22] suggest there are four political prerequisites. First , the developmental state that initiates and implements such policies is characterised by having a strong executive and relatively weak legislative arm. Second, the state must possess an efficient bureaucracy. Third, it is important to secure the insulation of economic policy making from political and social forces. Finally, developmental states use a diverse range of policy instruments to implement economic policy making. The defining characteristic of these elements seems being the 'dynamic, shaping role played by the state leadership and bureaucracy in relation to civil society.'[23] Castells further identifies five commonalities in the experience of the East Asian NIEs. They are:

[18] See for example Gold, T.B. 1986. *State and Society in the Taiwan Miracle.* New York, ME Sharpe.
[19] The term developmental.state has been widely adapted to define the mode of . development of the four 'Asian tigers'.
[20] Johnson, C. 1982. *MITI and the Japanese Miracle.* Standford, Standford University Press.
[21] Amsden, A.H. 1989. *Asia's Next Giant.* New York, Oxford University Press.
[22] Wade, R. 1990. *Governing the Market: Economic Theory and the Role of Government in East Asia Industrialisation.* Princeton, Princeton University Press.
[23] Green, A. 1997. *Education, Globalization and the Nation State.* London, Macmillan Press Ltd. p32

i) the existence of an emergency situation in the society during the early stages of industrialisation;
ii) an outward orientation of the economy;
iii) the absence of a rural land-owning class;
iv) an ability to reskill the society during the process of industrial upgrading; and
v) the ability to adapt rapidly to changes in the international economic.[24]

Thus, 'A state is developmental when it establishes as its principle of legitimacy its ability to promote and sustain development'.[25] This suggests the state plays an active role in engendering a high-quality, well-controlled labour force, in providing strategic guidance to economic agents, and in managing periods of transition and the process of technological diffusion.

This school of thought sees the relationship between education, training and economic growth as the state's involvement in reskilling the labour force during the process of industrial development. However, the actual manner in which the state achieved these objectives is left unanswered. Castells' discussion of labour is primarily on explaining how the state succeeded in controlling labour, he mentions little about the process of reskilling.[26] But the coincidence in these countries of rapid economic advance with educational expansion clearly suggests a close relationship in this regard, indeed, there have been few accounts of the

[24] Castells, M. 1992. 'Four Asian Tigers with a Dragon Head: A Comparative Analysis of the State, Economy, and Society in the Asian Pacific Rim' in Applebaum, R. and Henderson, J. (eds) *States and Development in the Asian Pacific Rim.* London, Sage Publication.
[25] *Ibid.* p56
[26] *Ibid.*

economic miracle in East Asia which have not stressed the contribution of education and human capital formation to economic growth. This relationship will be further examined in the next Chapter on the World Bank's approach to provide a theoretical framework for the skill formation model proposed by this thesis.

Wade's 'guided market' theory ponders whether the Taiwanese government has shifted policy in support of market trends or whether the policies led the market.[27] This question is important in terms of skill formation. If state intervention follows existing trends then demand for skills would come primarily from industry and the state's task is to match the demand. However, if the state's economic intervention lead the market then in effect the state is partly driving the demand for skills. When Hong Kong and Taiwan are examined using this theory it can be shown in later Chapters of this thesis that the Taiwanese government has led specific industries some of the time and has done more than just help private industry do what it would have done, it has guided the market. Indeed, the Taiwanese government has used public industries to lead industrialisation and an in-depth analysis also indicates Hong Kong is not excluded from the developmental club.

The next is to consider broadly the role of the state in educational development and the function of education and training in the developmental state. The degree to which educational development is planned and the role the central state and bureaucracy plays in this are reviewed. Both Hong Kong and Taiwan invest heavily in education. In

[27] Wade, R. 1990. *Op cit*; Wade, R. 1990. 'Industrial policy in East Asia: Does it lead or follow the market?' in Gary Gereffi and Donald L. Wyman (eds) *Manufacturing Miracle: Paths of Industrialization in Latin America and East Asia.* NJ, Princeton University Press.

Taiwan government planing has remained absolutely central to development and this has entailed an integrated approach to the planning of economic development and human capital formation. While in Hong Kong though central planning of economic development is not a general government practice but in education and training, manpower planning and forecasts are prepared from time to time to provide enrollment guidance to meet skill demand.

In his discussion on the role of the state and the social partners in vocational education and training systems, Green considered the role played by social partners in the determination and implementation of policies constitutes one of the most significant variables between different national systems of education and training.[28] Historically, in Taiwan the central state has played a much greater part in the TEVT system, both in terms of setting up and financing provider institutions and *via* the regulation of curricula and examination. While in Hong Kong the social partners play important roles in participating in policy-formation and implementation with respect to finance, delivery and standard-setting of public training. Green further suggests the fundamental importance of collaboration between the social partners in the effective provision of TEVT. Such collaboration can only be effective where the state intervenes to co-ordinate the roles and responsibilities of the different partners.[29] This is due to the limitation of the market as a means of regulating the supply and demand for training. Training is a collective public good from which the society benefits. However, employers often prefer to poach rather than to invest in training,

[28] Green, A. 1997. *Op cit.*
[29] *Ibid.*

especially as in Hong Kong and Taiwan, where there is no strong training culture and most of the enterprises are small business where the space and resources for training are very limited. Furthermore, it is in the employers' interests to provide narrow, job-specific training to minimise the risk of losing their trainees and forfeiting their investment. On the other hand, young people may decide not to receive training because they have insufficient information and life experience to see the long-term advantages.[30] This is a manifestation of market failure of voluntary training. So, Green concludes that system based on the principle of social partnership only work when one of the partners, the state, defines the roles of the others and determines the shape of the system as a whole.[31]

The Asian Development Bank and the World Bank Approach

In the Asian Development Bank's *Asian Development Outlook 1989* and the World Bank's 1993 publication *The East Asian Miracle*, investment in education has been seen as an important explanation for the rapid growth of the HPAEs. Hong Kong and Taiwan were among these HPAEs seen to have made a substantial investment in education, especially primary and secondary education during the early stages of their industrialisation. They explain education growth in the HPAEs as the result of a combination of determining factors and well-judged government intervention.

[30] Segal Quince Wicksteed Ltd. 1996. *Strategic and Organisational Review of the Vocational Training Council: A First Report to the Secretary for Education and Manpower.* Hong Kong.
[31] Green, A. 1997. *Op cit.*

They propose three contributing factors towards the growth of education. First is the high income growth which makes more resources available for education over time. High economic growth also provides new job opportunities, thus raising the rate of return on education and increasing the demand for it. Second, decline in the rate of growth of the school-age population in the NIEs enabled more resources to be allocated to individual students, subsequently enhancing the quality of teaching. Third, household income in the NIEs was distributed relatively egalitarianly. Consequent to this was a higher demand for education as households generally could avail surplus resources to enable them to take advantage of educational provision when returns are high.

With regard to government intervention in education, the World Bank identified two areas where a gap between private and social returns can occur and where government action is therefore needed. Related to these are the failures in the capital market and in the information available to parents. The absence of information on the benefit of education means that parents do not wish to invest in the education of their children, while the absence of capital reduces their ability to invest. Under these circumstances the government intervenes to make information more widely available and to reduce the direct costs by making education free. On top of that, educational investments have externalities which means that households that invest are not the sole beneficiaries. For instance, a person's education may increase their household's income but it also has a spillover impact on the income of other households in the locality who may benefit from the presence of an educated person in the community. These are seen as co-ordination problems and therefore governments may act on society's behalf by choosing a higher level of education than families acting alone.

A focal argument of the World Bank is their assertion that the difference between private and social returns is higher for primary and secondary level education than for university or tertiary level education. Technical education may also have high social returns especially if it is given after primary and secondary education. They conclude that governments should provide schooling free and available to all at primary and secondary levels.

In assessing the governments' performance, the World Bank found that public expenditure on education has not been higher among the HPAEs than among the developing countries. The only difference was that the HPAEs allocated less of their budgets to higher education and more to primary and secondary education. This was crucial because investment in primary and secondary education had stimulated the demand for higher and tertiary technical education. Emphasis on universal, high quality primary education had important pay-offs in economic efficiency and equity. Excess demand created by primary education for secondary and tertiary education was met by a combination of expansion of public and self-financed private systems.

Taking all these favourable factors affecting education together, the result was that

> 'manufactured export orientation and high labour force skills interact to facilitate the acquisition and mastery of technology with attendant spillovers'.[32]

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[32] The World Bank. 1993. *The East Asian Miracle: Economic Growth and Public Policy*. Oxford, Oxford University Press. p324.

The World Bank's position on the role of education was further elaborated by Campos and Root.[33] They cited the empirical findings of Birdsall and Sabot[34] that primary and secondary school enrolments had substantial effects on economic growth in the early 1980s to support their analysis of the relationship between the investment in education by the HPAEs and economic growth. Campos and Root also maintain that, since primary education has the greatest spillover effects, it has the greatest impact on economic growth, and since the social rate of return exceeds the private rate of return, the government should intervene. They argue that basic education increases the supply of skilled workers. When they are in short supply they earn more than unskilled workers and hinder industrial growth. An increase in the number of skilled or educated workers reduces bottlenecks in the labour market and decreases income inequality.

The benefits gained from training have also been considered positive by the World Bank group. The *East Asian Miracle* cites some evidence from Taiwan's manufacturing firms in support of the proposition that training raises a company's productivity.[35] However, Middleton *et al*[36] elaborate the World Bank's analysis argue that it is far more difficult to identify the contribution of skills training to economic growth than it is

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[33] Campos, J. E. and Root, H. L. 1996. *The Key to the Asian Miracle: Making Shared Growth Credible.* Washington DC, Brookings Institutions.
[34] Birdsall, N. and Sabot, R. in their 1995 publication *Virtuous Cycles: Human Capital Growth and Equity in East Asia* (Washington DC, World Bank) estimated that a 10% point increase in primary school enrolments in 1970 would have increased average annual growth in real per capital GDP between 1980 and 1985 by 0.21% point; a 10% point increase in secondary enrolments would have increased the growth rate by 0.33% point.
[35] The World Bank. 1993, *Op cit.* p202.
[36] Middleton, J., Ziderman, A. and Van Adams, A. 1993. *Skills for Productivity.* New York, Oxford University Press.

for general education because of the heterogeneous groups involved and the diverse forms in which such training is delivered. Thus vocational education, technical education and training can be delivered to groups of varying ages and educational achievement and to very different occupational segments of the labour market. When it comes to rates of return these are 'nearly always acceptably high'[37] provided that suitable employment opportunities are present.

Regarding the role of government in training, the World Bank group's position is determined by the requirements of neoclassical theory and the market-failure argument. In the case of labour market imperfections, for example, when wages are raised above their market level distorting the returns to training, or when training costs are so high that workers cannot afford them, government intervention is needed.

A series of policy objectives for vocational and technical education and training have been identified. Work-based training is usually seen as more cost-effective than pre-employment training. Pre-employment training should be specialised to prepare people for the different labour market segments and should be oriented to employment rather than social goals. Finally, because of rapid change in the labour market, public provision of training should be flexible.

This section has discussed the two Bank's perspective on the role of education and training in HPAEs. However, their neoclassical approach which sees government intervention as being to correct for market failure has limitations. These will be examined in the next Chapter.

[37] The World Bank. 1993. *Op cit.* p46.

CHAPTER 4

A SKILL FORMATION MODEL

Introduction

There appear to be three necessary conditions for human capital formation processes to operate. The first is an education and training system that provides students with skills and knowledge needed by the labour market. The second is the economy is able to absorb the skills created by the education and training system. The third condition being that the economic and educational systems are closely coupled so that graduates with appropriate skills are allocated the jobs requiring these skills.

Although the theoretical approaches discussed in Chapter 3 provide explanations to how education and training attributed an important role to the rapid economic growth of the Asian NIEs. However, these approaches, particularly the World Bank's, are not without limitations in articulating the government activities in establishing education and training systems and enhancing skill formation. In this Chapter, the World Bank's approach will be evaluated and a skill formation model is hypothesised to underlie the human capital formation operation in Hong Kong and Taiwan, the two NIEs under examination.

An evaluation of the World Bank approach

A close examination to the World Bank's approach in explaining the relationship between education, training and economic growth revealed a number of problems.

First, it only explains the linkages between investment in education and economic growth for the first stage of economic growth, during the period when the Asian NIEs were producing low value-added goods and services. Investment in primary education helps reduce shortages of skilled labour in the early phases of industrialisation. But does this also hold true for the later phases? The World Bank approach does not address the possibilities that the nature of the relationship may change over time. For instance, there is some evidence that investment in primary education is particularly effective in enhancing economic growth in the early phases of industrialisation, but it is possible that in later phases investment in technical education or skills deepening program is more effective. It does not touch on how the investment in education and training facilitated growth during the later phase when these economies were moving into the production of higher valued-added goods and services.

A second problem is that the World Bank ignores the issue of how the government may be able to link the changes in the demand for skills. One point that needs to be understood is that the NIEs' success in creating a literate and disciplined labour force, and attracting sufficient investment in the production of low value-added goods to create full employment, means the employers have to meet with increasing wages demanded by the workers. This undermines the competitive edge of the employers in the markets for low value-added goods and services. An alternative government strategy is to move the economy into forms of higher value-added production, upskilling the labour force in the process to allow for higher standard of living and wages. In so doing, the government is changing the structure of the labour market through its actions.

The last problem with the World Bank approach is its use of neoclassical theory that leads to a selective perception of government activities in education and training. The assumption that the market is the most efficient mechanism in directing the delivery of training has neglected the fact that education and training may generate skills with long and varied time lags. To maintain a balance in the supply and demand for skills that occur in a rapidly industrialising economy requires many of the government activities in co-ordinating education and training to ensure that the demands of employers are meet – not just for existing skills but also for the skills of new industries. This aspect is ignored by the World Bank approach.

A skill formation model for Hong Kong and Taiwan

The hypothesis here is that, despite the differences in social and political structures and government in Hong Kong and Taiwan, there is an underlying model of skill formation common to both. Applying this model, institutions are set up in these two NIEs to provide technical education and vocational training (TEVT)[1] opportunities for people to acquire skills demanded by the industry and trade. The framework of the model and related theories are presented here.

[1] Technical education and vocational training in this study refers to the post-compulsory form of education and training after nine years of basic education.

The first element of model – Mechanisms linking trade and industry manpower requirements to technical education and vocational training provisions

In order for existing and future skill requirements of industry and trade be used to inform the organisation and output of TEVT system, it requires certain mechanisms to be put in place. The functions of these mechanisms are to plan TEVT provisions based on relevant information from industry and trade and to implement plans to ensure that the needs of the economy are accorded. Related theories and issues of these functions will be first discussed and relevant mechanisms in Hong Kong and Taiwan discharging these functions identified afterwards.

Concept of educational planning

Educational planning is a process by means of which the planner aims to create an adequate future educational situation and at meeting needs for education. It is 'a continuous, systematic process, involving the application and coordination of social research methods, and principles and techniques of education, administration, economics and finance, ... with define aims and well-defined stages...'[2]

However, educational planning is not a magic formula that will provide ready-made solution. It is an instrument to channel all knowledge about education and related disciplines into the preparation and implementation of long-term and short-term educational development plans. It is a tool of development that can be applied to varying socio-

[2] Definition of the Inter-American Seminar on Overall Planning for Education, Washington, D.C. June, 1958.

political environments and adapted to the goals of each country. In Taiwan, for example, education has been regarded as an instrument of the overall national policy based on the Three Principles of the People: Democracy, Nationalism, and the People's Livelihood.[3] Improving economic life and increasing civil rights and the independence of the nation have been set up as goals of education. The essence was translated into Article 158 of the Constitution which reads as

> Education and culture shall aim at the development among the citizens of the national spirit, the spirit of self-government, national morality, good physique, scientific knowledge, and the ability to earn a living.[4]

In the case of Hong Kong, 'educational planning is becoming recognised by government as a public policy tool of acknowledged standing alongside social welfare and economic planning.'[5]

Educational planning has the task of ensuring that education fits harmoniously into the pattern of change. It involves procedures to size up situations, to measure the country's capacity to respond to those situations, and to prescribe actions to be taken. If we take a brief review of Hong Kong's educational planning since World War II we would be able to discern how different planning emphasis has woven into the rapid changing socio-economic environments to satisfy needs and expectations of the different individuals and groups during various

[3] Bureau of Statistics, Ministry of Education, 1993, *Education in the Republic of China.*
[4] *Ibid.* p4
[5] *A Perspective on Education in Hong Kong,* 1982, Report by a Visiting Panel, p18.

developmental phases in the past four decades of history. In the 1950s, subsequent to the large influx of immigrants into Hong Kong, the first item on the agenda was to plan sufficient primary school places for the rapidly increasing population. While in the 1960s and early 1970s planning was concentrated on the strengthening and increasing the provision of education as a whole. Areas under attention were teacher education, advisory inspectorate, special education, curriculum development, public school examination, school administration, and so forth. And then in the mid-1970s, expansion of secondary education to meet the increasing demand became top priority of planning for the government's Education Department. To supply enough manpower required for economic development, post-compulsory technical education and vocational training planning occupied a major position on the agenda throughout the 1970s and 1980s.

Educational planning presupposes the existence of administrative and executive machinery. Information must be gathered on past and present situations, problems analysed, and alternative solutions determined. Planning calls for the correlation from each level and branch of education. Educational goals must be linked to global development plans with interdisciplinary (education, industry, economic, social) participation and support of the general public sought.

Why planning for technical education and vocational training

TEVT is a sub-set of education policy as a whole. Therefore, there are commonalities between its planning and educational planning in general, the only difference being their coverage in scope. Chan[6] gave the following reasons for why planning for TEVT is needed.

Consistency

Planning would lay a track for the development of TEVT. The success of TEVT is contingent upon the execution of already agreed-upon development strategies without being disrupted. The planning process allows for the establishment of predetermined outcomes for the administrator to achieve would minimise any disruptions due to change of hands in administration. In other words, plans in TEVT enables a coherent effect to be achieved by providing direction and effective guides for action in carrying out the already formulated policies.

Prioritisation of funding

The growth of interest in the study of economic of education produced magnificent effects. Expenditure on education and training was looked upon as a form of investment that promise future benefit. With this investment concept in mind, educational effectiveness becomes the pursuit of the government to justify the investment made. In drawing up a priority list for allocating resources to different education sectors, a plan in TEVT would provide reference information about its objectives, content and

[6] Chan, C. H., 1992, *Technical and Vocational Education,* 2nd ed. Taipei, the Three People Bookshop. (In Chinese)

expected outcomes which in turn would enable the policy maker to analyse and make judgement to invest most effectively.

Effectiveness

The object of TEVT planning is to get as far as possible within constraints, and where possible, to overcome some of them. What is to be emphasised is that the constraints are not merely physical and economic, they are also political, sociological and administrative. It is important that the planner will identify the major alternative courses of action that are available within the boundaries of likely constraints, so that their respective pros and cons can be weighed before making a choice. There are usually a good many feasible options, the task of the planner is to identify the most effective one given the inescapable limitations. Planning also promotes the use of measures of performance by allowing the establishment of predetermined outcomes and the development of ways to determine the success in achieving those results. It is clear that the public in Hong Kong and Taiwan are increasingly demanding more accountability from the education administrators.

Utilisation of resources

TEVT demands more resources than general education to run. It requires a more adequate infrastructure and facilities and more specialised teachers than does general education. Planning in TEVT ensures that resources are used correctly so that desired results are achieved in the best manner possible.

An input-output paradigm

Rapid economic growth and industrialisation in Hong Kong and Taiwan have demanded an increasing supply of highly trained manpower for the industry and the provision of TEVT at different levels. To plan the growth of so complex an entity as a major part of a nation's educational activity (as discussed above, TEVT is a sub-set of education as a whole) is extremely difficult. If the decisions made are to lead to a development along desired path, integrated into the national development plan, it is necessary to understand the dynamics of the process.

The first step is to recognise that TEVT does, in fact, constitute a system. In order that TEVT development may be consciously coordinated, its systematic nature must be made explicit. We need a paradigm of the system which delineates the key inter-relationships between the most important components. A paradigm is not, of course, the real system but only an abstracted idea of it.

Although it is possible to look at TEVT development from many different viewpoints, an input-output paradigm (see Figure 4.1) demonstrating the interplay of various factors of national development is postulated here to examine the development of TEVT in the two NIEs. This paradigm was designed after reading in modelling for educational planning in general was undertaken.[7]

In this paradigm, the goals of national development (as manifested, for instance, in Taiwan's various national 4-year Economic Development Plans) motivate TEVT and other sectors of educational development. This motivation and ingredients of TEVT are shown under 'INPUT' on the left-hand side. They are chiefly curriculum - its aims, values and attitudes, skills and abilities. These are achieved through teaching and learning processes, practice and exercise activities, guidance and counseling provided, with incentives in either the technical education system or the vocational training system. The former consists of schools, colleges, technical institutes and polytechnics while the latter comprises training centres, industry-based in-house training and school-industry co-operation schemes. The two systems need to be supported by conventional academic and legal prescriptions regarding such factors as length of study (indenture of training), compulsory attendance, and examinations.

The paradigm is based on the assumption that the whole process is well articulated, and that there is no interference in the mechanism of converting the input into the desired output. This conversion turns the population of students and trainees into an educated and trained workforce cultivated in the habits, attitudes, and motivations necessary

[7] Armitage, P., Smith, C. and Alper, P. 1969. *Decision Model for Educational Planning.* London, Allen Lane the Penguin Press; Coomb, P. 1970. *What is Educational Planning.* Paris, UNESCO; Huq, A. 1976. *Manpower Planning and Technician Education.* Singapore, VITB; Cunningham, W.G. 1982. *Systematic Planning for Educational Change.* Palo Alto, Mayfield Publishing Company; Pang, T.L. 1989. *Theory and Practice of Manpower Development.* Taipei, Three People Bookshop (In Chinese); Chan, C.H. 1992. *Op cit.*

for achieving present goals and continuing progress. The 'OUTPUT' includes the critical manpower needed in roles of leaders and workers of various levels in the various sectors of the industry. This manpower constitutes the human capital essential not only for economic growth but also for social progress. This, on the one hand, provides the human resources needed for further development of TEVT, and on the other, inspire higher goals of national development. This may form in what well may be regarded as a dynamic process or chain reaction that enables greater progress.

As a matter of fact, the difficulties in articulation and the interferences in the conversion mechanism are numerous. The planning and development of TEVT call for understanding in methods and related issues in human capital formation which will be dealt in later parts of the research.

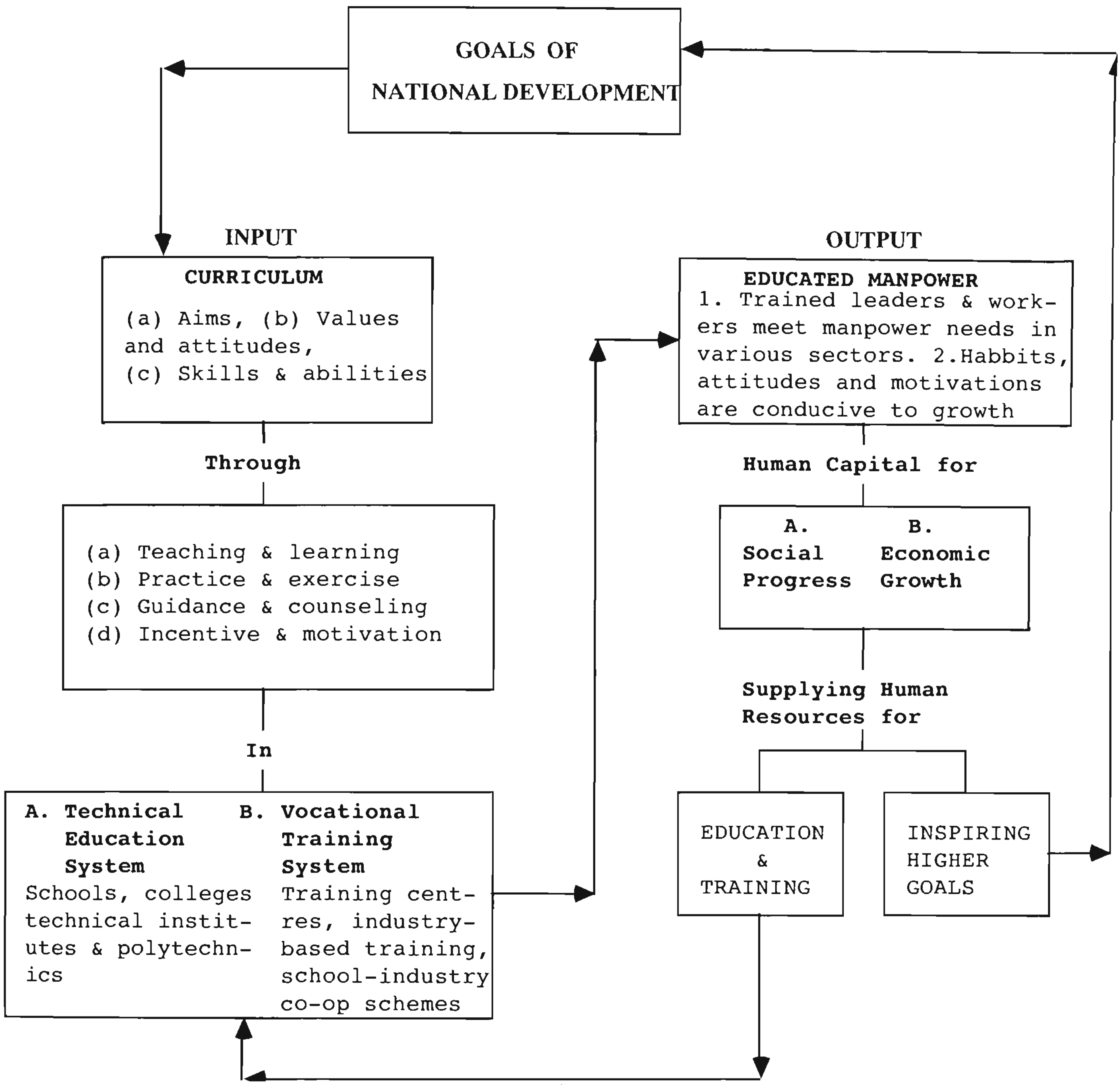


Figure 4.1 Input-Output Paradigm of TEVT Development

Policy and planning of TEVT

There are two major patterns in terms of prime responsibility for formulating and implementing policy for TEVT. The first one basically has all aspects of TEVT come under a national educational authority or these aspects are fully integrated into the educational system in some way. In the second pattern, education and training come under the aegis of separate authorities but with considerable degrees of coordination.

Hong Kong follows the first pattern to place technical education and vocational training under one body, the Vocational Training Council (VTC). The VTC was established to assume 'the responsibility for providing both technical education at the craft and technician levels and industrial training at all levels'.[8] At the same time when the VTC was established, the Technical Education and Industrial Training Department was set up as the executive arm of the Council by the merger of the Technical Education Division of the Education Department and the Industrial Training Division of the Labour Department. Functions and structure of the VTC will be discussed in detail in a later chapter in the Hong Kong Section.

While the VTC is responsible for the provision of TEVT at technician and craft level, the technical and commercial curriculum offered within the general secondary school system (which is not aimed at producing skill workers for the industry) comes under the responsibility of the Education Department.

In the case of Taiwan, the second pattern is more appropriate to describe its situation. The national government put forth the goal of education and the guidelines to implement it. The Department of

[8] Knight, H.R. (Executive Director, HKVTC), 1989, 'Advances and Innovations in Technical and Vocational Education in Hong Kong', paper presented at the Hong Kong Education Research Association 1989 Annual Conference.

Technological and Vocational Education within the Ministry of Education, a branch of the central government, is responsible of the planning and supervision of educational programs at the Senior Secondary Vocational School, Junior College, and Institute of Technology levels.[9]

While technical education comes under the responsibility of Ministry of Education, the organisation, planning, supervision and coordination of vocational training are the responsibilities of the Employment and Vocational Training Administration (EVTA) on nation-wide base. The EVTA is placed under the Council of Labour Affairs within the Executive Yuan (the Cabinet). The following Figure 4.2 briefly illustrates the Technical Education and Vocational Training System in Taiwan. Detail structure and functions of various components of the system will be discussed in a later chapter in Section 3 of this thesis.

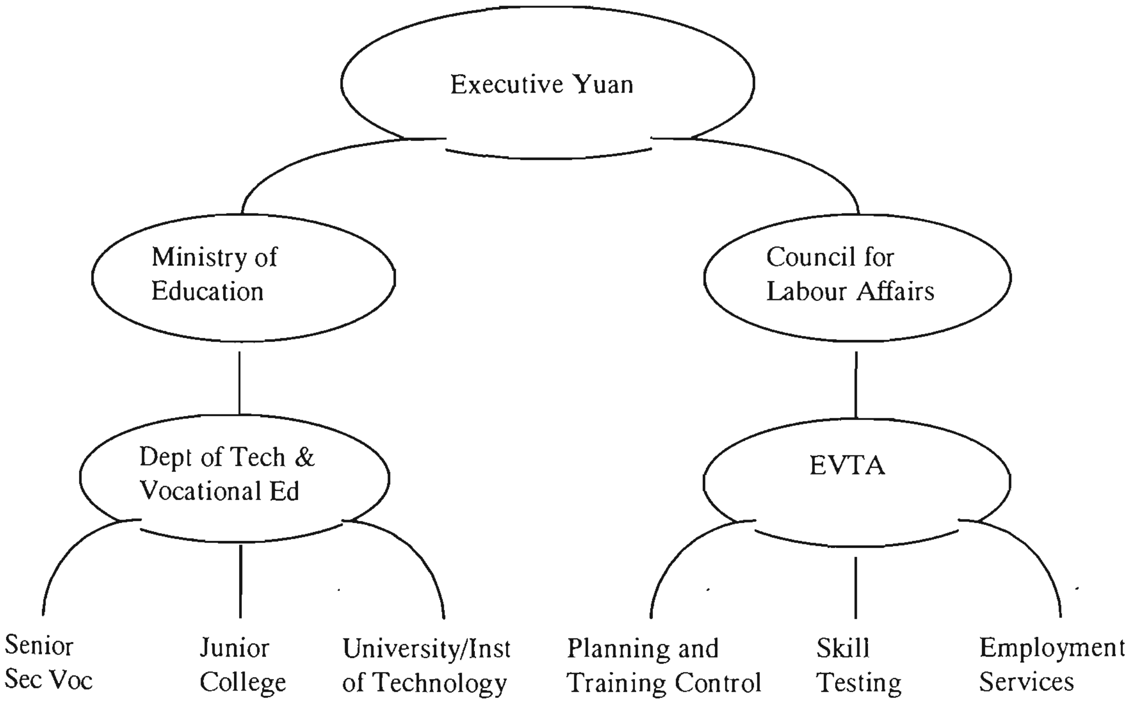


Figure 4.2 Structure of TEVT System in Taiwan

[9] See *Education in the Republic of China.* 1993. Bureau of Statistics, Ministry of Education, Taiwan.

The structures discussed above, then, represent the basic framework for formulating policy, planning for the future and administering TEVT.

Policy objectives

TEVT has been viewed as an essential factor in economic and social development by the UNESCO Revised Recommendation concerning Technical and Vocational Education.[10] Economic development presupposes the availability of skilled manpower. This holds true for all countries in the world from highly industrialised countries to the least-developed countries. In social terms, TEVT is directed to preparing young people for an occupation in fields corresponding to their talents and aspirations and to help adults adapt to changes in the employment structure. In broad terms, most countries have adopted general policy objectives for TEVT be integrated into the educational process as a whole.

Policy objectives for TEVT have to be set within specific national contexts and factors that shaped the specificity are crucial in setting these objectives. Among different factors, the economic context is the factor that has the most direct influence on the objectives set for TEVT in Hong Kong and Taiwan. The economic base determines to a great extent the policies adopted as to content of education and training, whether it is to be primarily industrially and business oriented or oriented to agriculture, or if oriented to the two, in what proportions. In economies that are industrially based like Hong Kong and Taiwan, the present and projected demand for industrial and related servicing manpower is a major consideration in establishing policy objectives.

[10] UNESCO, 1984. *Policy planning and management in technical and vocational education,* p 47.

Development objectives which are set in accordance with social policies and demands and the present level and desired directions of economic development are also a major factor in determining TEVT policy. If, given the level of development and economic context, high-tech industries is the top priority, as in Singapore and Korea, then the major objective of TEVT will be to make provision for training the required skilled manpower for those emerging industries like information technology, biotechnology, robotics and artificial intelligence, micro-electronics, laser technology and optics, and computer technology.

It is axiomatic that any policy has to be geared to available resources in financial and human terms if it is to be implemented. Indeed, given the cost consciousness and the need for cost-saving planning decisions in an era of rapidly shrinking resources, the meagre resources available to many countries have constituted the major barrier to the development of TEVT.

As discussed earlier TEVT is a sub-set of general education, therefore, its policy should be incorporated into overall educational policy. If the major objective of education is defined as having a larger role of catering for the needs of all while serving larger social and economic objectives, then TEVT policy will be an integral part of overall education policy.

These are the factors determining TEVT policy objectives. The process is, however, not static or one way, but rather dynamic and interactive. Sound TEVT policy should be directed precisely to improving the economic context by rendering the country more productive and the standard of living of individuals and families higher, that is to achieving development objectives. Figure 4.3 is a simplified representation that gives a summary of these complex relationships.

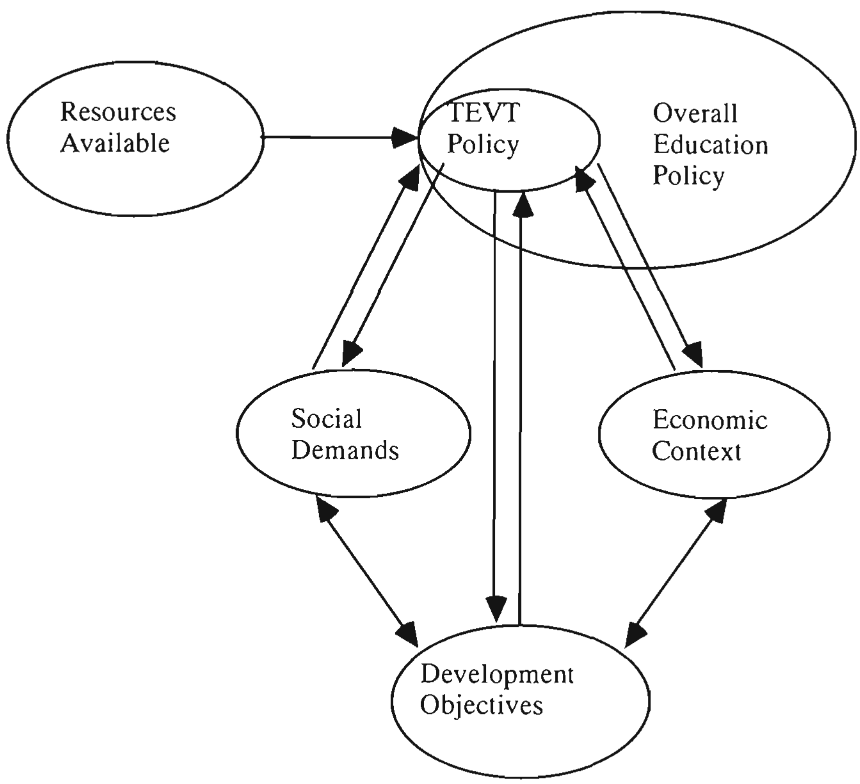


Figure 4.3 Factors Affecting TEVT Policy

Administrators planning TEVT must be aware of the interplay of these factors if viable policies are to be formulated and implemented.

The planning process

As discussed earlier, planning cannot be separated from the formulation of policy objectives at a higher level. As can be seen from the Input-Output paradigm (Figure 4.1) presented in the earlier part of this Chapter, the development and expansion of TEVT are for the most part an integral component in a national development planning. The problem is how to draw up concrete plans to achieve these policy objectives. This requires establishing a clear sense of direction and avoiding the planning failure of the past if the plans are to become reliable instruments of management and effective guides for action. A central issue is whether the standard paradigms and analytical tools are appropriate for the planning task.

In the normal planning model the planning officer is considered to be a technical analyst or an applied researcher who selects the best policy option out of a very large number of possible courses of action, using cost-benefit analysis and mathematical optimisation techniques as instruments of analysis. This essentially deterministic model assumes that if the planned actions are carried out, the outcomes will automatically materialise. Advocate of this model Psacharopoulos defines education planning as '... the examination of many feasible alternatives and choices among them according to an objective'.[11] This model is attractive in that it presents problems and defines priorities in a clear and structured way. We can imagine in an era of tight public resources, it is supposed to provide unambiguous guidance on the efficient allocation of scarce resources.

However, in an age driven by rapid technological advances where the production process in many manufacturing and service industries is changing dramatically with features like quality improvement, responsiveness to customer demand and small batch production being incorporated into management strategies, Verspoor [12] contends that the

[11] Psacharopoulos, G. 1990 'From theory to practice in comparative education' in *Comparative Education Review* , 34, pp369-381.
[12] Verspoor, A,M. 1992. 'Planning of Education: Where Do We Go?' in *International Journal of Educational Development.* Vol 12, No 3, pp233-244.

deterministic model has rarely been effective because of its failure to take into account the diversity of local conditions, the complexity of the systems used to produce the output and the neglect of implementation issues. To make it effective, it is essential to move to a process of planning that is more attuned to the organic nature of the educational process. Looking at the modern interactive business planning models, which emphasise the interpretation of practice, information exchange and the interaction of individuals and systems with their environment, Verspoor pointed out the need for the education planners to take into account: i) the wide *diversity* in educational problems and effective solutions; ii) the *uncertainty* inherent in any education plan; and iii) the critical importance of implementation.[13] Verspoor further suggested some new directions for education planners to provide effective support to policy makers. Elements of these new planning directions include: a) *systematic learning* which implies that planned educational change can only be successful if it is consciously designed as a learning process; b) *research and evaluation* which would made information on key performance indicators rapidly available to planners and policy makers; c) *indirect intervention* which allows local level initiatives in addressing educational problems; d) *institutional analysis* of the capacity of the educational organisations at different levels to implement the planned investments and policy reforms; and e) *sustained staff development* to provide training for the next generation of education planners and administrators.[14]

After discussing some new and challenging issues in the process of education planning (which are no doubt relevant to TEVT planning), we

[13] *Ibid.*
[14] *Ibid.*

now look at Figure 4.4 which sums up a general planning and management process that was adopted by many countries, including Hong Kong and Taiwan, in the development of TEVT. Main features of this process may be briefly summarised as information, co-ordination, and feedback and consequent readjustment.

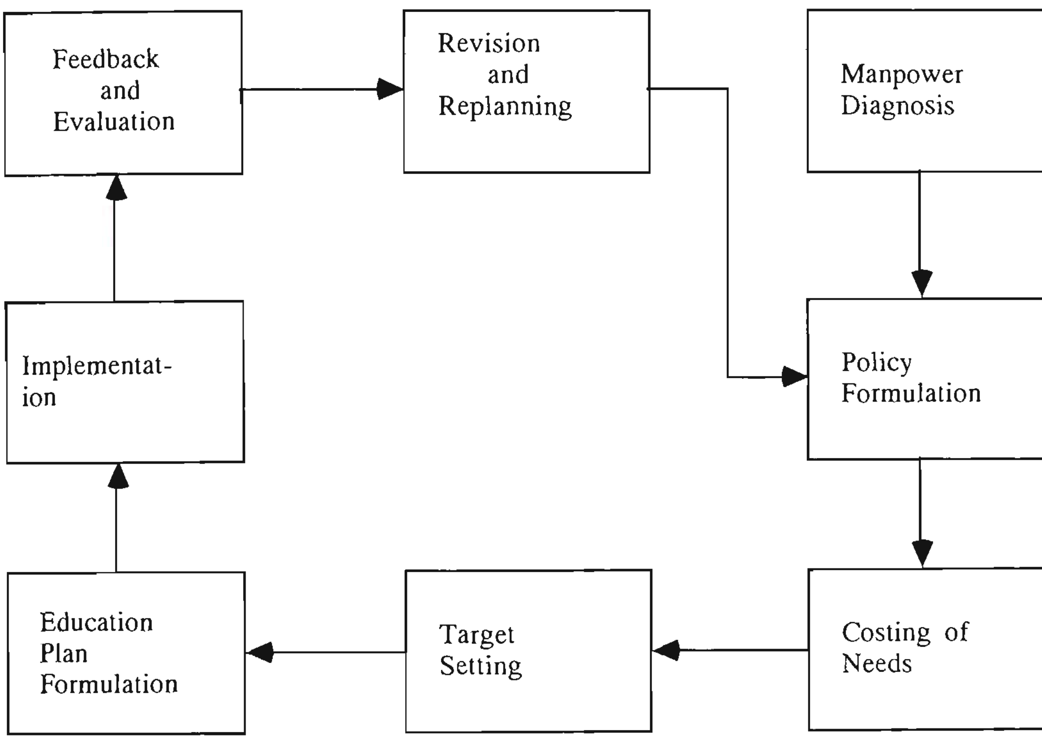


Figure 4.4 TEVT Planning and Management Process

Implementation

Successful development of TEVT depends not only upon finely spun plans or cleverly devised strategies. It can result only from action. If plans alone could guarantee rapid development, then the future for all the nations, especially those developing ones, might be very bright indeed. Policies and plans cannot themselves assure that TEVT is implemented in such a way as to reach the objectives. In a report by the UNESCO on a comparative analysis of the experience of twenty-three developing countries in TEVT it was argued that the achievement of policy objective for developing and expanding TEVT will depend to a great degree on the quality of the three major element of implementation: a) the students recruited, depending in turn upon the quality of guidance; b) the equipment, methods, and materials used in the teaching and learning process; c) the teaching staff. These elements of implementation are a function of the financial and human resources available that represented, in most of these twenty-three countries, the major problem areas in the development of TEVT.[15]

Coombs blamed the failure to implement educational plans as the result of: shortage of funds, unanticipated bottlenecks in teacher supply or facilities, unforeseen imbalances between the flow of students and the educational capacity at different levels, and other contingencies.[16] But the most ubiquitous cause of unsuccessful implementation, Coombs contended, 'is the lack of adequate administrative machinery personnel and the lack of sufficient understanding and support for the plan on the part of those who can carry it out'.[17]

It can be seen that many of these external factors cannot be changed. To attenuate the constraints and to enhance, within limits, the chance of successfully implementing a plan, Skorov preferred the broadest possible participation in the preparation of plans to the apparently more efficient work of a small isolated term of technicians. Departments

[15] UNESCO, 1978. *Developments in technical and vocational education: a comparative study*, p87.
[16] Coombs, P.H. 1970. 'What do we still need to know about educational planning:' in *The World Year Book of Education: Educational Planning.* London, Evans Brothers Ltd.
[17] *Ibid* pp71-72.

would carry out their responsibilities for implementing a plan only if they had been involved in its preparation. Educational and manpower planning must therefore be organised in ways where all parties at interest will effectively participate at every stage of the planning process.[18]

To effect the participation of related parties in the planning process, there is the need to build linkages to bridge them up together. The structure of such a network would be a systematic organisation of communication within the various parts of the administration machinery.

Inbar sees planning as a message stating the process of change, and implementation is the message's formal expression. He further writes 'A plan is a set of symbols embodying some articulated attitude. Educational planning can be considered as a process through which the communication of shared symbols creates intent'.[19] And plans tend to have no 'definitive formulation' and 'no ends to causal chains'. Hence, educational plans can never fully convey the contents of their message. They vary with the way in which they are perceived. So, 'educational planning is not only an expression but an impression, and the whole planning implementation cycle will depend greatly on the interaction between the two'.[20]

Because of uncertainty and incomparability there is no way to build a comprehensive and national plan. Inbar suggests to develop a 'linkage

[18] Skorov, G. 1968. 'Introduction' in UNESCO: IIEP, *Manpower aspects of educational planning.* Paris: UNESCO.
[19] Inbar, D. 1984. 'Planning problems, decisions-making and communication' in *Prospects.* Vol 14, No 4 pp489-495.
[20] *Ibid.*

planning strategy'. Linkage planning would be based on several plans, each fairly independent in its implementation, and each comprising a relatively controllable unit.[21] Supporting system would be provided for each link, and this link, as asserted by Skorov,[22] should be based on a developed communication network.

In many countries, although the administrative structures are there, according to the UNESCO study,[23] they tend to be static and it is difficult to impart the dynamic required for implementation of TEVT policy. There exists the problem of two-way flow, administrative structures are by nature hierarchical that the flow within them tends to come from top down more than vice versa. This resulted in a situation that people at top are not fast enough to be aware of the response at institutional or local level.

The last aspect of planning and implementing TEVT discussed here is that the needs of national development should not considered to be met merely by reaching the targeted number of a plan, as for example, by setting up a target and provide training to the required number of people with particular skills. Planning which limits itself to implementing such action would achieve only part of the policy objectives. Manpower planning can be said to have achieved its true objective only when trained persons actually fill the positions for which they have been trained.

[21] *Ibid.*

[22] Skorov, 1968, *op. cit.*

[23] UNESCO, 1984, *op. cit.*

Institutional mechanisms

To deliver responsive education and training provision, evolving institutional mechanisms were established in Hong Kong with linkages centre around the work of the Education and Manpower Branch (EMB), which is responsible for education, training policy and employment matters. On top of the EMB is the very influential advisory body known as the Education Commission (EC). Members of the EC are prominent education and business figures in the society with ex-official representatives from the EMB, VTC and Board of Education. The Commission is responsible for defining overall educational objectives and for co-ordinating and monitoring of the planning and development of education at all levels. The Commission also co-ordinates but not directs the works of the Board of Education and the VTC. The EMB is headed by the Secretary for Education and Manpower, whose responsibilities include formulating policy, securing and allocating resources for these policies and monitoring the implementation of programs from the executive agencies.

In Taiwan, the main institution for linking the supply of skilled workers with current and future demands of industry, has always been the central economic policy making body, which since 1978, has been the Council for Economic Planning and Development (CEPD). The CEPD works with the government to generate the industrial strategy and ensures that other ministries take the same step towards meeting the objectives of the economic plans. To have control over manpower planning, the Manpower Planning Department was established as part of the CEPD to carry out the detailed planning and policy execution. It was in mid 1960s that manpower plans were becoming explicitly linked with formal economic plans. For example, in 1966 the predecessor of CEPD initiated an increase in vocational and industrial education, corresponding to plans that involved Taiwan beginning to move up the value-added industry ladder. In the 1970s, it initiated an expansion of junior college of technology and engineering studies in universities, in view of its extensive plans for industrialisation of the economy. In recent times, the CEPD played an important part in the development of the Asia Pacific Regional Operation Hub in Taiwan, by ensuring that there is an emphasis on enhancing continuing education, innovation and the quality of education. This central focus of CEPD is then supplemented by the centralised Ministry of Education for the supply of technical education and the Council for Labour Affairs for public vocational training, as discussed previously.

The institutional mechanisms in Hong Kong and Taiwan seek to co-ordinate not only the development but also involve themselves in manpower planning. Manpower planning practices co-ordinate the industrial sector and government action in general and technical education and vocational training. Issues and theories relevant to manpower planning in Hong Kong and Taiwan will be discussed next.

Manpower planning – rigid and flexible approaches

The practice of manpower forecasting has been widely adopted in national planning of education in many countries particularly in those developing ones. The method is to forecast the manpower requirements for certain future targets and to convert these manpower requirements into educational qualifications. The notion is to determine the level of investment in education that is required to achieve specified economic growth targets.[24]

Despite its popularity in educational planning, manpower forecasting was heavily criticised, both for its limitations in theory and its failure in practice. One fatal criticism has been the incompatibility of the theoretical assumption underlying manpower forecasting with market economy. The manpower forecasting notion assumes high rigidity in the labour structure and low substitutability between occupations. This contradicts the recognised elasticity of labour market in a market economy.[25] Simmons further criticised that manpower forecasts are famous for producing wrong kinds of manpower, 'overeducation', 'educated unemployment', new bottle-necks and so forth.[26]

The question is then why is it that with all the shortcomings and limitations, manpower forecasting remains glowingly employed in educational planning?

One sound answer is that although comprehensive manpower planning may not be feasible, manpower forecasting will at least provide indicators to avoid severe oversupply or severe shortage of manpower in a certain occupation. In fact in many countries, manpower forecasting is no longer used for desired economic growth but merely

[24] Ahamad, B. and Blaug, M. 1973. *The Practice of Manpower Forecasting.* Amsterdam: Elsevier Scientific Publishing Co.
[25] Blaug, M. 1970 *An Introduction to the Economics of Education.* Middlesex: Penguin.
[26] Simmons, J. (Ed), 1980. *The Education Dilemma: Policy Issues for Developing Countries in the 1980s.* Washington DC: Worldbank.

as a means of avoiding mismatch of manpower.[27]

The following postulates a theory on which a manpower plan may be formulated. It is assumed that two alternative methods exist. At one extreme we have planning where almost total reliance is placed on manpower forecasting. The second method is the polarised version where forecasting forms no part, and where total reliance is placed on a flexible education and training system, and on an adaptable labour force. After an examination has been made of the two extremes outlines above, a view is taken of combinations of the two systems and at what positions various countries occupy on such a continuum.

Economic growth in developing countries means far more than the building of roads, reservoirs and other civil engineering projects, and the construction of power facilities, steel mills and factories. In addition, it is necessary to educate and train people, and to develop in them an appropriate set of skills, values, attitudes and work habits so that, possibly with the help of expatriates in the early stages, they are able to build the factories, to operate and maintain the equipment, and to provide the multifarious ancillary services that an industrialised state demands. And in this context a country has to be satisfied, as far as is possible, that the development of the economy and the social services will not be impeded by manpower shortages. Indeed especially since the Second World War, planners have devoted considerable time to what has been described as human capital formation, or, investment in people, who, it is sometimes said, may be educated, trained,

[27] Psacharopoulos, G. and Woodhall, M. 1985. *Education for Development: An Analysis of Investment Choices*. Hew York, Oxford University Press; Psacharopoulos, G. and de Moura Castro, C. 1991. 'From manpower planning to labour market analysis: In defence of planning' in *International Labour Review*. Vol 130 Issue 4. pp459-75.

refurbished and updated, and who have a monetary return which may be likened to that of any other resource. The cost of educating people however is high, and this is a major reason for trying to match the manpower output to the actual requirements, especially in a developing country where funds are generally in short supply.

Manpower forecasting has been defined as an intelligent attempt to anticipate employment needs and trends, in order to be able to estimate the size and type of labour force that a country will require in the future.[28] While this may be left to the vagaries of market forces, there is then the danger that, in the event of shortages, the country is not able to react quickly enough to correct the discrepancies and the shortfalls will impede economic growth. There is also the danger of poor utilisation of expensively educated personnel and of their being unable to find suitable employment. Indeed in most countries one finds dedicated planners, who have little faith in the free play of market forces that are suppose to bring the supply and demand of labour into equilibrium.[29]

The rigid manpower forecasting approach

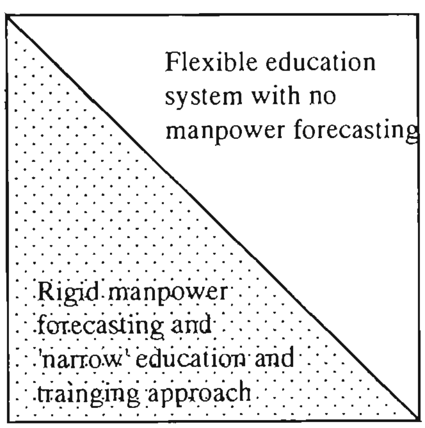
Let us now examine an extreme theoretical case of forecasting, where little reliance is placed on a flexible education system or the free play of labour market forces (see Example 'A', Figure 4.5).[30] Here, attempts are made to ascertain the exact numbers of different types of personnel that will be required, possibly by using the 'asking industry method'. In addition, job standards are prepared. Such an activity analysis

[28] Maclennan, A. 1975. Educating and Training Technicians.
[29] Blaug, *op cit.*, p 140.
[30] *Ibid*, pp214 to 224.

classifies all jobs according to their functions and lists the work content. It also specifies the type of education, training and trade-testing that people need to fill adequately each of the various posts, such as mechanical fitter, textile mechanic, building estimator and so on. The United States Dictionary of Occupational Titles lists as many as 20,000 different jobs,[31] although many occupation-education matrices do not go above 75 titles. However, even if a three-digit classification is used, it usually takes into account no more than about 200 jobs.

Example 'A'

1. Exact forecast are made of numbers and types of personnel required 'x' years from now.
2. Attempts are made, by means of rigid and specialised education and training schemes, to be able to fill the above estimated future vacancies.
3. Little career guidance.
4. Long 'narrow' apprenticeships and unions are 'closed-shops'.
5. Little or no transfer between trades or occupations or other forms of substitution.



Example 'B'

1. No manpower forecasts.
2. A broad general education scheme with no specialisation at an early age. Broad-based technical education using modules and credit-units.
3. Students well advised on careers.
4. Rigid apprenticeships and 'closed-shops' avoided.
5. Generally free movement between trades or occupations and various forms of job mobility and substitution available.

Figure 4.5 Comparison between Rigid Manpower Forecasting and Flexible Education

Returning to Figure 4.5, the education system in Example 'A' tends to be restrictive and specialisation starts at an early age. Technical education courses are long and 'narrow'. Apprenticeships of trade-

[31] *Ibid,* pp153 to 159.

unions and professional associations are run as 'closed-shops' impeding movement from one industry or profession to another. This extreme approach also assumes that manpower is a relatively inflexible resource, and that there is a limit to retraining, redeployment and substitution.

With the above system, there is an attempt to shape and fit a given number of pegs (people), albeit of various diameters and types, into a given number of holes of various sizes (jobs) in a number of years from now, assuming always that the economy develops at an even rate. Institutes and colleges too are planned and run in an inflexible manner, with buildings being designed with the present in mind and with limited thought being given to change.

Flexible education, training and manpower provision system

There are two distinct aspects to manpower planning. These are, firstly, forecasting the demand for manpower by industry, trade or whatever, and, secondly, planning the supply of manpower. The latter depends on the output of education and training institutions and such other factors as on-the-job training and manpower wastage.

The socio-economic structure of Hong Kong and Taiwan is characteristically fast changing, and it has been said that shifts which can take up to 20 years in other countries can be effected in these areas in one quarter of the time. The demand for labour can also change rapidly. Viewed in this context, a school of thought exists which feels that limited accuracy can be achieved with any form of manpower forecasting, and that any shortages, surpluses and imperfections in the labour market can be overcome by giving people a broad-based education, so that they are adaptable, and by the extensive substitution of 'flexible' workers. In other words, it is wrong to assume that there can be no manpower planning without forecasting, and a great deal can be achieved by an active and responsive (as opposed to a passive) education system.

In examining the theory, we can now go to the other extreme (see Figure 4.5). In Example 'B', no attempt is made to forecast the numbers and types of jobs that will be available in so many years time. Instead, all young people are given a broad general education, and they are not allowed to specialise until the second or third year of further education, as a solid broad academic program is considered by many as having the most currency for ensuring a wide choice to a range of vocations. (Indeed many United States colleges provide a wide selection of units for students themselves to choose from, and these can include a liberal mix of science, technology and the humanities in the same program, thus producing well-rounded graduates, with a better base for later specialisation or movement form one profession to another.)[32]

Even at that stage, technical education should be as broad-based as practicable, employing a module or credit-unit system, and it should be viewed as a continuing life-long process with adults going back to 'school' in order to update themselves or to be able to transfer into another job. All instruction should be as flexible as possible, and mobility should be provided so that craftsmen can upgrade themselves to technician level or move to other similar crafts. No student should be

[32] Various prospectuses of USA colleges.

without a second chance if, for example, he is a late developer or has left school at the earliest opportunity.

In addition, educational institutions should employ the latest teaching methods, with flexible class groupings for lead-lecture, for team-teaching, and for tutorials. If it is possible to use informational technology to facilitate flexible course delivery, then this should be done, as it improves the efficiency and availability of the courses. In order for flexible teaching to be provided, and so that educational institutions can adjust to changing requirements and modern development, they should be specially equipped with the necessary facilities and resources to accommodate changes.

Assume also that an efficient system of counseling is provided. In this way, students are fully aware of the openings available, the qualities demanded, and job prospects. Rate of return analysis is also important when considering what livelihood to take up, although this should not be allowed to overshadow suitability and interest in a particular career. In other words, school and college leavers should be dissuaded from giving preference to high starting wages rather than long-term job prospects. So often people lack information about skill shortages, and how they can train to fill vacancies, and, even if they eventually do know, there are usually delays in their receiving the details. There is also a need for colleges and schools to keep personnel officers informed about the input of the education system into industry.

A middle course

It is of course true that there is nothing so practical as a good theory. Those who have been involved in manpower planning would appreciate the theory just outlined (see Figure 4.5), and represented by the two extremes, may be portrayed as black and white. But, as related in the *Doctrine of the Mean,*[33] in the practical situation, black or white are often not appropriate. In other words, a suitable shade of grey is usually more germane to the real world of planning.

For example, does the dedicated forecaster really believe that it is possible to prophesy the actual numbers and types of personnel that will be required in the economy in twenty, ten or even five years from now (the longer the period the more difficult the task becomes with any degree of accuracy, with methods that are often considered suspect by the forecasters themselves even in a relatively stable world? Moreover, if technological change and economic progress are rapid but irregular (as one finds in the two NIEs under study), which are affected by recessions and booms, one begins to appreciate the difficulties in extrapolating production and manpower trends. This means that relying on forecasting alone is not realistic.

Or, as an alternative, do the advocates of the other extreme (Example 'B', Figure 4.5) really believe that forecasting serves no useful purpose, and that it is possible to educate an average man so that he is sufficiently flexible to move from one job to any other with a minimum of retraining? And do advocates really believe that it is possible to

[33] Zeng Zi. 365-290 BC. 'The Doctrine of the Mean' in *The Four Book* translated by James Legge (Publication date unknown, the present edition was reprinted in 1969). Hong Kong, the Cultural Book Company.

establish an education system that is sufficiently flexible to be able to achieve this end? The complexity of our lives today makes the division of labour inevitable. Without it we should never achieve control of our scientific and technological world. Because of this, a point is often reached when specialisms become so esoteric that they are incapable of being understood by the policy maker and the administrator.

While Example 'A' and 'B' (in Figure 4.5) illustrate basic principles, countries will generally be positioned somewhere on the continuum between the two extremes. Moreover, in the case of these two examples, there is no real ambivalence, as the two are not in conflict. For instance, the former USSR with her considerable experience in comprehensive economic manpower forecasting is well over to the left of our continuum, as it relies a great deal on forecasting.

This policy may be compared with the United States. Here, 12 years of full-time general education is available for all without any real degree of specialisation. At college too the first year of study is broad-based, and a greater attempt is made to educate the 'whole person'. This really means that, in the United States, it would be theoretically possible to adjust the supply of future engineers, scientists or other areas of manpower in 1992, for a 1996 outturn from a first-degree, four-year course on to the labour market. A smaller position exists with the education of technicians and craftsmen. And yet with limited specialisation, free choice, and an open-door educational policy, the United States is probably the most advanced technological nation in the world. Taking the above facts into consideration, this places her well over to the right on our continuum.

In Japan too a degree course is normally of four years' duration, and the first two years are biased towards engineering science, foreign languages and the humanities. The final two years is the so called 'professional education' period, and the aim is to build up knowledge in a particular subject area with study in some depth.[34] Nevertheless, such a curriculum has not escaped criticism from industry, which, on occasions, has expressed the view that such program are too basic, with insufficient detailed engineering being taught. To this criticism the universities response has been that they provide a firm foundation with maximum flexibility and responsiveness to prepare students for change.

In Britain, limited reliance is placed on manpower forecasting, and projects in this field have mainly been on an *ad hoc* basis. For example, the various manpower studies have been conducted by the Ministry of Labour,[35] and, later, the forecasting of the demand for craftsmen and technicians, up to 1986/87, for the Engineering Industry Training Board (EITB) conducted by the University of Warwick.[36]

Educational specialisation in Britain also starts earlier than in the United States, and a tripartite system of secondary grammar, technical and modern schools, and the 'eleven plus' grading examination, were introduced after World War Two. Since then, comprehensive schools with streaming for different ability groups have largely replaced them. Alongside these exists a public-school system. Further specialisation continues, in lower and upper sixth-forms, and a student normally

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[34] Ikuo, A. (Translated by William Cummings) 1990. *Education and Examination in Modern Japan*. Tokyo, Tokyo University Press.
[35] Typical example: *The Construction Industry*. 1965. Manpower Studies No. 3, Ministry of Labour, England.
[36] *The Engineering Industry Training Board Annual Report and Accounts 1981/82*, England.

studies either arts or science subjects for two years. By the time the student arrives at college or university, real specialisation commences. It can thus be seen that Britain's position on the continuum is considerably more to the left than that of the United States.

From the above examples it can be visualised that the positions of different countries vary, often considerably. Indeed this is necessary, to some degree. For instance if a developing country is affected, to a lesser extent, by technological change, and there are thus more rigid links between outputs of students and jobs, and between jobs and education, then the more justifiable forms of forecasting may be. Similarly, the longer it takes to produce specific skills, the more desirable manpower forecasting may be. On the other hand, in a country where changes take place rapidly, less reliance should be placed on forecasting. In the cases of Hong Kong and Taiwan, both has a very flexible labour market which is not preferable for any manpower exercise, but the rapid changing economy and production skills has rendered the supply of manpower always lagging behind demand. Under such circumstances, manpower planning served to satisfy part of the needs of the most fast growing industries. Thus, the manpower planning and forecasting exercises adopted by the MPD in Taiwan and VTC in Hong Kong could claim success.

The Second element of model – Strong control over the education and training system and rapid responses to change

The second element of the model is a strong control over the education and training system. As discussed earlier in this Chapter, no policy can be effective if the tools for implementing it are not in place. In this respect it is essential for the government to have direct control over the education and training system if the requirements of its economic development are to be fulfilled. To understand how governments are able to exercise control over policy implementation, Root and Weingast[37] argue there are two types of governments exist – strong and weak. The roles play by these two types of governments in economic development are different.

Weak government

A weak government is handicapped by its inability to enforce property rights, or even many of its own laws. Because of the legal inadequacy of a weak government, its interventions are based, not on rules, but on administrative or executive discretion. This results in corruption and opportunism rather than supervision. In fact, insufficient legal clarity is often intentional, thus facilitating random interventions by political authorities.

Although weak states respond to interest groups, they often cannot enforce bargains made with important constituents. Interventionist rules typically cannot be consistently enforced. As a result, reform measures, property rights, and contracts are not durable because the government lacks the means to implement and maintain them.
When governments are too weak to control their own officials, agents of the government may act independently of one another. Thus, a policy of reform may be announced by part of the government, while another part blocks its implementation. Political power is needed to defend

[37] Root, H. and Weingast, B. 1996. 'Chapter Nine - The State's Role in East Asian Development' in Root, H. *Small Countries, Big Lessons: Governance and the Rise of East Asia.* Hong Kong, Oxford University Press.

property rights when the impartiality of the legal system is jeopardised or when the rules are themselves inadequate. Bureaucrats in a weak government learn to use their power and access to information to extract value from proposed economic activity rather than to promote that activity.

Root and Weingast[38] contended that being unable to enforce the minimal conditions that are necessary to maintain markets, such as private property rights or a given set of regulations, weak governments can rarely sustain competitive markets. Instead networks of individuals with special connections to the political regime are needed to sustain trade. Inevitably, officials of weak governments are likely to collude with selected private groups to extract the nation's resources.

Strong and unlimited governments

In contrast to weak governments, strong and unlimited governments – authoritarian or totalitarian – have too much power. Lacking constitutionally defined limits, they are likely to be both interventionist and confiscatory. Being able to alter rights and markets at will, they are incapable of making a credible commitment to private sector development. To induce participation in markets, they must offer protection in the form of monopoly rights, trade protection, or trade-union privileges. The exercise of unlimited political discretion allows them to promise excessive benefits to one group to win their support. This, in turn, creates political risk, reducing economic investments and undermining the possible outcomes of reforms. Due to their unlimited power, no contract with the government is secure. According to Root

[38] *Ibid.*

and Weingast[39] a strong but unlimited government has much in common with a weak government, both are likely to become predators of private sector wealth.

Strong but limited governments

The third type of government is not only strong enough to establish and maintain property rights, but is constitutionally prevented form violating these rights. This government must have an administrative structure that keeps the economic and political activities of regime officials separate. The government must not only be strong enough to adopt rules that are suited to sustaining a strong, competitive private sector, but it must also be strong enough to prevent itself from responding to the inevitable political forces that arise to monopolise access to the marketplace. Only this type of government will ensure the survival of open markets with competitive access.

Strong but limited governments have often been mistakenly referred to as minimal governments because, in comparison with the interventionist government, they directly provide a relatively small number of goods and services. But the term minimal gives the impression of weakness, which is inappropriate. These governments must instead be strong enough to withstand the inevitable political pressure on them to intervene in markets. Hong Kong is perhaps a perfect example of such a government in which 'positive noninterventionism' protects the market from pressure groups, rent seekers, and unscrupulous officials. Taiwan is another example of government that accepted limits on its discretion over private sector

[39] *Ibid.*

profits. Both Hong Kong and Taiwan adopted mechanisms to separate the political and economic functions of government and protected property rights and the right for private parties to contract. Root and Weingast[40] held that these regimes did not have to be paragons of political development. To attract the energy or capital necessary for economic growth, they only had to be more effective in sustaining markets than the majority of developing nations.

Government's control over the provision of TEVT through decision making mechanisms

There are different views, valid or invalid, regarding the roles of the decision-making bodies of the Vocational Training Council in Hong Kong. They can be seen as being responsible for strategic formulation of long term policies on TEVT, or primarily as organs that are created to legitimise the Hong Kong government's central policy, or as bodies overseeing the day-to-day functioning of the vocational training operations, or as protectors or defenders of the executive management against external political and social pressures and criticisms. In Hong Kong, boards and committees formed by the government may be described as a type of representative policy making bodies which the government wishes to give voice in the decision-making process so as to represent defined interest groups and provide for a kind of forum for interaction and discussion.

In a study of the decision making bodies of the Vocational Training Council, Hung[41] observed that there was in place a triple alliance

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[40] *Ibid.*
[41] Hung, H. 1998. 'A study of the decision-making bodies of the Vocational Training Council in Hong Kong' in *Journal of Vocational Education and Training.* Vol 50, No 1.

among business-based (businessmen), knowledge-based (academics and professionals), and polity-based (government officials and politicians) members in decision making bodies of the Council responsible for making policies on the provision of TEVT to the economy. Hung argues that 'the triple alliance is a mechanism through which the government forms a partnership with three major types of interest groups in the community ton make operational decisions'.[42]

In this way, the Hong Kong government created strategic centralised institutions to deal with TEVT. These institutions have incorporated a broad range of relevant groups that have advisory capacities but no outright control over policy. The government has retained firm control over the provision of education and training thereby ensuring that the government can rapidly adapt TEVT provision to the demands of employers and to shifts in the economy. More details of the structure of these institutions will be dealt with in the Hong Kong study Section.

In Taiwan, the demand and supply of skills are co-ordinated at the highest level within the Manpower Planning Department (MPD) in the Council for Economic Planning and Development. The Process of manpower policy making in Taiwan has been a top-down affair. The ministries concerned send policy initiatives up to the CEPD where they are considered in light of overall policy objectives. There is little formal business or industrial input into policy although influential business people with government connections do attend various elite policy-making forums. By contrast, academics are well integrated into the policy-making system. Many government posts are filled by seconded academics who may fulfil this kind of role for up to three years. This

[42] *Ibid.*

practice is not only an indication of the value placed on academics and education in general, but in the past may have been used to co-opt some academics critical of government policy. The system has similarities to Hong Kong's consultation process in that influential figures may be co-opted.

The supply of manpower in Taiwan has been controlled by the centralised Ministry of Education and the Council for Labour Affairs and various other organisations. The mechanism the government used to implement policy are as follow: participation at certain levels of education is restricted, the provision of education and training is monitored and changed according to the economy's requirements, the curriculum is centrally controlled, and highly subsidised public training is provided to offset the lack of training provided by private business. The government has also been able to influence the demand for skills through the industrial policy of the Industrial Development Board of the Ministry of Economic Affairs. The coherence of policy across policy areas is attributed to the position of the CEPD, the predominance of the economy in the national agenda, and the stability of the institutional arrangements. This has led Taiwan to a situation of 'stability with flexibility' in TEVT policy along with economic policy. More details of the structure of these institutions will be dealt with in the Taiwan study Section.

The third element of model – Changes in the education and training system are closely linked to changes in the economy through time

The most important feature of the model is the ability of the governments to sustain the linkages between the TEVT system and the demands of a rapidly changing economy through time. The continuous industrialisation in Hong Kong and Taiwan involves changes from labour intensive to capital intensive organisation and from mechanical systems to micro-electronics. Thus economic development in these two NIEs is always tied-in with technological changes. Before examining how governments in Hong Kong and Taiwan institute linkages between the TEVT system and economic changes, literatures related to managing technological changes to achieve a responsive TEVT system is discussed.

Managing technological changes

Technological change is expanding the cognitive and theoretical knowledge required for productivity. New technology has blurred the lives between previously distinct work categories. Previously a draughtsman prepared a drawing and a craftsman made a component, but, it is becoming possible for the draughtsman to control the production process directly.[43] Most of the new technologies are, or will be, inter-related. Automated manufacturing systems are computer-controlled and robots now embody microcomputers. Computers are

[43] With modern technology the design and manufacturing processes are interfaced together through what are called computer-aided design (CAD) and computer-aided manufacturing (CAM).

used extensively to store and communicate data about many aspects of engineering, business, and to control machines.

The information and micro-electronic revolution has ushered a new way of working which is making new demands on the education system. This revolution is characterised by the speed of technological change and processing and exchange of information. It has had a profound effect on the production process not only in export-oriented industrialising economies like Hong Kong and Taiwan where development are market-based, but also in those countries that have not gone a long way towards industrialisation. As a result, institutions face pressures to increase their flexibility in responding to change. As technology changes, so too must technical education and vocational training.

The nature of technological change

Analysing technological change, understanding its scope and nature, and relating that change to the impact it has on society is potentially a very large task indeed. What is attempted here is to draw attention to some of the features of technological change which appear most relevant to the development of TEVT.

What is 'technology'? Wilkins gives its meaning as a term 'used variously to describe forms of development over a period of years and at particular times in history' and 'New technology' refers to 'the latest developments in machines and production systems'.[44] One group of

[44] Wilkins, P. 1992. *Managing New Technological Change: Case Studies in the Reorganisation of Work.* Sydney: Avebury. p 16.

writers have identified four principal areas of new technology applications.[45] The first area, robots, are potentially most useful in labour intensive processes such as in parts assembly. Secondly, manufacturing process computation describes the use of computers to speed up processes, improve quality, and increase throughput levels in manufacturing. The third area is in office machinery which is exemplified by word processing systems but includes a host of integrated computers dealing with the full range of clerical functions. The final area is electronic information handling which includes electronic mailing and funds transfer systems.

In a research to explore the influence of technological change on manpower requirement and industrial relation in Taiwan, technological change was referred to the technological advancement in micro-electronics.[46] Its scope covers those micro-electronic equipment used in 'factory automation' and 'office automation'. These micro-electronic products include: personal computers, universal computers, industrial robots, computer-aided design (CAD) systems, computer-aided manufacturing (CAM) systems, and other automatic control systems equipped with integrated-circuits (IC) such as multi-functional machine centres and numerical control (NC) machine tools. To keep pace with the national economic growth in the 1990s, technological advancement in telecommunication, e-commerce and biotech have been identified crucial areas of development by the government.

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[45] Black, P., Coombs, R. and Green, K. 1985. *Technology, Economic Growth and the Labour Process*. Basingstoke: Macmillan Press. pp 14-20.
[46] This research was reported in '*The Influence of Technological Change on Manpower Requirement and Industrial Relations*'. 1987. Manpower Planning Department, Council for Economic Planning and Development, Executive Yuen, Taiwan. (In Chinese).

Japan has since 1977 been using micro-electronic equipment at a large scale. According to the Japan Institute of Labour's 1984 survey on 'micro-electronics and the Response of Labour Unions', micro-electronic equipment was defined as: industrial robots including NC machine tools, personal computers, word processors and other office automation equipment, universal computers, CAD systems, and other automatic control systems equipped with integrated circuits.[47]

Microelectronic technology is by nature highly flexible and adaptable and has made changes possible in product markets. Mass production, economically viable at high volume throughput becomes increasingly less viable in markets requiring small numbers of variable products. This is due to the nature of the manufacturing systems used in mass production that would require constant resetting, while computer controlled systems are controlled by programs that can be accessed and changed rapidly.[48]

What all the technologies have in common is rapid transfer of information, which unlike the previous mechanical or manual processes provides, in theory at least, speed and flexibility. Managed intelligently, new technologies can lead to a richer array of cheaper and better products and services. This is on the plus side of the balance sheet, but perhaps the most frequently asked functions: What will happen to employment? Radical change in technologies ought to mean radical change for jobs, in many cases fewer people are required, and for those remaining profound changes in their jobs are likely. However,

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[47] JIL. 1984. *Microelectronics and the Response of Labour Unions.* Tokyo: The Japan Institute of Labour. p 1.
[48] Wilkins, 1992, *Op cit.*

Kaplinsky[49] found it is difficult to generalise about the precise effect to jobs subjected to new technologies. The more general concept of 'automation' has been variously described as a device for saving mental labour, manual labour, and mental and manual labour simultaneously. Bell[50] suggested it is perhaps a more subtle analysis to say that the present significance of automation, referring to current advanced technologies, is the presence of the control capability over jobs and processes. Blanchard,[51] the Director General of International Labour Office, considers the labour saving as short-term effects and they would be outweighed by long-term factors of new products and industries associated with producing, distributing and servicing them brought about by new technologies. Lower costs of production and improved quality of existing goods or services that made possible by applying more efficient technology would stimulate more purchases. So, Blanchard based on some ILO research projects, points out that investment in technologies can contribute to a general economic expansion and an increased demand for labour.[52] This implies that the shift away from traditional occupational groupings to new skill groupings reflecting technological advancements.

The impact of Technological change on Technical Education and Vocational Training

Technical education and vocational training are the connecting links between the school system and the employment market, which means that developments in TEVT are intimately linked to general trends in

[49] Kaplinsky, R. 1984. *Automation: the Technology and Society.* Harlow: Longman.
[50] Bell, D. 1994. *The Coming of Post Industrial Society.* New York: Basic Books.
[51] Blanchard, F. 1984. 'Technology, work and society: Some pointers from ILO research' in *International Labour Review,* Vol 123, No 3 pp 267-276.
[52] *Ibid.*

the economy and the labour market and therefore are particularly susceptible to the effects of technological change. The Berlin Congress convened by the UNESCO in 1987 on the Development and Improvement of Technical and Vocational Education[53] identified four factors in manpower planning and changes occurring in industry, caused by rapid technological progress, that may have impact on TEVT. First, information technology is changing the organisation of work, favouring the creation of small and medium-sized companies. Second, long-term workforce planning is becoming more difficult because of the pace of technological change (that is why, as discussed earlier in this Chapter, there is a need of flexible planning in manpower forecasting). Third, the evolving occupational structure is changing the demands for training placed upon TEVT. Finally, the qualification requirements for graduates of TEVT are changing. Consequently TEVT is affected in two ways: through the demand for new skills and qualifications, and through changes in the conduct of TEVT themselves.

It is clear that TEVT courses must change to reflect demands from industry. But what do these course changes involve? Few areas of TEVT activities remain unaffected. Areas for review could involve the content of courses, the equipment used in practical and experimental work, the knowledge and skills of the teachers, and the teaching strategies. But other elements of a TEVT system are not immuned to the effects of technological change in industry. Planning, resource

[53] See the publication based on the proceedings of this Congress titled *Trends and development of technical and vocational education.* 1990. Paris UNESCO.

allocation and policy also may be involved in a balanced response to change. Some of the issues raised in these areas are discussed below:

Course content

To what extent should TEVT course content reflect current industry practice? Should the effort be uniform across program areas? As changes occur in industry, elements of existing courses become dated and of decreasing relevance to the needs of industry. The time required to thoroughly analyse an occupation and to design a suitable course can be quite substantial. So much so that elements of the new course may themselves be dated before the course is fully implemented. Moreover, the costs associated with some techniques of occupational analysis and subsequent course development are sufficiently high to discourage their use except on a periodic basis. When reviewing the content of a course, the TEVT segment needs to be distinguished from the segment to be provided by industry through on- the-job training.

The main questions raised are

- What strategies can be used to best keep course content abreast of changes in industry?

- To what extent should a TEVT course meet the needs of those firms who are first to adopt new technologies? or

  Should TEVT institutions aim more towards changing its courses as more of firms are adopting a change? or

Can TEVT institutions afford to be even further behind than this?

- Will the answers to the above questions be the same for all courses? or
  Might some courses be deliberately kept more up to date than others?

Straightly speaking there are no fixed solutions to the content issue because the answer to the above questions, as suggested by Schilling,[54] could vary depending on whether the curriculum is primarily aimed at general skills, common skills, or specific skills. However, as general guidelines, the UNESCO Berlin Congress suggested frequent changes in TEVT courses and curricula in order to permit future adaptation to new occupational profile.[55] And the subject matter of TEVT courses should accord greater prominence to sciences, mathematical skills, electronics and computer related knowledge changes in production methods, the ability to abstract, plan and anticipate future situations.[56] In some cases minor, and thus easily managed, additions to existing curricula may be the best response to changes in skill requirements. This may happen when training in computer related skills is added to existing curricula for trainees.

[54] Schilling, R. 1983. *Common skills across trades.* Adelaide: TAFE National Centre for Research and Development pp 2-3.
[55] UNESCO, 1990 Trends ... *op. cit.* pp15-17.
[56] *Ibid.*

Equipment and facility

Introducing new technologies in TEVT institutions requires adequate and readily available funding for the necessary equipment and physical facilities, such as a CAD-CAM centre. To provide adequate practice to students, there has been a tendency to purchase equipment similar to that used in industry where possible. Because of the pace of technological change which has made teaching and training equipment to become obsolete more quickly than previously. In particular with the introduction of the computer technology into the equipment used in almost all industries, the equipment strategies of the past decades are no longer appropriate at all instances. The sheer volume of equipment which needs to be replaced if it is to reflect modern industry standards would be very great, and in many cases the cost of individual equipment is too great for TEVT authorities to maintain a policy of purchasing all equipment needed for the delivery of vocational courses.

It is difficult to produce solutions to this dilemma. What suggested here are some measures adopted by many countries to alleviate the problem. These measures involve co-operation between advanced industries and training institutions through a) use of industrial equipment by students on company premises; b) donation of specific equipment to the training institution by industrial and commercial enterprises; and c) free loan of equipment from industries to the training institution for a specified period of time.

Taiwan implements a scheme similar to a) above called the Co-operative Education Program for intending students in senior secondary vocational schools to enrich their modern industrial skills. Basically the students in this program learn the knowledge and basic skills at school and gain the practical experience at the industrial firm.[57]

In Hong Kong, to overcome the equipment problem due to rapid technological advancement, the two former Technical Colleges (now the Chai Wan and Tsing Yi campuses of the Hong Kong Institute of

Vocational Education) have adopted a 'free loan of equipment from industries' scheme where companies will loan those expensive modern equipment to the Colleges free of charge for a specified period of time. The Colleges during the loan period will keep the equipment in good condition and responsible for substantial repair including the entering into a service contract with the company.[58] Under this scheme, the Technical Colleges will constantly have up-to-date equipment for use in training the students at very minimum maintenance costs.

Staffing

It is a constant challenge within TEVT to maintain a teaching force which is skilled in the newer technologies being used in the industries. Many countries have recognised the importance of links between educational institutions and industry and commerce in order to provide present and future technical teachers with practical

[57] Ministry of Education, ROC. 1993. *A Brief Introduction to the Technological and Vocational Education of the Republic of China.* p7.
[58] See HKVTC internal paper on 'Sample Document for Free Loan of Equipment from Industries'. 1994.

experience in industry and commerce, thereby ensuring that they acquire the appropriate knowledge and skills for their teaching. There are a number of ways linking industry education and helping to upgrade TEVT teachers. One possibility is local co-operative projects involving personnel from nearby companies and staff from TEVT institutions. There can be common research programs between the personnel of industrial or commercial enterprises and TEVT personnel. Co-operation of industry and commerce with TEVT staff in curriculum development and student assessment, particularly in work experience, is useful. All these forms of co-operation are being used in varying degrees in Hong Kong and Taiwan.

In addition to their special subject field, all TEVT teachers need to keep up-to-date in and be aware of the applicability of new technologies to teaching. The recognition that TEVT teaching staff should posses appropriate academic and pedagogical qualification necessitated a systematic approach to technical teacher training. Career systems have been established to attract people with industrial experience to technical teacher training course. In Hong Kong and Taiwan, the recruitment of qualified TEVT teachers with experience in industry is followed by special in-service program oriented towards subject updating and pedagogical training.

Besides teaching staff, there are the groups of key personnel responsible for the planning, management and administration of TEVT that also need updating in knowledge of technology progress and skills in planning and management. Despite its importance only a few industrialised countries like UK[59] have specialised staff colleges and national institutes for the training of educational planners and administrators. In most cases attendance is voluntary and is not based on special national requirements. Hong Kong and Taiwan at present are in lack of such training provisions for TEVT administrators and managers.

Teaching methods

The advent of information technology not only have led to considerable changes in production methods but also made possible the development of new training technologies and entirely new instructional media for TEVT. It is recognised the impact of this technology on the education process has promoted a) the development of independent study and distance learning programs; b) a move towards modularisation of study, using resource based teaching; and c) linked computerised networks, offering easy access to training-program knowledge and data as well as the opportunity of speedy updating of information.[60] In addition to these is the advancement in informational and telecommunication technology that has enabled the delivery of TEVT courses online using computers in an interactive, hypermedia environment through the Internet.

In terms of instructional strategies and media, the importance of computer-aided learning (CAL) as a method of instruction and

[59] This refers to the Staff College, Coombe Lodge at Blagdon, Bristol, UK.
[60] UNESCO, 1990. *Trends and development... Op. cit.*

interactive multimedia (IMM) as alternative media to traditional resources such as lesson notes and handouts has been widely recognised. They offer the advantages of greater use of self-paced individualised learning, immediate student feedback, increased availability of up-to-date information and reduced face-to-face teaching contact. Other specific advantages of CAL may include a) use in simulations for practice and experiment to replace expensive equipment; b) increased flexibility of program of study; c) increased tutor guidance on student monitoring and accurate diagnosis of student achievements by appropriate software; and d) the use of computer-based program improves interactivity between teachers and students.

However, the introduction of information technology in TEVT teaching requires carefully structured, well-designed materials and the systematic, carefully planned production of software if effective teaching is to be aimed.

Policy and Planning

The issues raised by technological change in the areas mentioned above must be considered against the backdrop of policy. To obtain better match between industrial need and educational supply, greater co-operation between TEVT authorities and the industry at the structural and conceptual level rather than simply attempting to react *post facto* to changes in the labour market is necessary. This can be achieved through various forms of co-operation between the TEVT institutions, industry and TEVT planners that lead to more effective socio-economic-based approaches to manpower planning, with an emphasis on general human resource development rather than *ad hoc* planning.

Technological change not only increases the pressure on TEVT central authorities to respond to changes but requires increasing flexibility on the part of TEVT institutions. The institutions need to have the necessary decision-making independence and managerial capacity for adjusting their admission requirements, course content and curricula quickly. A good example of successful adjustment is provided by Singapore where joint government-private sector training centres have been set up with the co-operation of foreign firms engaged in manufacturing high technology products using high technology processes. The centres are designed to provide manufacturing companies in the precision engineering industry with a pool of pre-training apprentices who, after completing two years of centre training, are then given two more years of specialised or upgrading training in simulated work environments and in the factory. The courses offered under this four-year apprenticeship scheme cover a wide variety of trade skills, such as precision machining, tool and die making, plastic mould making, precision mechanics, instrumentation, electrical engineering, and consumer and industrial electronics.[61]

Information requirements with reference to technological changes

The discussion above concerning the impact of technological change on TEVT highlighted a wide range of TEVT activities which are affected by technological change. Each of these activities will have its own

[61] *Singapore Vocational and Industrial Training Board: Annual Report 91/92.* p5.

specialist requirements for information on technological change. An example may help to illustrate the difference between the information needs of curriculum developers and those of persons concerned with staffing and equipment. Where curriculum developers may require detailed skills data, a staffing issue may be solved by locating training resources in industry that can help updating skills of TEVT teachers. Equipment planners may be concerned with the capital cost of equipment and perhaps with the possibilities for equipment sharing arrangements in cases where the cost of outright purchase is very high. To illustrate the effect of a solution to a problem in one area on the solution of problems in others, take the case of an equipment sharing agreement on curriculum design. If the equipment is to be shared with a company in the industry, it may not be as readily available as if it were owned by a TEVT institution. This may have implications for the delivery methods of the course. Some of the normal flexibility in planning may be lost, and special arrangement has to be exercised to integrate the practical and theoretical work in an appropriate way.

It is useful to distinguish in broad terms between the information needed for policy and planning on the one hand and that needed for curriculum development and implementation on the other. Manpower policy and planning provide the framework for curriculum development and implementation. Because of the time required for planning or for policy review, these functions need to occur substantially in advance of curriculum development where possible. Moreover, the information required for policy and planning depends more upon an overview of the total situation and less upon specific detail than does curriculum, where these emphases are reversed.

Consequently, in providing information for policy and planning functions it is appropriate to consider major technological change and its effect on social and economic development; to follow the movements of technologies across occupational groups; and to anticipate, in broad terms, the likely trends of development.

Information gathering for curriculum development requires more detailed monitoring of specific changes as they occur with specific occupations. The differences in information needs between manpower policy planning and TEVT curriculum development are illustrated in Figure 4.6.

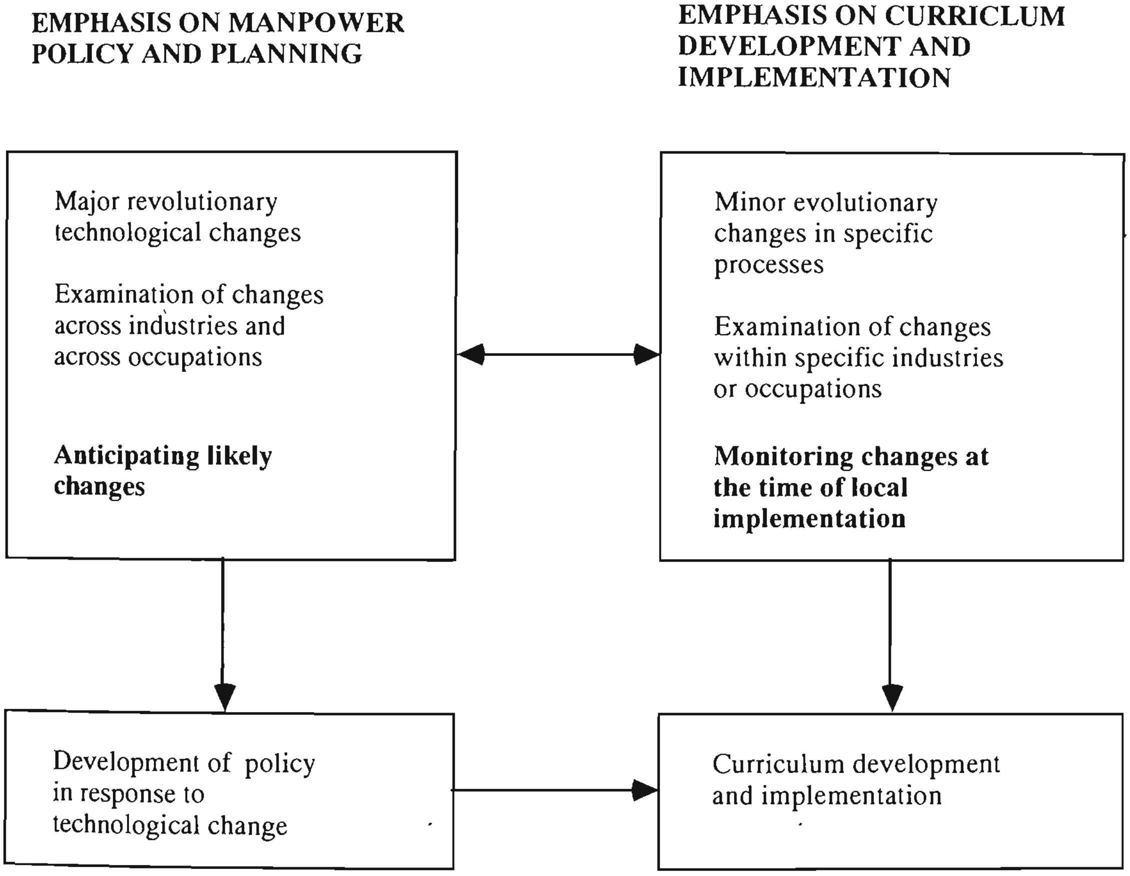

Figure 4.6 Relationships Between Anticipation of Change and Monitoring of Change

It is clear that anticipation of change and consideration of major changes primarily provide information relevant to manpower policy formulation. Examination of changes within specific industrial or occupational areas is appropriate for curriculum development, and involves monitoring specific processes as they are introduced into the work place.

A scheme for collecting information of technological change for TEVT

In managing technological change, solutions to the issues discussed earlier have to be generated. One pre-requisite for generating effective solutions is the availability of information. Therefore, improved procedures for gathering technological information may lead to TEVT courses that are more in line with current industrial needs. A scheme for the collection of information of technological change needed for various TEVT activities is outlined here.

The scheme proposed that the collection of information be co-ordinated at the central Authority level. It is envisaged that there need to be co-ordinators to perform the co-ordination functions. Co-ordinators are centrally located and accessible to those who need information, they would be responsible for monitoring the Authority's overall response to technological change and for providing information necessary to the management of that response. In particular, the co-ordinators provide a focus for all information in technological change and have the functions of maintaining an overview of developments in industry, anticipating major changes where appropriate and possible, and retaining as well as processing information about technological change. In short, the co-ordinators would provide the type of information required for manpower policy and planning.

Co-ordinators could be planning officers in the central TEVT Authority or drawn from different parts of the Authority structure assigned, *inter alia,* the following duties:

- overall responsibility for co-ordinating information collection and dissemination;

- receiving data from the monitors;

- developing techniques for collating and disseminating data from the monitors;

- developing a perspective on 'major changes' and the implications of accumulated technological changes, and investigating the policy implications;

- developing a perspective on technological change across industries and, in particular, identifying the specific technologies which are most prone to move across industries and occupational boundaries;

- instituting evaluative measures or feedback systems to ensure relevant information is reaching its destinations satisfactorily;

- monitoring literatures relating to the 'state of the art' research and development' especially from advanced countries; and

- anticipating likely changes.

Anticipation or prediction of likely changes is difficult but there is the possibility to predict the directions in which the industry may move in the near future basing on:

a) the basic scientific principles and the technological development upon which industrial change is based are usually well known far in advance of the development of industrial applications; and

b) industrial prototypes and pilot schemes usually precede the widespread introduction of new technical processes into local industry.

Information from above in the form of academic and research literature, professional journals, industrial magazines, association newsletters, company bulletins, sales brochures and so forth provide a potential base for predictions on what may become widespread local industrial practice. However, as with any prediction in the social sciences, extreme caution is needed in making predictions from these bases.

To satisfy the need for specific curriculum information, a network of monitoring systems has to be established. Selected TEVT teaching personnel would be assigned duties to monitor the technological change within specific occupations. These personnel are referred to as 'monitors'. At the monitoring level, the concern is not with prediction but with ongoing detailed monitoring of new technical processes, equipment, material and related techniques as they are introduced into specific industrial or occupational areas.

Monitors should be able to identify individuals within the industry who are useful contributors of information. One of the difficulties associated with collection of information on the latest industrial practice is the reluctance of the companies to contribute information in order to protect their competitive edge. In these circumstance, monitors have to convince individual companies that TEVT institutions' knowledge of industry developments will benefit both the industry and TEVT institutions. The range of techniques suitable for use by the monitors for gathering information may include personal visit, telephone or mail contact, industrial site visits, viewing and discussing with manufacturers new equipment and machinery during visits to exhibitions, etc.

Monitors are envisaged as industry specialists with working experience in specific occupations and they concern what is happening in industry. Whereas co-ordinators are conceived as methodologists and their task is to develop an overview of technological development as it affects TEVT. Figure 4.7 illustrates this scheme.

This scheme is not restrictive in the specific methodologies which can be employed. These can be varied to suit the circumstances. The most effective techniques may change over time. This scheme provides information for analysis of the entire range of problems posed by technological change on TEVT – data gathering, equipment issues, staffing issues, resources issues, management styles, teaching methods, and so on.

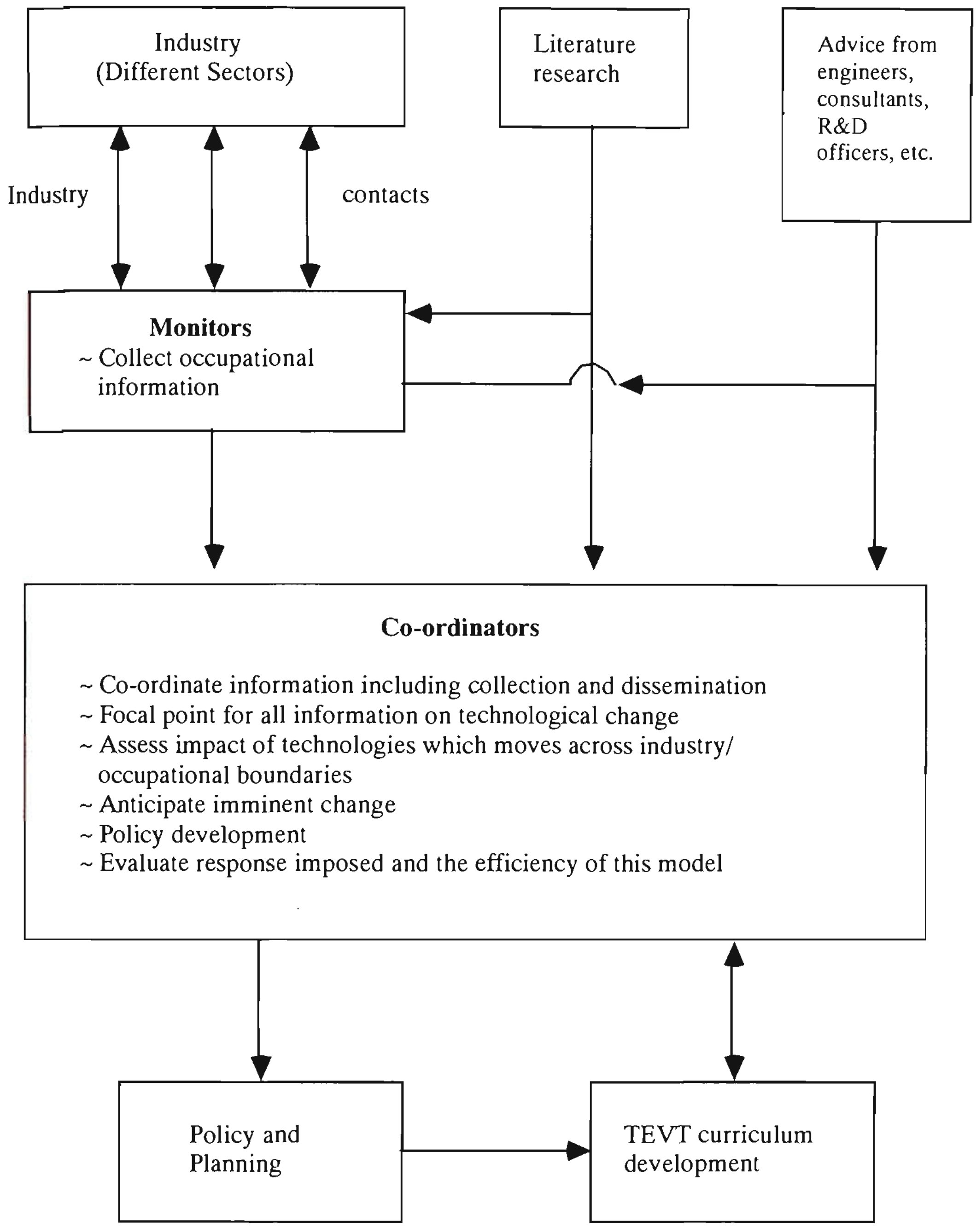

Figure 4.7 A Scheme for Collecting Information on Technology Change

What have been postulated, of course, is an ideal scheme for collecting information on technology change for the planning of TEVT. In practice, the Hong Kong and Taiwan authorities have established mechanisms, with different structure but similar principles to this scheme, to collect information on technology change and the subsequent shifting demands of skills from the industry. Details of these mechanisms will be examined in later Chapters discussing the Hong Kong and Taiwan cases.

Maintaining linkages through time

While maintaining its policy of non-intervention in the economy, there has been a sustained attempt on the part of Hong Kong's government to increase the skill base of the population in an effort to support the shift in the industrial and commercial base of the economy. This has been shown most clearly in the development of a responsive industrial training system, largely financed and provided by government, but strongly influenced by industrial interests.

One important difference between Hong Kong and Taiwan is that in Hong Kong the TEVT system is more reactive in its operation. In Hong Kong the government has created a centralised system of skill formation which attempts to respond rapidly to the changing needs of industry and commerce. This speed of response is achieved through a variety of mechanisms, such as the work of the Education Commission and a system of overlapping memberships on the various governmental bodies dealing with industry and education. The system is geared to providing the appropriate skills once the demand on the part of employers has been established. It is the employers who define the economy's skill requirements, not the government.

By contrast, the Taiwan government has been proactive in defining the territory's skill needs in order to ensure that the requisite skills are in place to attract or facilitate the establishment of specific industries.

Over the past two decades, Taiwan has undergone significant political and economic changes. As Taiwan converges towards Western level of productivity, the prospects of growth by absorption of foreign technology become circumscribed. Political and economic factors have influenced the skill formation system, not only by way of response to new challenges, but also in terms of a fundamental shift in the government's role in skill formation in the future. Yet economic plans continue to inform manpower policies. In recent years policies in the Economic Stimulation Plan aimed to guide industry to upgrade into higher value-added and high technology development and investment continue. Recently, Taiwan has been working on the development of micro-technology, bio-technology, communication technology and knowledge-based industries. Needless to say, professionals in these fields are obviously increasing. The drive to enter the World Trade Organisation has added impetus to market liberalisation and internationalisation. More recently the making of Taiwan an Asian Pacific Regional Operation Centre is the major economic policy goal for the Taiwanese government. All these economic policies will direct changes in the TEVT system.

A test of the model

The last two Chapters have discussed existing theories about the part played by education and training in the growth of Hong Kong and Taiwan. A skill formation model and related theories as well as literatures on elements characterising this model have been set out. The following Two Sections provide detailed case studies on accounts of the development of TEVT policy and institutions in the two NIEs, *with a time span from post-war revival to the mid 1990s.* The focus is on the institutional mechanisms that deliver system responsiveness and on the governments' involvement in sequencing policies. The proposed skill formation model will be used to approximate these accounts to test how true this model can apply to the situation in Hong Kong and Taiwan.

SECTION

III

Technical Education and Vocational Training in Hong Kong

CHAPTER 5

TERRITORIAL CHARACTERISTICS AS BACKGROUND FOR THE DISCUSSION OF TECHNICAL MANPOWER PLANNING AND DEVELOPMENT IN HONG KONG

Geographic and demographic situation

Geographically, Hong Kong is situated off the south-east coast of Guangdong Province of China, at the edge of the Pearl River Delta. The territory comprises the island of Hong Kong, the Kowloon peninsula, the New Territories (the peninsula's hinterland), 236 outlying islands, and land reclaimed from the sea. Hong Kong has a total land area of 1,084 sq km on which dwelt with 6.4 million of people at the end of 1996. Over 98 per cent of the population is Chinese, of which the majority are Cantonese. Among the remainder, the most significant groups are from the Philippines, the UK, the USA and the Indian subcontinent.

Hong Kong Island is approximately 17 km long and between 3 km and 8 km wide. An irregular range of hills rises abruptly from the sea with peaks over 300m in height. Granites, basalt and other volcanic rocks account for the main geological formation. These rocks are most common, too, on other islands and in the Kowloon peninsula and New Territories. Hong Kong is poor in minerals and has few natural resources apart from its harbour. It imports virtually all of its food, fuel and raw materials.

Constitutionally, Hong Kong was a British Crown Colony from 1842 until June 30, 1997, after which sovereignty over the territory reverted to China and it became a special administrative region

(SAR) with its own government and laws. According to the Basic Law promulgated by China's National People's Congress in 1990 the SAR now exercises a high degree of autonomy and enjoys executive, legislative and independent judicial power. The reality of these claims is still being tested.

Economic structure

The structure of the Hong Kong economy has changed significantly in recent years. In 1980 the manufacturing sector accounted for 23.8% of the output of the economy.[1] In 1995 manufacturing accounted for less than 9% of GDP.[2] In other words, Hong Kong has become a service, post-industrial economy, in which 83.8% of output and 77% of employment was provided by the tertiary sector in 1995.[3]

The factors underlying Hong Kong's economic performance are quite clear. For more than 40 years the government has maintained reasonable stability of political institutions and has supported a market that allowed for great flexibility of resource use and provided strong incentives to wealth acquisition in the form of low income taxes and no taxes on capital gains. In addition, the world economy has provided a favourable environment for growth through trade. Since the 1950s, Hong Kong has enjoyed favourable trade expansion. Trade, however, has not been the sole source of demand growth. In addition to private consumption, domestic investment and government spending have also been very important.

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[1] Source of figure from *Revised Estimates of Gross Domestic Product 1961 to First Quarter 1994*, Census and Statistics Department, Hong Kong Government

[2] Source of figure from *Hong Kong 1997, A Review of 1996*, Government Printer, Hong Kong.

[3] *Ibid.*

Hong Kong's prosperity was based for 25 years (from 1950 to mid-1970s) on the development of labour-intensive manufactures, especially textiles and plastics. Since the 1980s this pattern has changed gradually, partly because Hong Kong's cost became too high for many of its established industries. Two related trends reflected were: first, shifting of the former export bases to other lower-cost locations by the entrepreneurs; second, the development of links with China for low-cost manufacturing. Furthermore, Hong Kong is also itself a base for some types of industrial relocation from even higher-cost economies such as Japan and the USA. Even more important, Hong Kong has become a centre for other economies also relocating and developing business in China. Taiwan, in particular, has used Hong Kong in this way.

Industry

The dominant productive sector in Hong Kong in 1995 was manufacturing industry, which accounted for 8.8% of GDP and 13.3% of employment.[4] The most important industry was the textile sector, which was the basis on which Hong Kong's industrialisation was built in the 1960s. The sector remained active in spinning and weaving, but in recent years has moved progressively into clothing markets, initially at the lower, but increasingly in the higher, valued-added, fashion end of the market.

The other major industries in Hong Kong are electronics, clocks and watches, toys and plastics. Hong Kong continues to be the world's leading exporter of toys, and it plays a very important role in the watch trade.

[4] Source of figure from *Hong Kong 1996, A Review of 1995,* Government Printer, Hong Kong.

Labour shortages have been once the major problem that Hong Kong's industrial growth has been facing. Huge private and public sector infrastructural developments such as the new Chap Lap Kok airport have made the problem even more acuate.

Since the 1980s the Hong Kong government has played an active role in industrial development. Education and training is one field where this attitude is apparent. The establishment of the Vocational Training Council, the City Polytechnic (now the City University) and the University of Science and Technology are the most visible indicators that the government is strengthening technological education.

As research and development activities in industry are comparatively low in Hong Kong, the government, in order to make up this deficiency, has been providing support to industry in the form of specialised agencies, such as the Hong Kong Productivity Council (HKPC). The HKPC was established as long ago as 1967 but was expanded in the 1980s and now has a staff of over 300. It provides a wide range of technical support services including computing and electronic services, engineering, metals, environmental management and other forms of consultancy. In recent years the Council has increased its efforts to make an impact on the small and medium companies which are in great need of technological upgrading. In addition, since 1991 the government has begun to give active support to research through the establishment of the Hong Kong Research Council, and is also experimenting new ways of providing direct support for innovative firms.

The education structure

The system

Hong Kong's education structure is based on a modified British pattern. The system consists of kindergartens, primary and secondary schools, technical institutes, and tertiary institutions. The majority of places from primary school upwards are provided either free of charge or at highly subsidised rates. All children must, by law, be in full-time education from the age of six to their 15th birthday or completion of Secondary 3 (Grade 9 equivalent in Australia), whichever is earlier.

Most children attend kindergarten from the age of three. Primary school normally begins at the age of six, and lasts for six years. At about 12, children progress to a three-year junior secondary course. After Secondary 3, most stay on for a two-year senior secondary course leading to the first public examination, the Hong Kong Certificate of Education Examination (HKCEE), others join full-time craft courses of vocational training and a few leave formal education at this point.

After the HKCEE, students who wish to continue their studies either progress to a two-year sixth form course leading to the Hong Kong Advanced Level Examination (HKALE), to a two- or three- year vocational course leading to a certificate or diploma, or to a three-year course of teacher education. Post-HKALE opportunities include a place on a three-year first degree or diploma course, or on a two-year teacher education program. Those leaving full-time education at the end of the senior secondary or sixth form courses have opportunities for part-time study or vocational training through to degree level.

The government's role

Realising the importance of ensuring the education system continuously adapts to the demands of the society, the government established the Education and Manpower Branch within the Government Secretariat (the Cabinet), headed by the Secretary for Education and Manpower to formulate and review education policy, secure funds in the government budget, liaise with the Legislative Council on educational issues, and oversees the effective implementation of educational programs.

Next level down the hierarchy is the Director of Education, who heads the Education Department, implements educational policies at kindergarten, primary and secondary levels.

The provision and administration of technical education and vocational training is the responsibility of the Vocational Training Council (VTC) headed by an Executive Director. This body operates technical colleges and institutes to offer craft and technician level courses for school leavers, training centres to provide training for major industrial and service sectors.

To ensure the system is responsive to the changing needs of the community, a group of independent statutory bodies have been set up with members from the public to play part in the planning, development and management of the education system at all levels. This group includes:

Education Commission – the Commission advises the government on the development of the education system as a whole in the light of community needs. Its terms of reference are to define overall objectives, formulate policies and recommend priorities for implementation.

Board of Education – The Board advises the government, through the Director of Education, on educational matters at school level. It focuses on the implementation of approved policies, and the need for new or modified policies relating to education in schools.

Curriculum Development Council – the Council is appointed by the Governor to advise the government, through the Director of Education, on matters relating to school curriculum development.

University Grants Committee – the Committee is appointed by the Governor to advise on the development and funding of higher education, and administer public grants to eight publicly-funded institutions.

Hong Kong Examinations Authority – this is an independent and self-funding statutory body that operates public examinations in Hong Kong and conducts, on behalf of overseas examining bodies, many examinations leading to academic, professional or practical qualifications.

The Hong Kong Council for Academic Accreditation – this is an independent statutory body that reviews the non-university degree-awarding institutions and validates the individual programs of those which have yet to acquire self-accreditation status to ensure the awards meet internationally recognised standards.

Learning institutions

Primary schools

Primary schooling lasts for six years and has been free and compulsory since 1971. Chinese is the medium of instruction in most primary schools with English taught as a subject from Primary 1. All primary schools follow the same basic curriculum to provide a coherent and well-balanced program to promote all-round development of the child. Students ending the primary course are allocated places in government or aided secondary schools. In 1996, there were 464,200 children enrolled in 857 public sector primary schools.[5]

Secondary schools

Secondary schooling in Hong Kong comprises three years of junior secondary school, two years of senior secondary school and two years of Sixth Form. The junior secondary curriculum aims to provide a well-balanced and basic education suitable for all students, whether or not they continue formal education beyond Secondary 3. The senior secondary curriculum aims to prepare students for education beyond Secondary 5 as well as for work.

There are five types of secondary school, viz., grammar, technical, prevocational, practical and skills opportunity schools. A brief description of each type of them is given here:

Grammar schools – offer a five-year secondary course in a broad range of academic, cultural and practical subjects leading to the

[5] Source of figure from *Hong Kong 1997, op cit.*

HKCEE. Most also offer a two-year sixth form course leading to the HKALE. In 1996, there were 418 grammar schools with an enrolment of 456,700.[6]

Technical schools – prepare students for the HKCEE with choices of technical and commercial subjects. Technical school students follow very much similar curriculum with those in grammar schools. Qualified students can continue their studies in the sixth form. There were 20 technical schools enrolling 20,515 students in 1996.[7]

Prevocational schools – the name of this type of school seems misleading, it makes people think this form of schooling will prepare and direct graduates into a specific trade. In fact, the curriculum only place emphasis on practical and technical subjects upon which future vocational training may be based, while providing a good foundation of general knowledge. Students completing Secondary 3 in prevocational schools may enter an approved apprenticeship scheme, or continue in school and take the HKCEE. A small number of students will proceed to the sixth form. There were 27 prevocational schools enrolling 22,758 students in 1996.[8]

Practical schools – the only two practical schools offer a curriculum with a practical orientation and strong guidance support. They help students develop their interest in studies and prepare them for further vocational training or senior secondary education. There were 930 students in 1996.[9]

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[6] *Ibid.*
[7] *Ibid.*
[8] *Ibid.*
[9] *Ibid.*

Skills opportunity schools – there are only three schools, offering a tailor-made and skill-oriented curriculum to help students who have severe learning problems to acquire basic social and vocational skills. Enrolment were up to 700 in 1996.[10]

Technical colleges

Technical college forms part of the technical education system in Hong Kong to provide higher technical level education to senior secondary school leavers. The two colleges offer higher diploma (normally three years full-time) and higher certificate (two or three years part-time for diploma/certificate holders from technical institutes) courses in applied science, business administration, computing and mathematics, construction, design, electrical and communications engineering, electronic engineering, hotel catering and tourism management, manufacturing engineering and mechanical engineering.

Short courses are also offered to people in employment. In 1996, the two colleges enrolled 5,141 full-time and 8,731 part-time students.[11] Figure 5.1 shows students of a civil engineering course attending practical and theory classes.

[10] *Ibid.*

[11] Source of figure from VTC, 1997, *Hong Kong Vocational Training in Figures*, VTC, Statistics Section.

Figure 5.1 Technical College Students of a Civil Engineering Course in Class

Technical institutes

Technical institutes are also part of the technical education in Hong Kong. There are seven technical institutes providing technical and craft level courses in accounting, construction, design, electrical engineering, electronic engineering, hairdressing, hotel-keeping and tourism, manufacturing engineering, marine engineering and fabrication, mechanical engineering, motor vehicle engineering, printing and textiles. Technician level courses are offered for Secondary 5 leavers while craft level courses are for those who have completed at least Secondary 3. These courses are offered on either full-time, part-time day release, or part-time evening basis. In 1996 the seven technical institutes enrolled 10,157 full-time, 3,989 mixed full-time, 11,089 part-time day and 23,602 evening students.[12] Figure 5.2 shows students in various practical classes.

Figure 5.2 Students Attending Practical Classes in Different Technical Institutes

Tertiary institutions

In 1995, 18% of the 17 - 20 age group could receive tertiary education in Hong Kong. There were 14,500 places available for first-year, first-degree courses. Degrees up to doctorate level awarded in Hong Kong are recognised by institutions of higher learning around the world. There are eight publicly-funded tertiary institutions under the aegis of the University Grants Committee, of which six are fully self-accrediting universities, *viz.*

- the University of Hong Kong, founded in 1911 with 10,800 full-time and 3,220 part-time students enrolled in nine faculties in 1996,[13]

- the Chinese University of Hong Kong, established in 1963 with 9,630 full-time and 630 part-time undergraduate, and

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[12] *Ibid.*

[13] Source of figure from *Hong Kong 1997, op cit.*

1,080 full-time and 1,480 part-time postgraduate students enrolled in seven faculties in 1996,[14]

- the Hong Kong Polytechnic University, established in 1972 as the Hong Kong Polytechnic and upgraded to a full university in 1994. It offers post-graduate, first-degree, and sub-degree courses in six faculties with an enrolment of 11,200 full-time and 9,090 part-time students in 1996,[15]

- the Hong Kong Baptist University, founded in 1956 as the Hong Kong Baptist College and upgraded to a full university in 1994. It offers first-degree and postgraduates courses in five faculties with an enrolment of 4,230 full-time and 520 part-time students in 1996,[16]

- the City University of Hong Kong, founded in 1984 as the City Polytechnic of Hong Kong and upgraded to a full university in 1994. It had 10,530 full-time, 6,770 part-time and 420 sandwich course students in four faculties in 1996,[17]

- the Hong Kong University of Science and Technology, opened in 1991, awards bachelor's, master's, and doctoral degrees in four schools. In 1996 it had 5,610 undergraduates and 1,380 graduates students,[18]

[14] *Ibid.*
[15] *Ibid.*
[16] *Ibid.*
[17] *Ibid.*
[18] *Ibid.*

one degree-awarding liberal arts college, the Lingnan College (offering bachelor's and master's degrees to 2,120 full-time students in 1996.[19] Upgraded to a full university in 1999) and one teacher training institution, the Hong Kong Institute of Education (providing pre-service sub-degree teacher education to 3,080 full-time and 4,130 part-time students in 1996).[20]

Vocational/Industrial Training

Both pre-employment training for new entrants to the labour market and skill upgrading training for in-service personnel were offered by VTC's training centres, the Construction Industry Training Authority, and the Clothing Industry Training Authority.

Training provisions in precision tool and die design, application of CAD/CAM to die manufacture, electronic system design, object-oriented technology and open system in information technology, building and construction, and clothing and footwear are made available through out the year in full-time and part-time mode.

Trade tests were also offered to employees in the automobile, building and civil engineering, electrical, jewellery, machine shop and metal working, plastics, and printing industries.

Detailed studies of the planning and provisions of technical education and industrial training in Hong Kong, which is the focus of this thesis, will be dealt with in the following Chapters.

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19 *Ibid.*
20 *Ibid.*

CHAPTER 6

PLANNING OF TECHNICAL MANPOWER IN HONG KONG

Introduction

As discussed in Chapter 2, and elsewhere[1], the government in Hong Kong has taken a 'positive non-intervention' but hardly laissez-faire role in managing its economy. It provided a prudent fiscal policy based on a simple, low direct taxation system, a liberal foreign-exchange policy, and the timely and effective development of the infra-structure necessary for economic growth. Thus, while free-market adherents such as Friedman and Friedman[2] regularly reference Hong Kong as the most liberal of newly industrialising economies, in fact non-market intervention government programs have been instrumental in maintaining favourable conditions for economic development. The government has intervened in the manpower supply directly by means of its extensive educational and training provision at various levels. This Chapter will examine how the Hong Kong government has put in place mechanisms and policies that ensured the educational and training provision were linked to the existing and future needs of industry. The focus is to review the manpower planning process which

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[1] See, for examples Yeung, K.Y. 1991. 'The role of the Hong Kong government in industrial development' in Chen, E.K.Y., et al (ed) *Industrial and Trade Development in Hong Kong*. Centre of Asian Studies, University of Hong Kong; Berger, S. and Lester, R. K. (ed) 1997. *Made by Hong Kong*. Hong Kong. OUP. (Especially page 40).

[2] Friedman, M. and Friedman, R. 1981. *Free to Choose*. Hamondsworth, Penguin.

is the mechanism used to assess the type of skills needed by the major industry.

Historical evolution and development

Hong Kong provides an interesting example of a rapidly developing market economy where the nature of government manpower development policy has been evolving significantly in response to challenges arising from different phases of industrial development.

From the very beginning of its existence as a British colony, Hong Kong's rationale has been based largely on economic advancement. In the early period, the main avenue for such advancement was through activities connected with the entrepot trade. Even then, industries began to develop. According to Topley the early industries included rattan ware, ginger preserving, and flash-light production.[3] More directly entrepot-related enterprise such as shipbuilding and ship repairing were increased in number during World War I as reported by Phelps Brown.[4] The 1932 Ottawa agreement which sanctioned forms of colonial preference within the British Commonwealth further encouraged the germinating Hong Kong industries. Japanese occupation of Hong Kong in the early 1940s not only suspended British ruling of the territory, it also halted local industry.

[3] Topley, M. 1969. 'The role of savings and wealth among the Hong Kong Chinese' in Jarvie, I.C. (ed) *Hong Kong: A Society on Transition*. London, Routledge and Kegan Paul.

[4] Phelps Brown, E.A. 1971. 'The Hong Kong economic: Achievements and Prospects' in Hopkins, K. (ed) *Hong Kong: The Industrial Colony*. Hong Kong, OUP.

During this period of small scale and often entrepot-related 'proto-industrialisation', no thoughts were given by the government to formulate manpower policy for the island. Hong Kong's earliest experiment in technical education was to provide the social misfits with training in carpentry, tailoring, shoemaking, printing or bookbinding to gain employment[5]. The only document that bore a very light sense of occupational survey was *A Survey of Vocational Technical Education in the Colonial Empire* published by the Colonial Office in Britain in 1940. To compile this survey report, heads of education departments throughout the British colonies

> 'were invited in 1937 to supply information as to the general position, the nature of the employment for which technical training is provided, the types of institution giving the training, and the length and nature of the courses.'[6]

In the Hong Kong section of this survey, Hong Kong industries were categorised into engineering, shipbuilding, general building, electrical engineering, wireless telegraphy, automobile repair, furniture-making, tailoring, shoe-making, and printing for which technical training was provided.[7]

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[5] Sweeting, A.E. 1992. 'Hong Kong education within historical process in Postiglione, G.A. (ed) Education and Society in Hong Kong: *Towards One Country and Two Systems.* Hong Kong. HKU Press.

[6] Colonial Office, 1940. *A Survey of Vocational Technical Education in the Colonial Empire.* London, HMSO Introductory section.

[7] *Ibid*, p38.

Events in China and Korea in the late 1940s and 1950s adversely affected Hong Kong's established entrepot role. As a result, the economy underwent difficult structural adjustments to seek an alternate means for survival. At almost the same time, there were massive inflows of entrepreneurial skill and capital brought in by the immigrants from China. These factors altogether contributed to the rapid development of the export-oriented industries which relied mainly on low-cost, labour-intensive technology.

As industrialisation went on, it began to have an impact on opinions about the responsibilities of government in training the needed human resources in the process of industrial development. By the early 1950s, the official annual reports of the Education Department were beginning to recognise 'the increasing importance of Hong Kong as a manufacturing and industrial centre' and the implications of this for education.[8] It was based on this that the Hong Kong government began to pay a role in formulating some forms of manpower policy.

The appointment of the Technical Education Investigating Committee chaired by S. J. G. Burt in October 1951 to, *inter alia*,

> 'obtain evidence on the requirements for technical and vocational training in the various trades and industries in the Colony'

and to consider

[8] See for example, the *Hong Kong Annual Report* 1950-51, p64,

> 'what demands there are in the Colony for general and professional higher studies, how far these demands are at present being met or planned for, and what further facilities would be required to satisfy these demands'[9]

can be seen as the government's first attempt in manpower planning, albeit in a very rudimentary form.

Government's formal presence in the territory's manpower training increased as industrialisation evolved in the course of time. A system of surveys and manpower forecasting for technical education was introduced in the mid-1960s. Advisory bodies such as the Hong Kong Training Council was given broader terms of reference in 1973 to advise the government on 'the measures necessary to ensure a comprehensive system of manpower training geared to meet the developing needs of Hong Kong's economy'.[10] A statutory body, the Vocational Training Council was established in the early 1980s to undertake manpower planning and institute, develop and operate training provisions suited to the development needs of Hong Kong. The Education and Manpower Branch was established in 1983 to oversee all aspects of education and manpower planning in Hong Kong. These were indications of the government's growing involvement and responsibility in manpower planning and training. The evolution of government's manpower policy is given in details in the following section.

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[9] Technical Investigating Committee, 1953. *Annual Departmental Report 1972-73.* Hong Kong, HKGP, p13.
[10] See Commissioner for Labour. 1973. *Annual Departmental Report 1972-73.* Hong Kong, HKGP, p13.

Manpower policy and development in Hong Kong

During the long history of Hong Kong's industrial development, extensive restructuring has occurred. From the textile boom in the 1950s and 1960s to the flourishment of garments and plastics in the 1970s and to the development of the electronics and the toy industries into some multi-billion dollar business today, the industrialisation has indeed come a long way. Along the trajectory of development also saw the evolution of the government's policy in preparing manpower for the territory. The government's manpower policies in different phase of development after World War II will be examined next.

The early era of industrialisation 1945-1965

When the British returned to reoccupy Hong Kong in the latter part of 1945, initially it was the entrepot trade that helped the society find its economic feet. The economy needed a year or so to recover from the depredation of the Japanese occupation. However, this process was hardly complete, and its entrepot basis restabilised, when the first major transformation began. Fuelled by the private savings of many Hong Kong families, as well as the capital and entrepreneurial skills of industrialists, a significant number of whom were immigrants from the Shanghai region fleeing the new Communist regime, and the hardwork of thousands of economic and political refugees,[11] a major phase of industrialisation began in Hong Kong in the late 1940s. This new phase focused in textile manufacturing and began with relatively small firms

[11] Wong, S.L. 1988. *Emigrant Entrepreneurs: Shanghai Industrialists in Hong Kong.* Hong Kong: Oxford University Press.

producing low value goods. The outbreak of the Korean war in 1951 and the US embargo on the import of goods from China, as well as the UN embargo on the export of strategic goods to China created the crisis which made Hong Kong to depend on further industrialisation for economic survival.

The Korean war drastically reduced Hong Kong's trade, cut its income, and dimmed its prospects. With the exodus from China there was a significant amount of unemployment, and factory wages for a 70-hour week were, on average, about HK$4.20 a day, and productivity was low, and there was little mechanisation.[12] To survive the economic hardship and with what Sit *et al* described as 'a loose system of support for industrial development in Hong Kong'[13] from the government under which people and capital could move freely in and out of the territory and trade could be conducted with minium regulations and interference, the textile industry expanded rapidly and supplied overseas markets, especially the American market, with goods which these markets could not or would not receive from China.

Already skilled at importing and exporting, Hong Kong increased its imports of cotton from nearby neighbours and exported the semi-finished or finished products to the US, Britain, Australia, and many other countries. World demand for clothing was rising very fast in the 1950s, and Hong Kong also had the advantage, as a member of the

[12] Sir S.Y. Chung. 1981. 'Productivity dimensions and directions for the 1980s in the developing economies of Asia', address to Asia Productivity Congress, October 1980, in *Hong Kong Manager*, Vol 17 No 4.

[13] Sit, V., Wong, S.L. and Kiang, T.S. 1979. *Small Industry in a Laissez-faire Economy.* Hong Kong: Centre of Asian Studies.

British Commonwealth, of preferential tariff treatment by Britain. According to Youngson[14], the new textile industry grew fast. At the beginning of the 1950s there were only about 28,000 workers in the industry, engaged in spinning, weaving and finishing, which was about 35% of the total labour force in manufacturing industry. By 1960 the employment figure had risen to about 45,000. This was a fairly rapid rate of expansion but it was far surpassed by the clothing industry. Youngson further pointed out that in 1950 the clothing industry merely employed 2,000 workers but grew fast enough to almost overtaken textiles by 1960.[15] While employment in textiles almost doubled, employment in clothing multiplied twenty-one fold, the two industries taken together had provided over 40% of total manufacturing employment in 1960.[16]

In less than a decade Hong Kong successfully made its position on world market as a small but dynamic exporter of manufactured goods, principally of textile and clothing. Whereas in 1953 only 30% of all the territory's exports were of local origin, and 70% were re-exports, by 1959 the position had been reversed with 70% of exports were of local origin and only 30% were re-exports. These changes were chiefly due to the textile and clothing industries.[17]

Besides textile and clothing, a great variety of other industries expanded very rapidly - the manufacture of shoes, gloves, torches, batteries and

[14] Youngson, A.J. 1982. *Hong Kong Economic Growth and Policy.* Hong Kong: Oxford University Press.
[15] *Ibid.*
[16] *Ibid,*
[17] Source of figures from Hong Kong Annual Report 1953 and 1959. Hong Kong Government Printer.

bulbs, vacuum flasks, enamelware, aluminium ware and rattan ware. The fastest one was the plastics industry which began in 1947 and principally engaged in making containers of all kinds, plastic toys became an important product in the mid-1950s, and the making of plastic flowers, at first for the American market, suddenly boomed in 1957. This was another industry which required little capital and not much technical skill. Several hundred of very small factories were set up employing on average only about 25 people each factory. Despite of the size of the factories, the growth rate of output was astonishing. In the year between 1958 and 1959 the export of plastic toys rose by more than 50% and the export of plastic flowers more than trebled.

The first electronics factory was established in 1959. This was an assembly operation mainly subcontracting work for Sony. It assembled simple transistor radios using components sent from Japan. Exports of radio in 1960 worthed HK$30 million.[18] By the end of 1962 there were over twenty assembly plants, all working along the same line and exporting almost all their output to Britain and the US. The industry then began to diversify as well as to expand. More and more components were made in Hong Kong, the first silicon planar transistors were made in 1963 by a subsidiary of Fairchild Semi-conductor Company. The manufacture of television sets began in 1964 and the first export of sets took place in 1965.

[18] See Youngson, A.J. 1982. *Op cit.*

The rapid pace of Hong Kong's industrialisation from 1947 to 1965 is illustrated in the following Table 6.1:

Year	Population	No. of Industrial Establishment	No. of Persons Employed
1947	1,750,000	972	51,338
1955	2,490,400	2,550	118,488
1965	3,692,300	8,492	357,497

Table 6.1 Statistics of Industrial Growth 1947-1965[19]

By the mid-1960s, the early stage of Hong Kong's industrialisation was successful. Manufacturing was firmly established as the leading sector of the economy. This phase of industrialisation was concentrated on labour intensive light industry. This mode of manufacturing did not require a large supply of sophisticated machinery and special skills, or fine divisions of labour on an assembly line, for most of its processes. There was little need for design and development and limited use of technological expertise.

Government's manpower policy was obscure and there was virtually no manpower planning for the technical skills needed at the early stage of industrialisation. This was partly because of the official policy in distinguishing between the public responsibility for general education and that of private industry for training, and partly because of the resumption and expansion of education to cope with the up-surging

[19] Source from *Hong Kong Annual Report,* various years. Hong Kong Government Printer.

population had took up much of the energies of the government. Further to that, the abundant supply of labour who were able and willing to work at the beginning of this phase of industrialisation also exerted no pressure on the government to consider any form of manpower policy. Almost half a million people entered the territory between 1950 and 1955 and over 350,000 between 1956 and 1960.[20] Because the number of those seeking employment has grown so fast, there had never been a general scarcity of labour, indeed, until the mid-60s there was 'a perennial condition of a deficiency of work.'[21] Although most of this cohort of men and women were unskilled and with education hardly got beyond primary level, they adapted themselves well into the labour-intensive low skilled industries of the 1950s and early 1960s.

However, industrialisation did have an impact on opinions about the responsibilities of government in providing training for the manpower need. An example was the summary of a quite complex structure of provision for technical education and vocational training in an organisational chart in the 1954-1955 Education Department Report which illustrated the variety of opportunities for the trainees to follow and to change streams.[22] More confidential sources make it clear that time and effort were now being devoted to technical manpower development.[23]

[20] See Youngson, A.J. 1982. *Op cit.*
[21] *Ibid.*
[22] See *Education Department Annual Report 1954-55.* Hong Kong Government Printer.
[23] See for example, Minutes of the Board of Education, October 1950 onwards.

Throughout the early 1950s, the link between the increasing economic importance of Hong Kong's manufacturing and industrial activities and the need for manpower development of various grades of workers had been recognised by employees, employers, members of the Legislative and Urban Councils, and the government. It was against this background that led to the appointment of the Technical Education and Vocational Investigating Committee mentioned early to collect information about the facilities available in Hong Kong and to obtained evidence about future manpower requirements in October 1951. As a further manifestation of official concern, in July 1954, the Governor, as recommended by the report of this Committee, appointed the Standing Committee on Technical Education and Vocational Training with the following terms of reference:

1. To keep under constant review the current facilities for, and the varying requirements of, technical education and vocational training with particular reference to the manpower needs of commerce and industry;

2. To advise Government on the steps that should be taken to meet these manpower requirements and on all other general matters relating to technical education and vocational training.[24]

The work of this Standing Committee has farfetched influence in the

[24] See Hong Kong Government Gazette. July 31, 1954.

planning and provision of technical manpower in the following years of industrial development.

It is clear, therefore, that the period from 1945 to 1965 saw what might best be characterised as a minimalist approach to technical manpower planning and provision. Notwithstandingly, the later stage of this period also saw the beginnings of an infrastructure for further expansion of technical education and vocational training.

The fully fledged phase of industrialisation 1965-1972

Hong Kong's industry continued to grow rapidly during this period. Total exports rose from HK$6.5 billion in 1965 to HK$19.4 billion in 1972. The territory's GDP was HK$10.9 million in 1966 and doubled in current price to HK$22.9 billion in 1972, a real increase of nearly 60%.[25]

The garment industry's contribution to total export was still significant during this period of economic development. It was found to be 35% in 1965, and 40% in 1972 as shown in Table 6.2. Goods of high quality are now quite important in the industry. Well-known European clothing firms and fashion designers often obtain their knitwear and woven materials in Hong Kong and in many cases have finished garments manufactured there. The industry also diversified into man-made fibres. These, especially terylene, began to be produced and woven in the early 1960s. The result was a further widened scope of

[25] Source of figure from *Hong Kong Annual Report,* various years. Hong Kong Government Printer.

the industry. In 1969, 30% of locally-made garments were synthetic, two years later the figure was 40%.

Textile, the largest export earner in the 1950s, began to decline in the 1960s. Its percentage share in total exports, as shown in Table 6.2, was 16.6% in 1965 dropped to 10.2% in 1972. The lack of fibre production at home and the rising import price of fibre should be considered as major constraints to the growth of the textile industry. In the 1970s, labour shortage was a serious problem facing the textile manufacturers.

	Textile Yarn, Fabric and Made-up Articles	Clothing	Electrical and Electronic Machinery
1965	16,6%	35%	5.8%
1967	14.0%	35%	8.8%
1970	10.3%	35%	10.5%
1972	10.2%	40%	13.0%

Table 6.2 Hong Kong's Domestic Exports by Commodities, 1965-72[26]

Similar to garments, the plastic industry flourished in the 1960s, peaked in the early 1970. The manufacturing of plastic toys and footware overtook plastic flowers, which was the main product line in the 1950s. In the early 1970s, the industry began to move upmarket, and the manufacturers became more quality conscious. Plastic toys started to overtake plastic flower and footware. By the end of the

[26] Source: Census and Statistics Department, *Hong Kong Trade Statistics*, various years.

1960s, the electronics industry was producing not only silicon transistors and transistor radios but also amplifiers and tape recorders. Employing only a few thousand people in 1965, the industry employed 37,000 in 1969.[27]

When industrial upgrading and restructuring take place, inevitably more advanced skills are needed to man the industry. In its second phase of industrialisation, Hong Kong faced with labour supply problem. The rapid expansion of Hong Kong's manufacturing industries in the decade preceding 1965 resulted in a shortage of trained workers and prompted the government to review its policy on manpower development. In September 1965, the government set up the Industrial Training Advisory Committee (ITAC) under the chairmanship of the Commissioner for labour. With membership comprised representatives from industry, labour, government departments and other relevant organisations, this non-statutory ITAC was assigned the task of identifying the training and other problems related to manpower development and making recommendations to government for measures to solve these problems. ITAC was also required to recommend an appropriate permanent machinery for ensuring a comprehensive system of industrial training geared to meet the developing needs of Hong Kong's economy.

[27] *Ibid.*

Although concerned principally with manpower at technician, craft and operative levels, the training and related problems identified by ITAC included:[28]

1. Inadequate efforts were being made to cope with the manpower demand arising from expansion and diversification. Also both the industry and government lacked reliable manpower information based on which future manpower demand could be assessed and proper training plans formulated;

2. There was lack of accepted standards or criteria for measurement of skills required for the principal jobs in all industries. There was also a serious lack of technical education facilities, particularly at craft and technician levels, needed to provide workers at these levels with the knowledge they need to cope with advancing technology and new techniques;

3. Employers were generally short-sighted and not willing to train, considering only the cost of training but not the benefits that would result. To be effective, trainees should be given an initial period of broad basic training off-the-job but few employers in Hong Kong were able to set aside space for this purpose;

[28] As reported by Horace Knight, the then Executive Director of the Vocational Training Council, in 1988 in a paper titled 'Advances and Innovations in Technical and Vocational Education in Hong Kong' presented to the 5th Annual Conference of the Hong Kong Educational Research Association.

4. There was no policy defining the responsibilities of government and employers in the overall training of workers, nor a policy that would take account of the prevailing circumstances in Hong Kong;

5. There was no central body to organise and co-ordinate the training efforts of various parties concerned nor accord priorities for training;

6. The shortage of highly skilled and knowledgeable instructors and trainers, capable of importing their skills, would severely hamper the development of technical education and industrial training.

To assess the future manpower demand so as to inform the planning of training provision, ITAC decided that a selected program of manpower survey was necessary. As a result S.A. Morgenstein, an International Labour Office specialist in manpower assessment, spent six weeks attached to the Labour Department in Hong Kong, arriving in July 1967, to give advice to local manpower planners. Through the complex of industrial committee set up by ITAC, manpower surveys were conducted, largely run on the principles suggested by him, across ten major industries to draw up a picture of the manpower employed by job and level.[29]

From the manpower surveys conducted, ITAC succeeded by 1971 in assessing the major industries' short-term manpower needs, evaluated the deficiencies in both technical education and vocational training

[29] The ten major industries identified by ITAC were: automobile repairs and servicing, building, clothing, electronics, electrical apparatus and appliances, machine shop and metal working, plastics, printing, shipbuilding and ship repair, and textile. Employment levels were categorised into technician, craft, and operative.

facilities. Measures to meet those needs recommended in its final report were:[30]

1. To overcome the shortage of skilled workers, industry-wide training schemes including modern apprenticeships should be set up by employers for the training of craftsmen and technicians;

2. The training should consist of both
   a) organised practical training according to specific training programs and comprising both on-the-job training preceded by a period of broad basis off-the-job training, and
   b) related technical education and such practical training as was necessary to illustrate theory;

3. The division of responsibility for the overall training of manpower should be
   a) practical training - employers should accept the full cost of providing practical training, whether given in industrial premises or in training centres specially built and equipped for the purpose. Where such centres are established, employers should be responsible for all capital and recurrent costs. The government should, however, grant land free of premium for the erection of such training centres provided that they are non-profit-making, or alternatively, loans should be provided from the

[30] Industrial Advisory Training Committee, 1971. *The 1971 Final Report.* Hong Kong Government Printer.

Development Loan Fund for the purchase of flatted factory space for the purpose,

b) related technical education - government should be responsible for funding the institutional training necessary for the organised teaching of theoretical knowledge at all levels;

4. Government should build four more technical institute (in addition to the Morrison Hill Technical Institute which ITAC assisted in bringing into being) to provide the extra technical education facilities needed for the training of manpower at craft and technician levels. Government should also expand the system of prevocational education;

5. A permanent body should be established to replace the ITAC with added responsibilities for extending investigation not only into the manpower needs of the commerce and service sectors, but also the training of technologists;

6. Facilities should be established for training additional and upgrading existing instructors and qualified instructors should be given due recognition.

What emerged from the recommendations was a policy prescription distinctive on two interrelated aspects. The first was a statement which suggested the extension of 'qualified' intervention of the administration into technical manpower training. It was hence a recognition of an official commitment, in the spirit of 'positive non-interventionism', to a responsibility of 'funding the institutional training necessary for the organised teaching of theoretical knowledge at all levels' and 'such practical training as was necessary to illustrate theory'. To achieve these, the ITAC adopted thereafter a more eminent basis to serve as the principal agency for co-ordinating manpower development and industrial training on a territory-wide basis.

The second was the divide between practical shopfloor training of job skills on one hand and theoretically oriented technical education on the other. A line was drawn to prescribe that the former should belong to the private sector's jurisdiction whilst the latter should be developed by the government as part of its education activities available through the government or government sponsored education/training institutions.

To show its commitments in technical manpower development, many of ITAC's recommendations were accepted and implemented by government.

The phase of industrial diversification 1973-1981

Diversification was not a new idea to Hong Kong's industrial development. In 1962 the then Governor, Sir Robert Black, addressed the Legislative Council on the need for 'training to new industries', and that 'there is room not only for new industries but also for variations within the existing ones'.[31] In the same year several members of the

[31] See *Hong Kong Hansard 1962*. (Proceedings of Legislative Council Meetings)

Legislative Council spoke of the need for 'efforts to diversify our industry' and of the possibilities of diversifying our range of products'.[32]

The content in which this topic was discussed in the Legislative Council meeting in the early 1960s was the dominant position of the textile industry within the manufacturing sector of the economy. Many people believed that the prospects for further expansion of the textile industry were very poor, and that further development depended on a policy of 'diversification'. However, because Sir John Cowperthwaite, the then Financial Secretary, thought that government action to encourage diversification was in any case impossible,[33] this issue was not heard during the later 1960s and early 1970s. Hong Kong's economy continued to grow significantly during the 1970s, although there were variations in the year-to-year growth rate as shown in Table 6.3.

Year	Rate of change GDP	Rate of change GDP per capita
1972-73	16.4%	13.7%
1973-74	1.8%	0.7%
1974-75	2.2%	0.5%
1975-76	18.8%	17.5%
1976-77	10.2%	8.5%
1977-78	10.7%	8.0%
1978-79	8.6%	2.1%
1979-80	9.0%	5.4%

Table 6.3 Growth Rates of Output at Constant Prices in the 1970s[34]

[32] *Ibid.*
[33] See Youngson, A.J. 1982. *Op cit.*
[34] Source: Hong Kong Census and Statistics Department. *Estimates of Gross Domestic Product,* various years.

Although manufacturing still accounted for the largest share of the GDP fell from 30.9% in 1970 to 26.9% in 1975 and further down to 23.8% in 1980. Its growth rate was the lowest in the secondary production sector comprising manufacturing, electricity, gas and water, and construction. There has been a noticeable shift in the relative importance of different manufacturing industries. The clothing industry, has replaced the textile industry as the largest single industry in terms of net output. The relative importance of plastic products declined slightly and the electronics industry, has upgraded its product list to include computer memory systems, electronic calculators, integrated circuits, semi-conductors, electronic watches and clocks, TV games, and walkie-talkies. By 1980 these industries provided over six hundred thousand jobs, or almost 65% of industrial employment and about 70% by value of visible exports.[35] Table 6.4 shows the value of domestic exports of these four industries in 1980.

	HK$ million
Wearing apparel	16,946
Textiles	11,962
Plastics products	6,122
Electrical and electronic products	12,574
Others	20,567

Table 6.4 Value of Domestic Exports, 1980[36]

Behind this industrial growth and shifting, however, there were also causes for worries. Not only were Hong Kong's export faced with the

[35] Youngson, A.J. 1982, *Op cit.*

[36] Source: Adapted from Youngson, A.J. 1982. Table 1.3. *Ibid.*

adverse effect of increasingly tight economic conditions and intensifying trade protection in the principal markets, its products also faced rising competition from neighbouring countries such as Taiwan, South Korea, and Singapore. The Hong Kong manufacturers began to realise the need to further improve the productivity and efficiency, upgrade the product quality, venture into more sophisticated products and diversify into new fields. All this calls for a well trained, adaptable and versatile workforce capable of responding quickly to new requirements and modern technologies.

In response to this call and to implement the recommendations made by the ITAC, the government took two measures. The Hong Kong Training Council (HKTC) was established in 1973 to replace ITAC with wider terms of reference. Its main function, as quoted earlier, was to advise on 'measures necessary to ensure that there was a comprehensive system of manpower training geared to the developing needs of Hong Kong's economy'. Its scope of work covered not only industry's manpower needs at the technician, craft and operative levels, but also those at the technologist level to respond to the increasing demand from industrial upgrading. HKTC would also investigate the requirements of all levels of manpower in the commerce and service sector, a sector of growing significance in Hong Kong's economic structure since the beginning of the 1970s.

Similar to ITAC, HKTC's membership included employers' and employees' representatives, educationalists, representatives of organisations with special interest in training and of relevant government departments. But unlike its predecessor, it was chaired by a prominent industrialist who was also a member of the Legislative Council. To achieve its objective, the HKTC worked through a complex of training boards and committees. The training boards were responsible for all training matters in their respective industrial, commercial and service sectors while the committees dealt with problems common to more than one sector. The HKTC implemented many of ITAC's recommendations and greatly improved the manpower assessment methodology used by ITAC to assess future technical manpower demand. The training boards forecast the demand for manpower in their industries, make recommendations on means to meet that demand, and advise model training programs. In addition, they constituted the liaison bodies between industry and technical education.

To ensure a constant supply of trained skills with workplace experience and theoretical knowledge that fits with the requirements from various trades, the government enacted HKTC's advice to bring into force in 1976 the Apprenticeship Ordinance to promote and regulate apprentice training in designated trades. The apprenticeship scheme included both planned work-based practical training and experience and attendance at a part-time day-release course of related technical education during the apprenticeship indenture.

The dearth of individual company training facilities particularly in the construction and clothing industries had led to the setting up of statutory training authorities for their industries. In line with the government policy on industrial training as proposed by the ITAC, the HKTC assisted in the preparation of the legislation which established in

1975 the Construction Industry Training Authority and the Clothing Industry Training Authority to provide practical training for their respective industries and empowered them to impose a levy on their industries to finance the training. The levies imposed were used to build, equip and maintain training centres. Land for all the Authorities' training centres was granted at nil premium by the government.

The economic recession in 1973-75 did shock the government (see Table 6.3) and deepen its awareness to the importance of broadening Hong Kong's industrial base. Subsequently, the government took the second measure to charge a high level commission of civil servants and private individuals with a study of how to maintain the growth rate of the economy.[37] The Advisory Committee on Diversification was set up in October 1977 to consider factors that could attract new activities in the manufacturing and other sectors of the economy and the role of policies that might encourage industrial diversification. Particularly, the Committee was to advise the government

> '...wether the process of diversification of the economy, with particular reference to the manufacturing sector, can be facilitated by the modification of existing policies or the introduction of new policies.'[38]

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[37] With the Financial Secretary (Chair), the Director of Trade Industry and Customs, and the Secretary for Economic Services as official members and seven Legislative Councillors as unofficial members (there were 13 unofficial members).

[38] *Report of the Advisory Committee on Diversification 1979*. Hong Kong Government Printer. p2.

The Advisory Committee in its 1979 report was bold enough to envisage and advocate a more active official role for the government to contribute to the overall development of the economy. It made a wide range of recommendations to diversify the territory's economy and the infrastructure to facilitate the process. Recommendations related to the sphere of manpower training and education included:[39]

1. Improvements to technical manpower forecasting machinery. A number of ways to refine HKTC's manpower surveys, *inter alia*, the provision of estimates of additional demand attributable to the increasing use of advanced technology and the increasing sophistication of products, and possible demand from industries that are likely to be established were suggested;

2. Introduction of practical and technical subjects into the secondary school curriculum to stimulate an interest in careers in industry and broaden the base from which industry can recruit its labour force in the future;

3. Regular monitoring of the balance of provision between craft level and lower technician level courses offered by the technical institutes to ensure the changing manpower requirements of the economy being satisfied;

4. Establishment of a closer and more direct form of liaison between the technical institutes and industrialists on a regional basis, and

[39] *Ibid.* Chapter IX.

procedures to ensure that the institutes have sufficient flexibility of action in the commissioning and reorganising of courses to meet changing needs;

5. The transference of policy responsible for the kind of education provided by the technical institutes from the Secretary for Social Services to the Secretary for Economic Services. This was to recognise the fact that the technical institutes were providing an economic rather than a social service in that they train people for employment in industry and commerce;

6. Investigation on the possibility of moving of the executive responsibility the technical institutes from the Education Department and placed under the control of the Training Council or the Hong Kong Polytechnic to allow these institutes to achieve greater flexibility of response to the needs of industry;

7. Review the proposed increases in enrolment in technical education courses at the universities and polytechnic after 1980 to ensure the development of Hong Kong's industries in the 1980s would not be inhibited by a shortage of high level technological manpower. If it proved necessary, the government should inject more resources into it;

8. All industrial training to be financed from General Revenue by way of discretionary grant subventions. This was to improve the inadequate provision of industrial training to produce the skilled manpower required by industry and commerce stemmed mainly

from the fact that only two out of the eight training schemes prepared by the training boards of HKTC were operational. The failure of get the schemes off the ground was attributed to the difficulties involved in devising financial arrangements for them;

9. The creation of a new statutory Industrial Training Authority to organise individual areas of training; and

10. Request of input of resources into the educational institutions, from
industry, commerce and the government, to enable these institutions to expand their participation in industrially-oriented research.

A close examination to these recommendations revealed three distinctive aspects in augmenting government's involvement in planning and sponsoring of technical manpower development. The first was the measures taken to improve the planning, education, and training mechanism's responsiveness to the changing demand of the economy in the diversification process. These included ways to refine manpower survey methods, shifting of policy and executive responsibilities of education and training, establishment of closer regional liaison between technical institutions and industry, and the monitoring of a balanced manpower output at technologist, technician and craft levels to satisfy the industrial need of different skills. The second was a revolutionary idea of extending direct financial subvention to industrial training schemes in selected key industries, which was a radical change from the distinction the government formerly drew between public responsibility for technical education and the responsibility of private industry for practical training. The third was the adoption of a more forward looking concept in manpower required by industries that are likely to be established with a view that the education and training authority could play a role in influencing the demand for the skills required for the next stage of economic growth.

In spite of its bold and visionary recommendations related to technical manpower development, the Diversification Report was not without its limitation. Indeed, amongst its forty-seven recommendations only five have a definite bearing on the financial and service sectors of the economy. It seemed to assume diversification to mean almost entirely the diversification of manufacturing. In fact during the early 1970s the expansion of the financial and business sector has been much faster than that of manufacturing. Employment in commerce has risen from about 10% to about 20% of total employment. The expansion of tourism, and of the import/export trades, had also outpaced the growth of manufacturing.

The above mentioned recommendations were subsequently adopted by the government. Details of their implementation will be discussed next to illustrate government's increasing direct involvement in the development of Hong Kong's technical manpower.

The manufacturing cum tertiary, service-oriented industrial development phase 1982-1996

Before 1980, Hong Kong could still be considered as at the stage of exporting labour-intensive manufactures. After 1980, Hong Kong entered the stage of transition, moving towards the production of more technology and human capital intensive products. As Hong Kong has a highly export-oriented economy, the change in factor intensity of its manufactured product could be revealed by the change in its trade composition. The change in trade composition could in turn be reflected by the Revealed Comparative Advantage (RCA) Indexes. Table 6.5 shows the change in the RCA indexes by factor intensity and by commodities in the 1980s.

It can been seen that Hong Kong still has distinct comparative advantage in the export of labour intensive goods during the 1980s in spite of some fluctuations in the mid-1980s. Table 6.5 also shows that Hong Kong had barely acquired a comparative advantage in the export of technology-intensive goods even in 1985 (RCA was 1.95), but had acquired a more distinct comparative advantage in exporting these products since then (RCA in 1988 and 1989 were 2.46 and 2.59 respectively).

Factor Intensity	1980 (%)	1985 (%)	1988 (%)	1989 (%)
Unskilled Labour Intensive Goods	62.52 (6.48)	60.35 (5.74)	51.64 (6.40)	53.70 (7.72)
Human Capital Intensive Goods	17.12 (1.23)	13.91 (0.87)	12.79 (1.93)	11.90 (1.92)
Technology Intensive Goods	16.33 (1.59)	20.26 (1.95)	23.80 (2.46)	23.12 (2.59)
Physical Capital Intensive Goods	3.90 (0.23)	7.55 (0.44)	8.44 (0.68)	8.00 (0.70)
Non-Electrical Machinery	2.70 (0.31)	4.66 (0.55)	5.55 (0.86)	5.39 (0.91)

Table 6.5 Export Shares and RCA Indexes by Factor Intensities[40]

In fact, automation in the Hong Kong industries had started roughly in the early 1980s, and intensified since 1985. In the 1990s, a set of technology was prevalent in the manufacturing sector, collectively known as 'Programmable Automation'. It included the use of

- computer-aided design (CAD),
- computer-aided management (CAM),
- computer-aided engineering (CAE),
- flexible manufacturing system (FMS),
- robotics, and

[40] Extract from Table 4, Wong, T.T.C. 1994. 'Hong Kong's manufacturing industries: Transformations and prospects' in Leung, B.K.P. and Wong, T.Y.C. (ed). *25 Years of Social and Economic Development in Hong Kong.* Centre of Asian Studies, University of Hong Kong.

- computer-integrated manufacturing (CIM).

In a 1991 survey conducted by the Hong Kong Industry Department.[41] It has been found that among the sample firms being surveyed, 58% reported that advanced technology was being applied, mainly in the areas of production process, management, and quality control. The electronics industry has the largest users of advanced technology, followed by the electrical product industry. The applications of surface mount technology, multi-layer printed circuit board technology, and specific integrated circuit had become increasing common in these two industries since the early 1990s. The increase of the RCA Indexes for human capital-intensive goods from 0.87 in 1985 to 1.93 and 1.92 in 1988 and 1989 could be explained by the substantial increase in the export of electrical and non-electrical household equipment over the years.

The 1980s and the early part of the 1990s should be considered as the age for the electrical and electronics industry, toys, watches and clocks, and the manufacturing of jewellery. The export share of electrical and electronic machinery increased from 10.5% in 1970 to 22.9% in 1991. The export share of scientific instruments, photographic and optical goods, watches and clocks increased from 1.8% in 1970 to 10.2% in 1990.[42]

[41] Hong Kong Government Industry Department, 1992. *Hong Kong's Manufacturing Industries*. Hong Kong Government Printer.
[42] Source of figures from Hong Kong Census and Statistics Departments. *Op Cit.*

Over this same period, despite its expansion into the production of upper end products the importance of the manufacturing sector has declined. Hong Kong's economy has undergone a dramatic structural change as it has become increasingly linked through trade and investment to China. The island has emerged as a mature services-based economy.

Since the open-door policy and economic reforms began in late 1978 in China, rapid economic growth has followed. Indeed, over the period 1978-95, real GDP in China grew at an average rate of over 9% per annum, notwithstanding stop-go cycles. Since 1978, China has made tremendous headway in attracting direct foreign investment capital (DFI). Between 1979 and 1992, China has approved 84,000 DFI projects with an agreed investment from them amounting to some $100 billion,[43] mostly in industrial processing and export-oriented manufacturing. Correspondingly, in the relatively short span of time, China has emerged as an important trading nation exporting and importing a wide range of products. By 1992, China was ranked eleventh in the world by its foreign trade volume.

The implications of such a reforming Chinese economy on the industrial structure of Hong Kong's open city-state economy are far-reaching. In the first place, many manufacturers were attracted by the liberalisation of DFI regulations and other economic reforms in China to shift a substantial share of their labour-intensive operations across the border to neighbouring regions in South China, where labour costs were

[43] Figures as quoted by Ho, Y.P. and Kueh, Y.Y. 1993. "Whiter Hong Kong in an open-door, reforming Chinese economy?' in *Pacific Review*. Vol 6, No 4.

initially up to 15 times lower, and land and facility costs up to 10 times lower, than in Hong Kong. Thus, from 1980 to 1995, the expansion of outprocessing operations, as well as the sustained rapid increase in China's export activity, boosted the development supporting services industries in Hong Kong and resulted in a dramatic structural shift of the economy.

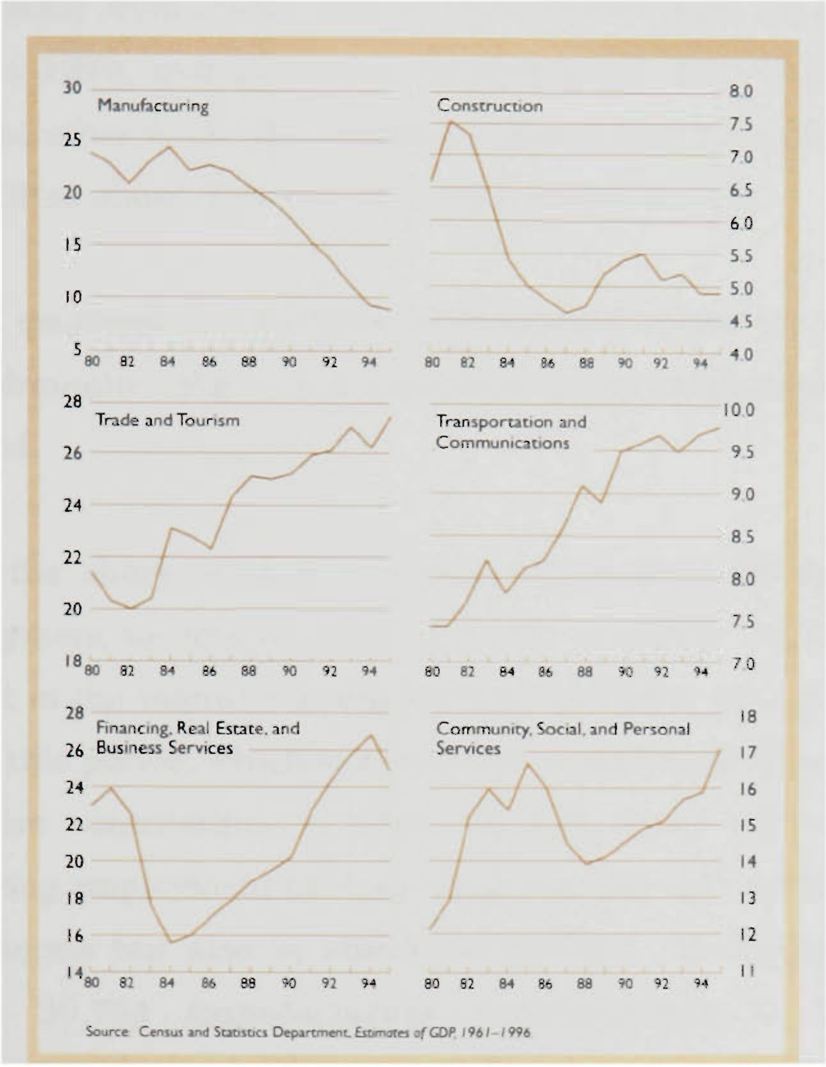

Figure 6.1 Percentage Contribution by Major Industrial Sectors to GDP, 1980-1995[44]

[44] Figure adopted from Dodsworth, J. and Mihaljek, D. 1997. *Hong Kong, China Growth, Structural Change, and Economic Stability During the Transition.* Washington DC, IMF. Figure 1.

The development and changing structure of Hong Kong's economy as reflected by the relative shares of major industrial sectors in total GDP for the period 1980 to 1995 is outlined in Figure 6.1 in the previous page.

It can be seen the contribution of the manufacturing sector to the GDP declined steadily from about 24% in 1980 to less than 9% in 1995. At its height in 1970, manufacturing accounted for 31% of Hong Kong's GDP. On the other hand, the combined share of services rose from two-thirds of GDP to about 85% over the same period of time.

In terms of employed labour force by industrial sector the change was even more dramatic. Figure 6.2 next page shows employment by sector of this period.

As shown, the share of manufacturing employment fell from 41% of total employment to 25% in 1991 and 13% in 1995. In other words, employment in the manufacturing set saw a relative drop of 28 percent points over this period, which is even more pronounced than the decline in its relative contribution to GDP. In fact, since the early 1980s, manufacturing employment in Hong Kong has not only continued to fall in relative terms but also in absolute numbers. In September 1995, there were 30,761 manufacturing establishments in Hong Kong employing 375,766 persons, but the level of employment was 904,646 as recorded in September 1981. On the other hand, the share of four key service sectors rose from 37% of the total in 1980 to 63% in 1995 as shown in Figure 6.2. This development signified a growing structural orientation of the economy towards services, in line with Hong Kong's continued expansion as a financial and trading centre and its increasing economic integration with South China.

Figure 6.2 Percentage Distribution of Working Population by Major Industrial Sectors, 1980-1995[45]

[45] *Ibid*, Figure 2.

Another robust development that has taken place in the 1980s was the re-emergence of Hong Kong as a centre for China trade resulted largely from outward-processing and re-export trade. Further analysis shows that the kind of trading activity currently undertaken by Hong Kong has far exceeded the traditional entrepot trade. It actually embraces a lot of production related services such as product design, sample-making, quality control, packaging, transportation and warehousing. More important still, many companies registered as trading entities in Hong Kong have industrial undertakings, in one form or another, outside the territory. Most commonly in the form of an outward processing venture in South China. As a result, the real distinction between manufacturing and trading activities in Hong Kong has become blur over the years.

Despite the booming tertiary sector and the relative decline of manufacturing industry over the past decade, yet, manufacturing industry has remained one of the most important economic sectors in the territory. In fact, the significance of export manufacturing in Hong Kong goes far beyond the relative GDP contribution and employment statistics. Among other valuable characteristics, there are direct and indirect linkage effects, such as the demand for intermediate and secondary supporting services provided by Hong Kong.

After reviewing Hong Kong's development trajectory in the last two decades the next is to consider the strengths of Hong Kong industry. An understanding of the industry's competitive advantage is imperative to the planning of manpower with the right skills.

According to a group of researchers from the Massachusetts Institute of Technology who studied Hong Kong's industry,[46] the following are the strengths:

Flexibility in production – Hong Kong businesses are very flexible. They have the ability to produce products for customers with very diverse needs; the ability to detect changes in trend and to respond to them with new products rapidly; the ability to get goods to customers quickly; the ability on the plant floor to work on many different products at the same time and to switch product lives rapidly from one kind to another.

Co-ordination – The globalisation of production means that companies in all advanced industrial societies are learning to master the co-ordination of development, design, marketing, production, and distribution in sites that are widely separated geographically. Hong Kong manufacturers have been doing this for long and their experiences have made them superb co-ordinators of production, trade, and services.

Managers – The enormous expansion of manufacturing in Hong Kong form the 1960s through the 1980s has produced an abundance of managers who can solve the most demanding co-ordination problem of staffing plants outside Hong Kong with little industrial experience. These managers derive their multifaceted skills from education in Hong Kong and abroad, years of work in Hong Kong plants with skilled

[46] Led by Suzanne Berger, Director of the MIT International Science and Technology Initiative Program, and others an interdisciplinary team of researchers from MIT investigated the future of Hong Kong's industry from micro to macro level in 1996. This investigation was funded by the public and private sectors in Hong Kong.

workforce, multiple close contacts with demanding and sophisticated buyers in Hong Kong and abroad, experience in international markets, and job rotation through a number of Hong Kong companies across different parts of the industry.

Internationalism – Internationalism means the ability to understand, interpret, and translate into specific and diverse products that meet the preferences of many different national societies. Hong Kong's capabilities in this respect derive partly from the cosmopolitanism of Hong Kong society in which the presence in daily life of people from different ethnic and national groups has created the capacities for social and business interaction. Hong Kong's bilingualism is another support of internationalism.[47]

To maintain Hong Kong's competitive advantages in the time of economic restructuring what sorts of manpower are required then? The Federation of Hong Kong Industries found in the 1995 survey[48] of its members that in industry educational qualifications have been rising as the result of the massive migration of low-skilled manufacturing operations to China. The number of unskilled and semi-skilled positions in Hong Kong has been declining rapidly since the mid-1980s, but as noted early, most manufacturing firms have maintained headquarters operations in Hong Kong, therefore the demand for managerial staff, engineers, technicians, and other skilled workers has continued to rise. Industry's recruitment profile has therefore become

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[47] See Berger. S. and Lester, R.K. 1987 (ed). *Made By Hong Kong* (Report of the Investigation team published in the form of a book). Hong Kong, OUP.

[48] Federation of Hong Kong Industries, *1995 Survey on Manufacturers: Demand for Administrative and Technical Manpower.* Hong Kong, FHKI.

skewed towards more highly educated workers. The survey further revealed that two thirds of the new hires planned by these firms after 1995 will be for managerial, engineering, marketing, and R & D positions, with production engineers and technologists and R & D personnel topping the list.

Has the government put in place affirmative manpower policy and action to cope with the economic restructuring in the 1980s and 1990s to maintain Hong Kong's competitive advantage? In sequel to the recommendations of the 1979 Advisory Committee on Diversification there was a shift in public policy as the government began to liberalise its restrained role in private industry training. The government liberalised the increasingly blurred distinction between technical education and industrial training in 1982, so that its general revenue can be now used to develop not only technical institutions but also training centres for industry. In a sense, it may be argued that a more integrated and coherent framework of national manpower policy emerges as a result.

The adjunct to this policy re-orientation was the enactment of the Vocational Training Council Ordinance in February 1982 and the establishment of the Vocational Training Council (VTC) to replace the Hong Kong Training Council. The new Council was vested with broadened jurisdiction in manpower planning and training. The functions of VTC under the 1982 Ordinance were

- to advise the Governor on the measures required to ensure a comprehensive system of technical education and industrial training suited to the developing needs of Hong Kong;
- to institute, develop and operate schemes for training operatives, craftsmen, technicians and technologies needed to sustain and improve industry; and
- to establish, operate and maintain technical institutes and training centres.

The Ordinance was amended in August 1991 to widen the remit of VTC to include vocational training for the disabled and the administration of the Apprenticeship Ordinance. Two more official functions were thus extended:

- to promote and regulate the training of apprentices;
- to provide and co-ordinate the provision of skills training to disabled persons aged 15 and over for the purpose of improving their employment prospects and preparing them for open employment.

Along the vein of the re-aligned policy, the distinction between technical education and industrial training become relaxed that VTC is able to use public finance for industry-wide training schemes. Within the umbrella of VTC, its Committee on Technical Education is responsible for managing the technical colleges and institutes where as the training boards were to administer the training centres in their respective trades.

To carry out its functions, the VTC has set up 20 training boards to cover manpower training of all major industrial and commercial sectors and 7 general committees to deal with training areas relevant to more than one sector of the economy. The responsibilities of the training boards and some of the general committees include the assessment of future manpower needs of their respective trades and recommending measures to the Council for meeting such needs (*See details of the method of assessing manpower demand and technology change used by the training boards at the Appendix to this Chapter*).

Thus the training programs offered by industry-specific training centres address mainly the skill training of tradesmen, craftsmen, technicians and technologists. Similarly, the development of technical education towards craftsmen and technicians were provided by the technical institutes and colleges. In short VTC took over from government the responsibility for providing both technical education at the craft and technician levels and industrial training at all levels. It is not difficult to understand the advantage of placing both technical education and industrial training under one body was the bringing about of a better dovetailing of the two essential elements of training.

Furthermore, the official sponsorship of the training centres under the supervision of the respective training boards can be viewed in part as a government strategy to devolve public-funded vocational training to the specific level of the individual industries which thus enjoy higher flexibility in responding to the specificities of their product, technology and skill demands.

In parallel to its enlarged role in manpower policies the government streamlined the relevant administrative organ to harmonise with the changes. A new Technical Education and Industrial Training Department was formed in 1982 by the amalgamation of the Industrial Training and Apprenticeship Branch of the Labour Department and the Technical Education Division of the Education Department. This new government agency served as VTC's executive arm in the 1980s until early 1990s when all employees were transferred to directly under VTC's appointment with new terms of employment conditions.

A further indication of the importance that the Hong Kong government attached to the connection between education and manpower planning occurred in February 1983 when a minister-equivalent portfolio, the Secretary for Education and Manpower, was established within the Government Secretariat. This position was charged with overall responsibility of co-ordinating policy issues on education, labour, employment, and manpower planning. Since 1983, the Education and Manpower Branch has become the nerve-centre for the administration's consolidated policy-making processes on the manpower and education fronts. This ministry-level government office oversees the Labour Department, Education Department, Vocational Training Council, University Grants Committee, and the Registry of Trade Unions.

With a central policy formulating structure led by the Education and Manpower branch and the Vocational Training Council, it is useful to take a look at government's policy in developing technical manpower for the rapidly changing economies of the late 1980s and 1990s. The theme of orienting the territory's technical education to suit industry's changing demands was the directing guide in planning. As the Report of the Advisory Committee on Diversification recommended

> 'development at this level should reflect the likelihood that in the 1980s the Hong Kong economic situation would be characterised by diversification of industry and the development of new product areas; improved standards of quality and design in the face of competition for overseas markets ..... the need for Commercial, administrative and marketing skills of a high order to be made available to industry; and the ability to respond quickly and effectively to changing market conditions.'[49]

Although this Report could not foresee the massive migration of manufacturing operation across the border into China but it did raise the need for supplying the industry with 'commercial', 'administrative' and 'marketing' skills which were essential for maintaining Hong Kong's competitive advantage.

Thus, upgrading of study programs from certificate to diploma and from diploma to degree status become government's endeavour in the 1980s. University and polytechnic level education was expanded and lower level courses were transferred from the polytechnics to the technical

[49] Report of the Advisory Committee on Diversification. *Op cit.*

institutes. A local framework of a two-tier structure of technical and vocational education institution began to crystallise.

To harmonise better the educational institutions' output with the changing economic needs in the 1990s and beyond, an inter-departmental manpower Committee was established in December 1988 to advise the Secretary for Education and Manpower on manpower requirements of Hong Kong. One of the major task of the Committee is to evaluate on a regular basis whether the current and planned education provision would be able to broadly supply the manpower that was in line with the future requirements of the economy in terms of the mix of different levels of educated skills. To achieve this task, projections of manpower supply and requirements by educational level were compiled in 1990, 1991, and 1994. The scope of these projections is for educational planning purposes, hence:

> 'The aim is to determining what kind of education the population should possess to meet the needs of economic development, instead of assessing what the optional size of the population, and hence its work force should be. Thus the study does not address the question of whether there is a labour shortage of whether importation of labour is justified.'[50]

[50] Education and Manpower Branch, 1991. *Manpower Outlook in the 1990s - An Updated Projection of Manpower Supply and Requirements.* Hong Kong Government Printer.

Although the scope and coverage of these projections were narrow as compared with Taiwan's Manpower Development Plans,[51] they did provided territory-wide indication on the supply and demand of manpower of eight educational levels. Tables 6.6 and 6.7 show the 1996 and 2001 manpower balance indicated by the 1994 Projection.

Educational Level	Supply	Requirements	Balance As % of No. Requirements
Lower secondary	1,484,300	1,400,100	84,200 6.0
Upper secondary	859,000	910,400	-51,400 -5.6
Sixth form	162,900	184,700	-21,800 -11.8
Craft level	25,700	27,100	-1,400 -5.2
Technician level	64,300	65,900	-1,600 -2.5
Sub-degree	143,200	145,300	-2,100 -1.4
First degree	195,800	209,800	-14,000 -6.7
Post-graduate	29.600	31,500	8,100 25.7
All levels	2,974,800	2,974,800	0

Table 6.6 Manpower Balance, 1996[52]

[51] As will be discussed in Chapters 9 and 10 of this thesis, Taiwan's Manpower Development Plans cover areas such as population, labour force, employment, unemployment, education, labour conditions, etc.
[52] Table adapted from Education and Manpower Branch 1994. *Manpower 2001 Revisited: A Revised Projection of Manpower Supply and Requirements for 2001.* Hong Kong Government Printer. p50.

Educational Level	Supply	Requirements	Balance As % of No. Requirements	
Lower secondary	1,410,300	1,361,000	49,800	3.7
Upper secondary	922,200	967,900	-45,700	-4.7
Sixth form	158,700	207,100	-48,400	-23.4
Craft level	33,300	28,200	5,100	18.1
Technician level	80,100	76,900	3,200	4.2
Sub-degree	180,200	173,400	6,800	3.9
First degree	251,000	254,400	-3,400	-1.3
Post-graduate	69,800	37,200	32,600	87.6
All levels	3,106,100	3,106,100	0	

Table 6.7 Manpower Balance, 2001[53]

Figures from these two tables suggested a trend of upward requirement in educational level of the workers as the economy becomes more knowledge and technology intensive. The number of workers with lower secondary education or below who are educationally underqualified for their jobs will remain quite large running up to 2001. On the other hand, the positive balance emerging at the sixth form and first degree level is significant. At the craft level, a positive balance equivalent to 18.1% of the requirement is predicted in 2001 while at technician and

[53] *Ibid.* p52.

sub-degree levels the manpower supply and requirements will be more or less in balance.

In deriving these supply and demand figures, the Manpower Committee has responsively taken into consideration significant factors affecting the economic development of Hong Kong such as the impact of China's economic reform on the territory's economic structure that brought about employment shift from manufacturing sector to services sector,[54] and the general upgrading of the occupational structure within individual industries that resulted in the increased demand for high-skill workers.

These Manpower Projections and those Manpower Surveys conducted by the various training boards of the VTC should be viewed in the context that Hong Kong is often identified as a typical free-market economy, and hence the least desirable place for manpower forecast and manpower planning. Obvious problems are gaps arising from i) output imbalances like over-supply or under-supply of personnel at various education levels and occupational classes; and ii) the surplus manpower released from those industries in a secular process of decline and contraction, causing labour redundancy.

These problems are more or less inherent in any manpower planning exercise at the macro level in any free market economies. The magnitude of discrepancies depends in part upon the technical quality

[54] See for example Section Three of *Manpower 2001 Revisited. Op cit.*

and reliability of the relevant measuring methods, however, more recently, it is affected increasingly by the volatility and fluctuations of the economy arise out of the Asian financial turbulence which precluded precise prediction in manpower and training forecast. The government is now ready to intervene to arrest the intensifying problem of sectoral labour surplus of redundant skills in industry by setting up a special central fund and authority to cater for post-experience retraining of skills to facilitate job transfer.

To conclude, it can be said that, in these two and half decades, the nature and reach of government's technical manpower development policy have been evolving significantly in response to the changing challenges. Growing government involvement was reflected in the expansion of public agencies responsible for manpower training and education.[55] Further evidence of the changing official attitude to manpower policy was seen in the growing readiness of the administration to take a direct part in industrial training. Industry-specific training centres set up by VTC have enabled the key economy sectors to respond quickly to shifts in market demand and to technological innovations. To cope with industrial upgrading and economic restructuring that took place rapidly since the mid-1980s, broad-based comprehensive manpower projections were compiled at different times to reflect the future requirements of the economy in terms of different levels of educated skills. These manpower projections helped the government to evaluate the current and planned provisions of education, including technical education and training.

[55] Such as the establishment of the Vocational Training Council and the Education and Manpower Branch.

Appendix

Method of assessing manpower demand and technology change used by VTC's Training Boards

To ascertain the manpower needs of the major industries and commercial sectors, the 20 training boards and general committees assembled under the umbrella of VTC conduct surveys of the sector for which they have been established to collect updated information on current employment and future manpower requirements by principal jobs as well as employers' views on training. The surveys adopt the "employers' opinion" technique which was first developed by the International Labour Organisation in the 1960s. Data and information obtained from these surveys thus formed the basis for the forecasts.

To achieve more reliable manpower forecasting in an ever changing economy, the following techniques were used by the training boards to prepare projections.

Cycle time of industrial surveys

The surveys are spread over a period of two years. In deciding on a two-year cycle, due consideration has been given to the fact that a two-year cycle should be frequent enough to keep pace with technological, economic and social development within the period.

Adjustment according to market 'signals'

To ensure market 'signals' from various sources such as 'key informants' in employer, government and trade unions, analysis of traces studies of past students, etc. were adequately reflected in the process of manpower forecasting and planning, survey results are analysed by the responsible training board taking into account all factors such as prevailing market requirements, market trends, technological changes, internal promotion, and natural wastage in order to derive manpower demand projections by different skill levels. Information for this comes both from the many other surveys such as employment survey of graduated and tracer study of past students and from the members of the respective training boards. All members of the training boards are appointed by the Governor and with few exceptions all are prominent figures in the industrial, commercial and service sectors and education. The boards' membership thus provides an important forum for collecting views and feedback that help to make reliable projections.

The method of assessing manpower demand used by the training boards is illustrated in Figure 6.3.

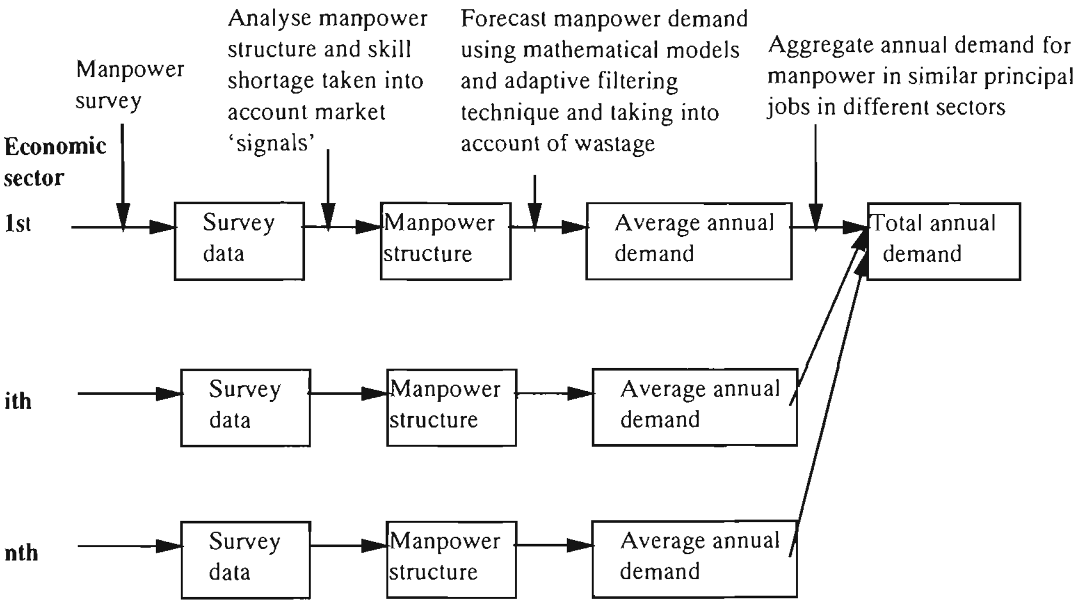

Figure 6.3. Manpower Demand Assessment [56]

This method consists of basically i) conducting a manpower survey; ii) analysing survey data, taking into consideration of market 'signals' ; iii) forecasting manpower demand using adaptive filtering technique and taking wastage into consideration; and iv) aggregating annual demand for similar principal jobs in different sectors.

Adaptive filtering

A forecasting technique to produce a family of short- to medium-term projections based on past and present employment data. In brief, available data used in this method are weighted. Heavier weights are given to the more recent data making forecasts that are more dependent on the recent data.[57]

[56]Figure adapted from Vocational Training Council. *1989 Report on Demand for and Supply of Technical Manpower in Hong Kong 's Major Industries.* HKVTC.
[57]Vocational Training Council. *1989 Report on Demand for and Supply of Technical Manpower in Hong Kong 's Major Industries.* HKVTC.

Course planning

Having established the annual demand for manpower by discipline and level, the planners' next step is to determine the supply. The number of planned course completions in each discipline and level from all educational institutions is collected and after taking account of the participation rate, gives an estimate of annual supply of newly qualified workers by level and discipline.

The demand for and supply of manpower information by occupation and level is used by relevant institutions including the technical colleges, technical institutes, and training centres, which are operating under VTC, when planning their student numbers. The mechanism of how courses are planned and developed in technical institutes is illustrated in Box 6.1 next page.[58]

In the course planning process although forecast demand is said as the basis for determining enrolment numbers, however, social demand, particularly in areas where the actual demand of study places far exceeds the projected manpower demand, is also taken into consideration.

[58]Based on VTC document W-PA-9 WT-DCC and the interview on 1July 1996 with the Assistant Executive Director (Technical Institutes) and the Senior Education Officer (Administration) (both of VTC) by the author.

Course Committee ↓	To propose and revise course curricula to meet the changing needs of the society; it is composed of course leaders, representative of TIDHQ and external members including external examiners of the courses; and is chaired by a Head of Department or his/her deputy.
Departmental Board ↓	To consider and recommend alterations to the proposed course curricula in light of educational desirability, commercial/industrial needs and resources implications; its membership is composed of:- - all Heads of Department in the same discipline of study - representatives of training boards, industrial associations or educational institutions - teaching staff representatives - Principals/Vice-Principals of TIs - representatives of TIDHQ
Planning Committee ↓	The Planning Committee will examine the resources incurred prior to making recommendations to Technical Institutes Academic Board for apporval.
Technical Institutes Academic Board	To approve the proposed changes of course curricula for implementation.

Box 6.1 Process of Curricula Development and Change

CHAPTER 7

DEVELOPMENT OF TECHNICAL MANPOWER IN HONG KONG: PROVISION OF TECHNICAL EDUCATION

Introduction

Having examined Hong Kong government's growing involvement in and evolving attitudes towards technical manpower policy development in response to the changing challenges, this Chapter illustrates how manpower plans, in the form of forecasted demands, framed within the purview of the policy at different points of time, were translated into the actual provision of places in technical institutions and training centres.

The success of this translation process requires good educational planning, implementation, and administration. The educational planning process is an attempt to explicate the theoretical policy as faithfully as possible into practical action. Guided by government's policies specifically for technical education and vocational training, different types of educational plans have been prepared to provide schemes for development and expansion. For example, since the government defined its role to support economic development by responding to industry's skill requirements, the plan for the first technical institute was drafted in mid 1960s.[1] Other development plans were released as reports such as the two published by the planning

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[1] Education Department. 1964. *Proposal of a Technical Institute.* Departmental discussion paper.

committees for the two polytechnics.[2] As far as the technical institutes were concerned, a five-year development plan was drawn up in 1976, giving details of programs and the number of classes to be run.[3] This has since been updated on a regular basis. In addition, plans for other educational purposes were also prepared, such as the one to show the link between the output of students in prevocational and secondary modern schools and how they could be channeled into technical institutes.[4] Also, on the advice of the management consultants, Mckinsey and Company Incorporated, a program plan covering all aspects of government development was introduced in the mid 1970s.[5] While this plan was not so detailed as the Manpower Development Plans in Taiwan, it did provide a useful outline for development. Into this overall Hong Kong government plan is incorporated a section on education. This gave details of the number of technical institutes together with student-capacity and targets, based on manpower surveys, as well as short falls. Institutes requiring additional storeys or annexes were also shown, as were the financial implications. Student enrolment targets for the polytechnics were also included in the program plan. Furthermore, plans in the format of manpower demand/technical institute output balance sheets have been regularly prepared to show how the need for future technician and craft students, based on manpower surveys, were to be met, together with the

[2] *Final Report of the polytechnic Planning Committee,* 1971; and *The First Report of the Planning Committee for the Second Polytechnic,* 1982.

[3] Education Department, 1976. *The Planned Development of Technical Institutes.* Department al Planning Document.

[4] Education Department, 1973. *Link Between Out - turn of Students from Prevocational and Secondary Modern Schools and Intake of Day Students in Technical Institutes.* Departmental Planning Document.

[5] Hong Kong Government, 1978. *Hong Kong Government Development Plan 1979 - 80 to 1983 - 84.* Hong Kong Government Printer.

shortfalls.[6] All these showed there has been a great deal of forward planning in technical and vocational education since the 1960s.

Implementation is the development phase of planning. Whether or not the planned objectives are met is a question of management and administrations. Management is concerned with input, with directing, organising and execution. In implementing the plans, the existence of an administrative system for technical and vocational education is essential. This Chapter will also examine how effective management and administration attempts have been made to translate forecasted manpower requirements, to achieve specific growth, into the necessary educational output.

Although the history of technical and vocational education in Hong Kong can be traced back to the opening of classes in technical subjects by the Salesian Fathers in 1926, and government's involvement could be dated back to 1932 and 1937 when the government Junior Technical School and Trade School were established,[7] there was no central body for organising and coordinating as well as for according priorities in the development of technical education and industrial training until 1982. Before that, the responsibility for providing technical education at technician and craft levels was rested with the Technical Education Division of the Education Department, headed by an Assistant Director

[6] See for examples, Education Department Planning documents 'Technical Institute Student Capacity Matched to Manpower Demands (November 1976)', and 'A Projection on Student Capacity in Technical Institutes and Forecasted Manpower Demands (July 1977)'.

[7] Sweeting, A.E. 1992. 'Hong Kong Education within Historical Process' in Postiglione, G.A. (Ed) *Education and Society in Hong Kong Toward One Country and Two systems*. Hong Kong, Hong Kong University Press.

of Education. While industrial training, in spite of its limited scope of provision, was administered by the Industrial Training Division of the Labour Department.

From 1982 onward, development of technical education and industrial training in Hong Kong entered another era. The government has been successful, though the establishment of the statutory Vocational Training Council (VTC), in placing manpower forecasting and planning as well as the operation of centres for skill training and institutions for technical education under one body. This practice has not only given Hong Kong an efficient vocational training system but also one that is flexible and responsive to the changing needs of the economy. In the last two decades or so, the rationalisation of work and the linkage that have been established between the training centres, technical institutes and colleges, and the polytechnics has helped to avoid duplication of work and excessive over-provision of student places as well as to optimise the use of resources.

The governance of technical and vocational education

Administration and finance

Technical and vocational education was mainly provided by VTC with the two polytechnic universities (until 1995 the polytechnics) offering some similar programs. Since VTC is the main provider of this form of education, it is the focus of this study.

The main aim of VTC is to provide and promote a cost-effective and comprehensive system of technical education and vocational training to meet the needs of the economy in line with the Council's vision

> 'To be the leading qualifying body and provider of vocational education and training in the region',[8]

and mission

> 'To provide high quality, cost-effective, internationally acceptable vocational education, training and qualifications for students of all age, directly applicable to the requirements of Hong Kong's employees'.[9]

Operating on 16 main sites, the VTC is providing job-related training and education to over 100,000 people in 1995-96. Technical education and training are provided at craft, technician, and higher technician levels in a range of discipline in two technical colleges, seven technical institutes and 24 industrial training centres. VTC is responsible for training disabled people for open employment and provides training directly in three skill centres and oversees two more in the voluntary sector. VTC is also responsible for other services and programs designed to support training and skills acquisition which include the New Technology Training Scheme and the Hong Kong Management Development Centre. The Council has a staff of 3,600 and annual expenditure of approximately HK$ 2 billion.

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[8] VTC, *Vocational Training Council Annual Report 1997 - 1998*. p.8.
[9] *Ibid.*

The Council is composed of 23 members representing industry and commerce, higher education and trade unions, all appointed by the Governor. The Council meets four or five times each year and a good deal of its business is transacted by correspondence. It is supported by three governing Committees of Council *viz* Finance, Administration, and Estates. Eight General Committees and 20 Training Boards oversee different aspects of VTC's activities. The Training Boards, the majority of which antedate the establishment of VTC, are responsible for determining the manpower needs of the economic sectors for which they have been established and making recommendations on how these needs may best be met, prescribing job specifications and designing training programs and trade tests for principal jobs in their respective sectors. The Committee on Technical Education oversees matters which relate to the administration, coordination and development of technical education provided by the Council's technical colleges and technical institutes. It advises the Council on the development of technical education at the craft, technician and higher technician levels that would meet the manpower needs of the economy. The other General Committees deal with training areas which affect more than one sector of the economy. All Training Boards and General Committees are serviced by professional staff of the Council secretariat. Figure 7.1 shows VTC's functional structure.

Vocational Training Council

Administration Committee
Estates Committee
Finance Committee

Training Boards

- Accountancy Training Board
- Advertising, Public Relation and Publishing Training Board
- Automobile Industry Training Board
- Banking Training Board
- Building and Civil Engineering Industry Training Board
- Clothing Industry Training Board
- Electrical Industry Training Board
- Electronics Industry Training Board
- Hotel, Catering and Tourism Training Board
- Insurance Training Board
- Jewellery Industry Training Board
- Journalism Training Board
- Machine Shop and Metal Working Industry Training Board
- Merchant Navy Training Board
- Plastics Industry Training Board
- Shipbuilding, Ship Repair and Offshore Engineering Industry Training Board
- Textile Industrial Training Board
- Transport and Physical Distribution Training Board
- Wholesale / Retail and Import / Export Trades Training Board

General Committees

- Committee on Apprenticeship and Trade Testing
- Committee on Information Technology Training
- Committee on Management and Supervisory Training
- Committee on Precision Tooling Training
- Committee on Technical Education
- Committee on Training of Technologists
- Committee on Translation
- Committee on Vocational Training for the Disabled

Figure 7.1 Functional Structure of VTC[10]

[10] Adapted from VTC Annual Report 1997 - 98. *Op Cit.*

In terms of organisational management, with the day-to-day operation led by the Executive Director (who is also a member of the Council), VTC is organised into three broad areas such that

- one Deputy Executive Director is responsible for the two technical colleges. Apart from central support functions no other headquarter staff are involved in the oversight and management of the colleges. The Deputy Executive Director is responsible also for two central support functions - library services and computing systems,

- the second Deputy Executive Directors is responsible for the work of the technical institutes and industrial training. The Management Development Centre also falls within his remit. Two Assistant Executive Directors report to him. One is responsible for the technical institutes, including the technical institutes' headquarter division, and training for people with disabilities. The other Assistant Director is responsible for the Industrial Training Division at headquarter, the training centres and the oversight of apprentices,

- the central support services - finance, administration (including personnel), estates, information and public relations are each managed by a designated senior officer and report to the Executive Director.

A diagrammatic illustration of the management structure of VTC is shown in Figure 7.2.

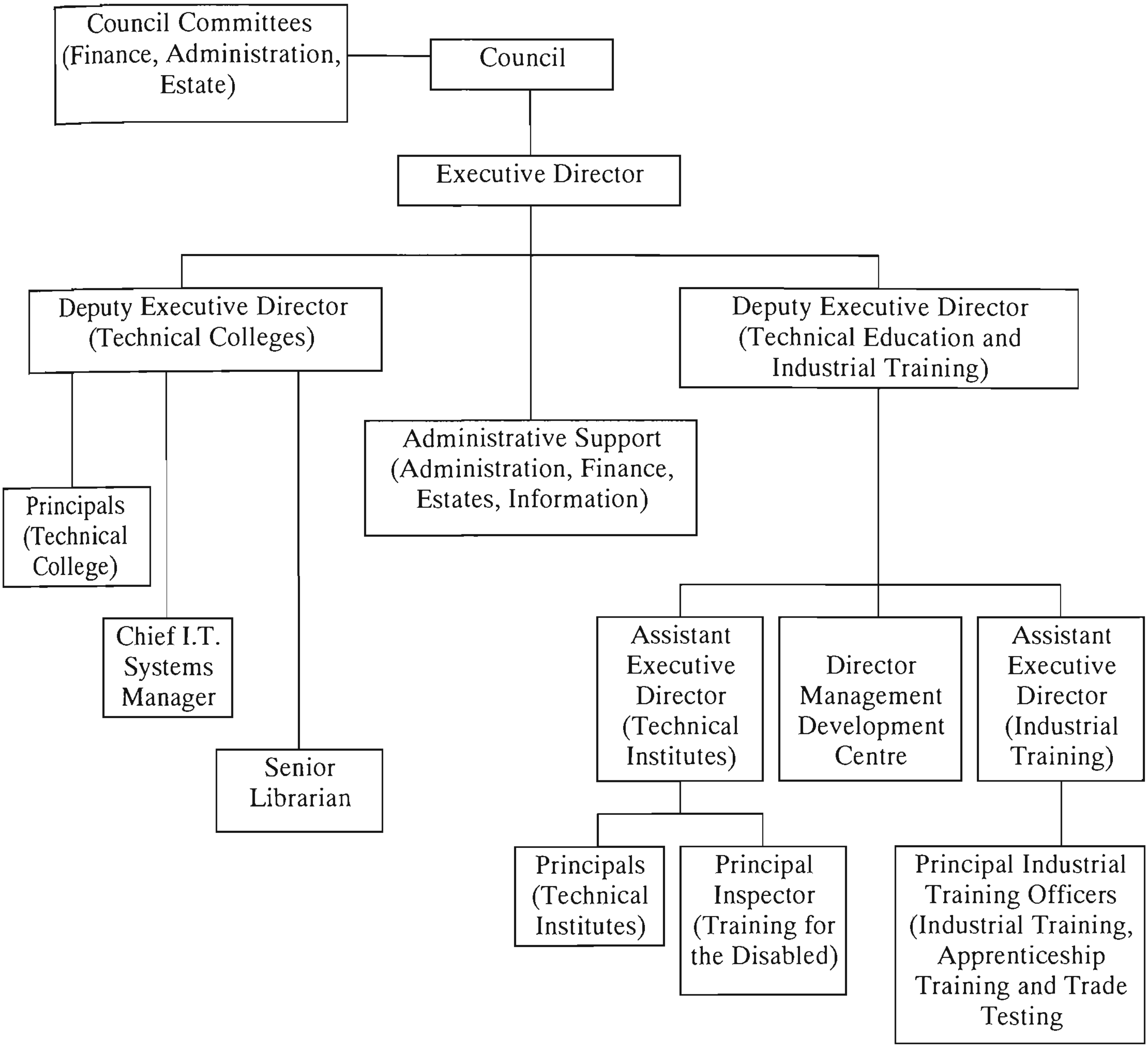

Figure 7.2 Management Structure of VTC

With regard to funding of the VTC, approximately 83% of VTC's total income is provided by government, 15% is earned through fees and 2% comes from other sources, such as interest on bank deposits. The recurrent budget for 1995 was a little over HK$ 1.5 billion and the comparative costs of the various component activities were as follow:

Cost Centres	Comparative Cost %
Technical Institutes	42%
Technical Colleges	25%
Training Centres	21%
Training for Disabled People	4%
Apprenticeships	2%
Central Support Services	7%

Table 7.1 Comparative Costs of VTC Activities

There has been a growth in expenditure of some 17 times since 1982 (a six fold increase in real terms).[11] This has been caused by the opening of the technical colleges and the transfer of sub-degree work to VTC, the establishment of three new technical institutes and a growth in the number of training centres.

Types of institutes

Technical and vocational education programs are offered through seven technical institutes and two technical colleges:

- Morrison Hill Technical Institute, Hong Kong
- Kwai Chung Technical Institute, New Territories
- Kwun Tong Technical Institute, Kowloon
- Haking Wong Technical Institute, Kowloon

[11] All figures quoted in this section on VTC finance are derived from statements of income and expenditure appended to VTC's Annual Reports of various years.

- Lee Wai Lee Technical Institute, Kowloon
- Tuen Mun Technical Institute, New Territories
- Sha Tin Technical Institute, New Territories
- Hong Kong Technical College (Chai Wai), and
- Hong Kong Technical College (Tsing Yi).

The technical institutes offer craft and technician level programs on a full-time, part-time day release, block release or part-time evening basis. The technical colleges provide programs at the higher technician level on same modes of study as the technical institutes.

Types of programs

Three levels of programs are offered by the above institutions to train crafts, technicians, and higher technicians.

Craft programs – these are trade courses offered by the technical institutes. They are designed to provide basic skills related to a specific trade or occupation, mostly in engineering and related disciplines but also in commercial and service fields. The normal minimum entry requirement for such courses is completion of Secondary 3 (Year 9 equivalent in Australia). Most craft programs are terminal in nature, but in some cases it is possible for students to complete a bridging program so as to be eligible for admission to a technician level program. Full-time courses offer an alternative to senior secondary school education and lead to basic trade qualifications. Students attend theory classes at a technical institute usually for two days and acquire practical training at a training centre for three and a half days per week. The most common pattern of craft training consists of one year of full-time study followed by an apprenticeship, which is combined with two years of part-time day release study.

Technician programs – these have been designed to train personnel for middle-level employment in the industry, commercial and service sectors and are offered by the technical institutes. There are two main types of program, those leading to the certificate and the diploma. Certificate programs generally require either one year of full-time study or two to three years of part-time evening or day-release study. Admission requires completion of senior secondary school with four subject passes in the public Certificate of Education Examination. Programs leading to the diploma generally required either two years of full-time study or three years of part-time study. Admission to these programs is the same as to Certificate programs. In the past, programs at this level have been monitored and validated by the Business and Technology Education Council (BTEC) of UK. Upon completion, students were able to register for BTEC awards. In 1994 the VTC appointed the City and Guilds of London Institute to accredit the 39 programs offered by the technical institutes, replacing the BTEC validation.

Higher technician programs – these are intended to prepare students for senior technician posts, or for management positions at a similar level. . This level of programs is offered by both the technical colleges and polytechnic universities. There are three main types of awards at this level, the higher diploma, higher certificate, and associateship. The duration of higher diploma courses is normally three years full-time.

Admission requires completion of senior secondary school with five subject passes in the Certificate of Education Examination. However, some courses have their own specific entrance requirements. Direct admission to a limited number of places in the second year of higher diploma courses is available for diploma holders. To facilitate the pursuit of further studies for those already in employment, two-year part-time evening higher diploma courses are offered in certain disciplines and entry to those courses in restricted to higher certificate holders.

Higher Certificate courses, either three-year part-time evening or two-year part-time day release, are designed for people in full-time employment. The entry requirement is a technical institute certificate or diploma in an appropriate field of study.

The two technical colleges also offer two-year part-time evening associateship courses in building services engineering, electronic engineering, electrical engineering, manufacturing and management, mechanical engineering, and transport studies. These courses provide an academic route for higher diploma graduates seeking to satisfy the academic requirements of relevant professional bodies.

The foregoing has shown the administration and financing of VTC. As a governing agency, VTC .has assumed the full responsibility of the planning, formulation and implementation of vocational education and training in Hong Kong according to the technical manpower policy framed by the government from time to time. The modus operandi of VTC is a manifestation of government's growing direct involvement in developing the required technical manpower demanded by the changing needs of Hong Kong's economy.

Provision of Technical Education to Satisfy Manpower Needs in Different Phases of Development

Developments in technical education during the early twentieth century as mentioned earlier were characterised by the enthusiastic backing of some charity organisations and religious bodies, but lacked wholehearted support from officials. The result was that the next major developments in the history of Hong Kong's technical education did not take place until the 1930s.

After World War II, changes in technical education were rarely as rapid as those taking place in industry. This was at least partly because recovery from the Japanese occupation was slowest in the field of technical education. Equipment looted earlier could not be quickly replaced in a short time. People with technical qualifications were under demand by industry itself that there were few to take up the challenge of technical teaching.

Meanwhile modest developments were taking place. The two Salesian-run industrial schools resumed their operations shortly after the British returned to Hong Kong. By the 1950s, the interim and final reports of the Technical Education and Vocational Training Investigating Committee stimulated action. The former led directly to extensions of the Hong Kong Technical College and the latter became the blueprint for further expansion.

The subsequent phase of expansion and increasing sophistication began in 1957 when the Technical College moved from its old campus in Hong Kong Island to handsome new premises in Kowloon. A further phase of expansion to meet the increasing demand from industry saw the transformation of the Technical College into the Hong Kong Polytechnic in 1971 as well as the establishment of the first Technical Institute at Morrison Hill in 1970 to provide sub-polytechnic training.

The latest phase of industrialisation has brought a further expansion of technical education. The increasing number of technical institutes (especially after 1975), the establishment of a second polytechnic, named the City Polytechnic of Hong Kong, in 1984, the official founding of a third university, named the Hong Kong University of Science and Technology, in 1988, and the incorporation of two technical colleges to take over para-professional courses from the two polytechnics, in 1993, are the most obvious instances of this trend. The link between such developments and the newer infrastructure clearly outlined in the Report of the Advisory Committee on Diversification of the Economy in 1979. In the spirit of this report, the replacement of the Hong Kong Training Council by the Vocational Training Council, in 1982, improved the coordination of vocational training schemes and opened up opportunities for more sophisticated manpower planning exercises.

The following is a detailed examination of the different phases of technical and vocational education in Hong Kong focusing on

i) how government's manpower policy was implemented;

ii) how the output of the education system was coordinated through a series of mechanisms, set up by the government, to match the demand for skills from the economy; and

iii) the forces that drove the changes and the authority's measures in response to these forces.

The infancy stage of development, period prior to 1965

The history of technical and vocational education can be traced back to the early twentieth century. Developments during that time were characterised by the enthusiastic backing of local businessmen and missionaries, but without full support from the government. According to Sweeting, 'the actual extent of financial commitment to technical education, official and voluntary, remained very limited throughout the early period.'[12]

Thus, it took a group of influential Chinese and Eurasian businessmen nearly fifteen years of pressure and frustration before they succeeded in gaining government support for the establishment of a trade school for poor children in Aberdeen in 1935. In this case, the onset of the Great Depression probably had more impact on persuading officials about the urgency of the need for technical education than the eloquence of the original group of supporters. Two years earlier, largely as a result of the depression-influenced report by a committee appointed in 1930 to look

[12] Sweeting, A.E. 1992. 'Hong Kong Education within Historical Processes' in Postiglione, G.A. (ed) *Education and Society in Hong Kong, Toward One Country and Two Systems*. Hong Kong, Hong Kong University Press.

into the possibility of increasing facilities for practical education and on the feasibility of establishing a government trade school, the Junior Technical School was opened to provide a pre-apprenticeship course for artisans at 12 years of age. The need for such an institution was clearly demonstrated from the outset of its existence, there were eleven applicants for every single place in the school. This School provided the type of education required by entrants into the large engineering and shipbuilding works. The course is somewhat on the lines of the junior technical school in England, except that more attention is devoted to English, which accounted for half the time table. Other subjects taught were mathematics, elementary science, machine drawing, and Chinese. The number of students in attendance was 120, the staff consisted of a European instructor and eight graduates of the Hong Kong University.[13] Students on leaving the School were expected to enter the engineering industry as apprentices and to continue their education by part-time studies.

In 1937, partly responding to a critical 'Report on Education in Hong Kong' written by the British visitor, Edmund Burney, the Government Trade School was finally established.[14] This Trade School provided technical education at post-secondary school level. Full-time courses in Building, Motor-car Engineering, and Wireless Telegraphy were the only day programs offered. Apart from maintaining these two full-time institutions, the Evening Institute was set up to provide part-time education by the Education Department. It had no building of its own,

[13] Information about this School is taken from: Colonial Office. 1940. *A Survey of Vocational Technical Education in the Colonial Empire.* London, HMSO.
[14] See Sweeting. *Op cit,* p77.

classes were held in selected buildings which were available in the evening. The teaching staff was recruited from the Dockyards, the Government Marine Surveyors Department, the Public Works Department, etc.

Under the control of the Evening Institute, classes were held in the Taikoo Dockyard School, the Kowloon Dockyard School, the Junior Technical School, and the Trade School. Particulars of these classes, as given by the Colonial Office's Survey,[15] are briefly described here.

Both dockyard evening schools catered for apprentices in the two dockyards who have not passed through the Junior Technical School, or received an education sufficient to enable them to embark on their technical studies without further training. The course was of three years duration. Apprentices who completed the course satisfactorily proceeded to technical classes held in the Junior Technical School or Trade School.

The Junior Technical School and Trade School operated evening classes in marine engineering, shipbuilding, building, and electrical engineering.

The marine engineering course was seen somewhat on the line of a major course in England. It aimed at reaching the standard of the 2nd

[15] Colonial Office. 1940. *Op cit*, pp 39 - 40.

Class Board of Trade examinations for marine engineers. Its students were all apprentices, working in different yards by day.

The shipbuilding course was run as a major course, at the standard of the Ordinary National Certificate in England.

The building course was run as a major course and concentrated on teaching potential foremen the elements of their job. The course had been instrumental in assisting many graduates to better positions in the trade. The curriculum covered carpentry, concrete works, brick-laying, introduction to quantities and measuring, building drawings and construction, and arithmetic.

The electrical engineering course covering as it did in one year the elements of direct current work, and in its second year, alternating current.

The choices of course offering reflected the demand from the economic activities of Hong Kong before World War II. As discussed in the previous Chapter, it was the entrepot trade and entrepot-related enterprises such as shipbuilding and ship repairing that helped the colony to find its economic feet. Courses in Motor and Marine Engineering and Shipbuilding trained craftsmen and technicians for the European operated commercial dockyards, the Royal Naval Dockyard, the Railway workshops, the Public Works Department, and other concerns of similar standing. While courses in Wireless Telegraphy provided the only route for people to acquire a qualification recognised by the Postmaster General to become radio officers on ships who were entitled to sail in any part of the world. Demand for this type of skill was great given the large number of supporting business connected to entrepot trade. Besides going on board ships, posts were available with local air lines, Cable and Wireless Company, and other occupations related to radio communication.

The foregoing information showed that during the 1930's economic depression, Hong Kong's technical education, despite its small scale of operation, was coordinated with the economic development at that time. The nature and lines of the education related closely to the local requirements.

After the war, the government Trade School, under its new name, the Hong Kong Technical College, reopened in stages between 1947 and 1950, with the Junior Technical School initially occupying some of its premises in 1948. The Junior Technical School has had an unfortunate history since the war. The Public Works Department has taken over the pre-war building for use as a Transport Workshop. Sharing accommodation for some two years with the Technical College, in very cramped quarters, it occupied part of the then new Morrison Hill Primary School, where accommodation is better.

In the meantime, Hong Kong's economic activities gradually recovered from the war-time destruction. Many of the light industries were resuscitated and the manufacture of all the pre-war items had been revived. As discussed in the previous Chapter industrialisation started in the early 1950s through the transfer of capital, machinery, skills, market connections and entrepreneurial capabilities from Shanghai and other parts of China. The textile and garment industry was first established, followed by the then-emerging plastic and consumer electronic industries.

Recognising the importance of growing industrialisation and the implication of this for education, the government began devoting time and effort to the development of technical education. In sequel to the interim and final reports made by the Technical Education and Vocational Training Investigation Committee in 1952 and 1953, massive expansion took place with the Hong Kong Technical College.

To cope with the rising demand for technical education, an additional floor was built in 1953 on the Technical College's original building to provide extra places. The situation was eased for a short while and it soon became obvious that the existing premises were inadequate and could not be extended further. Thanks to an initial contribution of HK$ 1 million by the Chinese Manufacturer's Association, an equal grant and free land by the government, and other gifts in money and in kind from leading commercial and industrial associations and firms in 1955, a handsome new premises on reclaimed land equipped with modern facilities was opened for the Technical College in 1957.

The premises vacated by the Technical College were immediately occupied by the Junior Technical School, renamed the Victoria Technical School. The School was suitably equipped and restructured to provide a five-year secondary technical school curriculum in which woodwork, metalwork, and technical drawing were added to a general education. A new stream of technical schools was formed within the secondary education curriculum when other two schools, the Ho Tung Technical School for Girls and the Salesian Aberdeen Trade School also provided students with five-year courses leading to the Hong Kong School Certificate.[16] These schools enabled graduates to sit for the Technical College entrance examination or to seek employment in technical, industrial, and commercial posts.

In order to ensure that the development of the Technical College did meet the needs of industry and commerce in Hong Kong and provide adequate opportunities for the employment and advancement of local young men and women, a Technical College Advisory Committee was established in October, 1957. This Committee (composed of representatives of commerce, industry and government departments) was to advice the Principal of the College on problems of general policy.

The College was divided into the following departments in 1950, all of which had their various day and evening classes. Applicants for admission were required to have a general education to School Certificate level.

The Department of Building – offered courses with specialisation in building, structural engineering, and quality surveying.

The Department of Commerce – offered courses with specialisation in book-keeping and secretarial studies.

[16] See Director of Education. *Triennial Survey of the years 1955 - 58. Passim.*

The Department of Mechanical Engineering – offered a broad-based course in mechanical engineering.

The Department of Electrical Engineering – offered courses leading to the Postmaster General's 1st and 2nd Class Certificate in Wireless Telegraphy, and in radar and radio technologies.

The Department of Navigation – provided courses for masters', mates' and 2nd mates' certificates of the Marine Department.

In response to the skills demanded by the expanding textile industry, a new Department of Textiles was established in the Technical College as recommended by the Technical Education and Vocational Training Investigation Committee. This Department had been opened in co-operation with local industry. The first full-time courses were of three years duration in weaving and spinning, testing and dyeing enrolling 39 full-time and 202 part-time students in 1958.[17]

Other new courses introduced on subsequent demand from business and industry included Accountancy (leading to the Associateship of the Australian Society of Accountants), electrical engineering, dyeing and finishing, textile mechanics, pre-sea training, and production engineering. To ensure highest quality provision, expert advice was sometimes sought from overseas in setting up these courses. For example, when the Technical College Advisory Committee decided to

[17] *Ibid*, p58.

start a production engineering course in the Department of Mechanical Engineering to supply the increasing demanded skills for the growing manufacturing industry, a request was made for the assistance of technical experts from the International Labour Organisation (ILO) and, as a result, a production engineer was seconded by ILO to the Technical College for a period of 1 year to train staff in production engineering, to advise on the equipment and layout of the production workshop and to organise a number of seminars on management of local industries.[18]

Besides these formal full-time courses, part-time evening courses covering a wider area of disciplines were designed to satisfy the needs for skill advancement of people in work. Courses were available in accountancy, building construction, electrical engineering, automobile engineering, mechanical and production engineering, telecommunications, naval architecture, advanced structures, refrigeration and air-conditioning, field surveying, plumbing, weaving, spinning, industrial organisation, jig and tool design, dental mechanics, factory accounts and costing, and business management.

To help local factories and firms improve their productivity, the Productivity Centre ran by the Mechanical and Production Engineering Department of the Technical College started, in 1961, to provide short courses in specific areas such as materials handling and plant layout, work study, quality control, and production planning and control. To meet the needs of local industry the language of instruction in these

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[18] *Ibid*, p49.

courses was Cantonese. Attended by hundreds of owners, managers, supervisors, and technicians from local factories representing 13 different industries, these courses proved to be successful and appeared to have produced real improvements in the productivity of a number of local firms. Participants even formed a Technical College Productivity Association which frequently meets for the purpose of promoting productivity.[19]

One important factor in the development of technical education as discussed in Chapter 4 is the installation and constant upgrading of facilities and equipment to provide graduates with updated and current experience in rapidly advancing technologies. To this end, the government's policy was to encourage links between industry and technical education which would bring in financial contributions towards facility and equipment. Under this arrangement half of the cost for the new premises of the Technical College came from commerce and industry. Installation of new and upgrading of old facilities in the following areas were also made possible through this arrangement since 1957 when the Technical College moved into its new building.

In 1959, the multi-functional Keswick Hall was added with funds partly donated by John Keswick to commemorate the 100 years' association of the Keswick Family with Hong Kong.[20]

[19] A detailed description of the Productivity Centre was reported in the *Triennial Survey of the Year 1961 - 64* by the Director of Education.
[20] See Director of Education. *Triennial Survey of the Year 1958 - 61.* p37.

In 1960, the Moller Heat Engines laboratory, the China Light and Power Electrical laboratories, the Production Engineering Shop, and a two-floor dyeing and finishing shop were all completed. The Heat Engines laboratory, built and equipped with a gift of HK$500,000 from Messrs E.R. and R.B. Moller, contained a large boiler, steam engine, gas engine, turbine, compressor, and refrigeration equipment, all were state of the art equipment designed for experimental work at that time. The Production Engineering Shop, built with a gift of HK$200,000 from Butterfield and Swire Limited and its associated companies, comprised a workshop for making and using jigs, dies and press tools, a work study demonstration room and a metrology laboratory. This shop provided the necessary equipment to train for skills in the growing manufacturing sector of the industry.

Subsequent years saw further improvement and expansion of facilities at the Technical College. A two-storey library building, built with the assistance of a donation from Imperial Chemical Industries, was completed in September 1964, and in November of the same year, a new block of workshop which contained, *inter alia*, facilities for the introduction of courses in commercial and industrial design, for which the need had been growing more and more apparent, was opened. At the same time, the International Wool Secretariat contributed half the capital cost of building and equipping a workshop to provide facilities for training in wool technology, and Hong Kong wool manufacturers, under the sponsorship of the Federation of Hong Kong Industries, contributed the remaining half. Total capital costs were about HK$1.5 million. Other forms of donation from local and overseas firms and organisations included materials, equipment and books. Examples of equipment received included a miniature crucible furnace, an automatic loom and a radar set. Gifts of books to the library were made by a number of local book sellers, the British Council, the British Trade Commission, the US Information Services and the Asia Foundation.[21]

New development in course and curriculum were also introduced during this period to response to the increasing demand of technicians and craftsmen from the industry.

These courses were:

- New 2-year full-time Ordinary Diploma courses at the technician level in the fields of mechanical, electrical, and marine engineering, and in building construction;

- New 1-year full-time craft courses in carpentry and joinery, tool and die making, automobile mechanics, sheet metal work, and radio mechanic;

- New 1-year full-time pre-apprentice course in building, mechanical, and electrical trades.

Besides these full-time courses, short courses of special interest to particular industries were also developed to meet skills enhancement needs from the booming building, textile, and electronics industries. Examples of these courses were critical path planning for the

[21] Details of donations were mentioned in the Director of Education's *Triennial Surveys 1958 - 61, 1961 - 64, 1964 - 67.*

construction industry, modern developments in the design and finishing processes for wool knitwear, and transistor Amplitude-modulated receiver design for the electronics industry.

The increasing demand for technicians, craftsmen, and skilled workers in practically every industry in the mid-1960s had highly raised the public interest in technical education. This was reflected in the number of applicants to the various courses at the Technical College, in 1963, there were a total of 2,868 applicants for 496 places in full-time courses. It was evident that demand for places was far exceeded supply. In fact, since the transfer of the Technical College to its new site in 1957, the enrolment had constantly increased. In March 1964, there were 730 full-time, 267 part-time day release and 8,983 evening students.[22] This enrolment of 9,980 students, however, could never satisfy the increasing demand of various types of skills from the fast growing industry. Indeed, with an employment figure of over 350,000 people engaged in manufacturing industries in 1964,[23] the technical education places available for pre-service and in-service training was far behind that in demand.

The foregoing paragraphs reviewed the stage of technical education development prior to 1965. As discussed in the previous Chapter, there was no formalised government manpower policy and planning to guide the development of technical education. Provision .of technical education was reactive to the demand from fast growing industries and was limited in scale with the Hong Kong Technical College being the

[22] Figures quoted from *Triennial Survey* 1961-64. *Op cit.*
[23] Figures quoted from *Triennial Survey* 1961-64. *Op cit.*

only training institution offering technician and craft level courses for the skills required by the business and industry. With a strong belief in distinguishing between the public responsibility for general education and that of private industry for training, half of the funding of the new Technical College was supported from private donations. Official policy at the macro level was largely concerned with the quantitative provision and the control of education, predominantly on primary schooling. This was manifested in the Education (Amendment) Ordinances (1948), the new Education Ordinances (1952), the Draft Ten Year Plan (1950), the Fisher Report on Educational Expenditure (1950), and the Seven Year Plan (1954-61). The endeavours to centralise educational administration and to expend quantitative provision had taken up almost all the energies of policy-makers at both macro and micro level during this period.

The growth and expansion stage, 1965-1982

As discussed in the last Chapter, this stage saw the 'boom' years of Hong Kong's industry. The growing manufacturing sector accounted for upwards of 40% of total employment in the private sector. Apart from a modest dip in 1977, manufacturing employment climbed from 472,000 in 1968 to 774,000 in 1976 and reached the peak at 905,000 in 1981.[24] The increasing demand of manpower, both in terms of quantity and quality as the results of industrial upgrading in the mid 1960s and industrial diversification in the late 1970s from the industrialists, has exerted mounting pressure on the government to provide more

[24] Hong Kong Government. *Hong Kong Annual Report*, various years. Hong Kong Government Printer.

technical and vocational education. As revealed in the previous Chapter, it was against such a background that the government has taken a more positive and active role in establishing the advisory body, the Industrial Training Advisory Council (ITAC) and later the Hong Kong Training Council (HKTC) to make recommendations on territory-wide technical manpower policies and planning. The continuing paragraphs will examine how, guided by these policies, technical education grew and expanded during this stage.

The Morrison Hill Technical Institute

In the mid 1960s, when the first institute, the Morrison Hill Technical Institute, was being planned, technical education in Hong Kong entered a new stage of development. A general view held by the public was that the government should run more craft courses so as to meet the increasing demand from industry for more and better educated apprentices and craftsmen. The feelings were that unless this was done the development of industry, and the manufacturing of more sophisticated products, would be retarded. Although the Technical College had expanded considerably, the opinion of the public was that the facilities provided at the College were for technician and technologist courses and the development would not be able to meet future demands for craft level skills.

At the time when the Morrison Hill Technical Institute was planned, little has been done in the way of manpower forecasting in Hong Kong. Mr H.K. Watt, Principal of the then Technical College, estimated in 1964 that Hong Kong needed annually 1,500 technologists, 3,000 technicians and 10,000 craftsmen.[25] These figures were based on the labour intake into registered and recorded factories in 1963, which was 56,497, while the total number engaged in the manufacturing industries was estimated by the Labour Department to be 558,600. This gave an annual growth rate of about 10%. It was also assumed that one person in six who found employment in the manufacturing industries should be a skilled craftsman. They should have received institutional training beforehand. Although these ratios looked high by Asian standards, they appeared to correlate with an OECD manpower survey of Mediterranean countries.[26]

Watt further estimated that, based on figures obtained from a government Census and Statistics Department survey, about 56,000 additional persons were entering industry every year. He went on to say that the then Technical College was producing about 20% of the technicians and technologists required from the College's full-time and part-time courses. He also pointed out that, in 1963, there were 2,868 applicants for full-time courses at the College but, of these, only 496 were given places. It was also estimated that there would be 11,381 high school leavers in 1964, and that if only 10% were given an opportunity to pursue a technical course, then the Technical College would have to be at least doubled to meet the demand.

Largely on the above scant manpower calculations, the government decided that an additional technical institution was needed. As a

[25] Watt, H.K. 1964. 'Proposed Technical Institute in Hong Kong', memorandum to Director of Education. Education Department internal document.
[26] Blaug, M. 1972. *An Introduction to the Economies of Education.* Penguin, England.

result, the Morrison Hill Technical Institute was eventually founded in 1969.

Much of the planning for this first institute was done on an ad hoc basis as there were no territory-wide manpower information to base on. According to D.D. Waters, the first principal of the Morrison Hill Technical Institute, planning of this Institute was done by the principal of the then Technical College who was advised by his heads of departments. They, in turn, made informal contacts with industrialists to gauge what type of courses ought to be run.[27] Finally, six teaching departments comprised of electrical engineering, mechanical engineering, construction, commerce, technical teacher training, and general studies were established in borrowed premises at the Technical College.

The relatively crude method used to plan this first Institute indicated the lack of earlier manpower planning. ITAC's formal programs of manpower survey commenced in 1966 (see discussion in the previous Chapter) and by the time when the first three survey reports were available in 1967 the schedule of accommodation for the Morrison Hill Technical Institute had long been finalised. Findings in these reports could only help to make limited changes in the design of this Institute.[28]

With the founding of the Morrison Hill Technical Institute, all craft courses and some technician courses were transferred from the

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[27] Waters, D.D. 1980, 'The Technical Institutes in Hong Kong 1969 to 1980'. Education Department internal document ED(TE)114/2.
[28] *Ibid.*

Technical College in 1969, thus allowing the College to concentrate on higher-level work.

The Hong Kong Polytechnic

Another break-through in the development of technical education in Hong Kong was the establishment of the Hong Kong Polytechnic. It was suggested as early as 1964, by H.K. Watt, the Principal, that the Technical College should eventually become a college of advanced technology, as some of its higher-level courses had been recognised by many British professional institutions since the early 1960s.[29] The decision to upgrade the College was taken by the government in 1967, although an alternative proposal was that it should remain as a technical college and that an entirely new Polytechnic should be established.[30] However, there were advantages in using the College as a nucleus, for example, it was cheaper.

The government in 1969 expressed its intentions to establish the Polytechnic with a student population of about 4,000 full-time equivalent day students by 1974.[31] Like many of the decisions made on student numbers at that time, it was based mainly on *ad hoc* estimates and not on detailed manpower forecasting, as very limited statistics were available. This project was a case of upgrading and enlarging a flourishing institution, as the Technical College, in 1971, already had a

[29] Watt, H.K. 1964. *Op cit.*.
[30] University and Polytechnic Grants Committee of Hong Kong, 1976. *Special Report October 1965 to June 1976.*
[31] *Ibid.*

base of 1,834 full-time equivalent students and a campus on which the polytechnic could further expand.[32]

The Polytechnic Planning Committee was appointed in May 1969 under the chairmanship of the late P.Y. Tang, a prominent industrialist and public figure.[33] The Sub-Committee on Scope of Initial Courses, chaired by Sir S.Y. Chung, included representative from employers' associations, professional institution and the Civil Service was set up to recommend the type of courses should be run. The Final Report of the Planning Committee covered such areas as scope of initial courses, sites and buildings, the Polytechnic Board, legislation, financing, order of costs, staffing, consultancies, supervisory, consultative and advisory machinery, and further development of the Technical College.[34]

According to the Final Report, the Sub-Committee on Scope of Initial Courses dealt with the following 20 areas of study:

- accountancy,
- building and surveying,
- business studies,
- chemical engineering,
- civil and structural engineering,
- electrical engineering,
- electronic data processing,
- electronic engineering,

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[32] *Ibid.*
[33] *Final Report of the Polytechnic Planning Committee, July, 1971.*
[34] *Ibid.*

- industrial and commercial design,
- industrial and production engineering,
- languages and other studies,
- management sciences,
- mathematics and science,
- mechanical and marine engineering,
- nautical studies,
- plastics technology,
- printing technology,
- textile chemistry,
- textile technology, and
- tourism.

Each of these 20 panels were chaired and manned by persons who were in close contact with the industry concerned. They were charged with the task to obtain first-hand information as to actual needs. In many cases they worked through their respective trade association which, in turn, obtained information from its members. No elaborate surveys were conducted.

The Final Report further revealed that after all the panels had finalised their reports it was found that 5,280 student places were needed, which was 32% more than the original government target of 4,000. The proposals were then divided into three main groups. Firstly, there were top priority courses which received the greatest demand from both students and employers, such as electronics, electrical and mechanical engineering, and accountancy. Secondly, there were fields such as industrial engineering and electronic data processing, which were not yet taught at the Technical College, but were areas in which Hong Kong already had some expertise and their introduction was not expected to cause any controversy. Then, thirdly, there were courses such as printing and tourism where expertise was lacking and it would be necessary to proceed with caution. On this basis, the planned number of student places was reduced to 4,000 to meet the government target.

The Polytechnic grew rapidly, and the task given to the Director, Dr Keith Legg, on his arrival in 1975, was to develop the Polytechnic into a large and complex institution, which would produce much needed manpower to assist in the growth of the economy.[35] In 1977/78, the enrolment target was 7,650 full-time equivalent students and by 1982/83 there was a total of 24,831 students (including all modes of study) on roll after a number of technician courses had been transferred to the technical institutes.[36]

After the Polytechnic Planning work was completed and the Polytechnic Planning Committee was dissolved in 1971, the task of advising the Polytechnic Council, the Director and staff, on new programs to be run was taken over largely by the Polytechnic departmental advisory committees. Proposals regarding developments and expansion are normally prepared by the Director and his staff, for the Polytechnic Council, and they are then put to the University and Polytechnic Grants Committee and to the government for approval.[37] With this advisory

[35] Hong Kong Polytechnic, 1982. *Hong Kong Polytechnic 10th Anniversary Supplement.*
[36] Figures taken from Hong Kong Polytechnic Prospectus 1977/78 and 1982/83.
[37] See Hong Kong Polytechnic, 1979. *Hong Kong Polytechnic Triennial Academic Plan 1981-94.*

and planning mechanism the Polytechnic commenced another phase of big development in the next decade.

Increasing number of technical institutes

After the ITAC conducted manpower surveys for the ten major manufacturing industries in Hong Kong (see previous Chapter), it was found that the ten industries demanded annually 2,890 technicians and 9,650 craftsmen to maintain industrial growth. This demand largely exceeded that can be supplied by the Morrison Hill Technical Institute and there was obviously a need for the government to increase the technical education provision as soon as possible.

The government decided to build five technical institutes to satisfy the demand for skill and the planning of the other four institutes was based upon the findings of the surveys. A great deal of the initial planning for these four technical institutes was done by the ITAC Committee on Technical Institute. This Committee consisted of members drawn from industry, educational institutions, and from the government.

The sites for the next four institutes were proposed by the Technical Institute Committee, bearing in mind the concentrations of industry. Consideration was also given to siting institutes within easy reach of resettlement housing estates, where the less privileged live, as it was considered that such people would be more willing for their youngsters to study craft courses and to take up 'blue-collar' jobs. At the time, it was felt by the Technical Institute Committee that courses might be under-subscribed if institutes were situated in more affluent districts.[38]

Four more technical institutes were eventually built by the government, two of which were opened (Kwai Chung and Kwun Tong) in 1975. The fourth (Haking Wong) was opened in 1977 and the fifth (Lee Wai Lee) in 1979, although the building was not completed until 1980.

With regard to course design, the Committee on Technical Institutes formed an *ad hoc* working party which drew up a list of proposed courses for the institutes. Table 7.2 shows the proposed courses to be run in different institutes.[39]

Technical Institute and date opened	Courses as proposed by ITAC	Actual courses established
Kwun Tong (1975)	Textiles and garments Mechanical engineering Electrical engineering Horology and instruments Construction Business studies Industrial design	Textiles and Clothing Mechanical engineering Electrical engineering Printing --- --- ---
Kwai Chung (1975)	Textiles Mechanical engineering Electrical engineering Business studies Construction	Textiles, Clothing Mechanical engineering Electrical engineering Commercial studies Construction (established

[38] Committee on Technical Institutes, ITAC Paper No. 2/69.
[39] With information based on 'Report of the Working Party on the Choice of Courses of the ITAC Committee on Technical Institute (December 1969)' and Technical Institute Prospectus, various years.

	Boots, shoes and leatherwork Agriculture and fisheries	in 1982) --- ---
Haking Wong (1977)	Garment and knitting Textiles Mechanical engineering Electrical engineering Shipbuilding and ship repairs Business and supervisory studies --- ---	--- --- Mechanical engineering Electrical engineering Marine and fabrication --- Construction Hotel and tourism
Lee Wai Lee (1979)	Garments and knitting Mechanical engineering Electrical engineering Business studies --- Hotel and catering Technical teacher training ---	--- Mechanical engineering --- Commercial studies General studies --- --- Industrial technology (Footwear, Optics, Metal-finishing, Clock and watch repairs, Production and industrial engineering)

Table 7.2 Comparison of Courses Proposed by the ITAC Committee on Technical Institutes with the Actual Courses Run in the Institutes

The report on the choice of courses was proposed in 1969, and the fifth institute was opened ten years later. During that period, diversification took place in industry (see discussion in the previous Chapter) and because of the availability of sites, the institutes were not built in the original order recommended by ITAC. This meant that, due to urgent need, some courses had to be established at an earlier date in other institutes. Indeed, the authority had taken a flexible and responsive approach in planning and establishing courses to meet the industry's demand in time. An examination of the Report[40] showed that it included a section dealing with the changing needs of industry. In fact, rationalisation of courses among the technical institutions was considered at intervals.[41] For example, a department of construction was set up in the Kwai Chung Technical Institute in September 1982, mainly to accommodate part-time day students from the newly open Construction Industry Training Centre.

The number of technical institutes needed

After ITAC conducted the ten major industries survey, statistics gathered from 1967 to 1970 showed that the total labour force was in the region of 410,000.[42] It was obviously not possible to forecast accurately how the labour force would develop from 1972 onwards, but further growth depended, to a large extent, on an improvement in manufacturing efficiency coupled with a higher degree of technological sophistication. These conditions, in addition to demanding better qualified technicians and craftsmen, possibly in increased proportions

[40] Report of the Working Party on the Choice of Courses of the ITAC Committee on Technical Institutes, December, 1969.
[41] See 'Notes of a Special Meeting to Consider Rationalisation of Courses in Technical Institutes (23 May 1977)', Education Department internal document.
[42] The Final Report of the Industrial Training Advisory Committee, March 1971.

to the overall size of the working population, would affect the rate of growth of the labour force, as the development of more sophisticated industries produces a further shift from labour intensive to more capital intensive methods. The case for additional technical institutes was agreed on these lines.

It is significant to note that the size of the manual labour force, including craftsmen and technicians, during the year 1972, was 545,000 which represented an increase of 33% over the 410,000 employed in industry, in 1969.[43] It was argued that it was reasonable to update the ITAC estimates of annual demand for 2,890 technicians and 9,650 craftsmen by applying a simple multiplying factor based on the growth of the workforce. In paragraph 3.43 of the ITAC Final Report, it was pointed out that the then manpower surveys dealt with the industrial sector only leaving the commercial and service sectors relatively unexplored. Yet the need for technical education in these areas was also important, as they too contributed substantially to Hong Kong's economic growth. There was, therefore, good reason to suppose that, if a survey of these sectors had also been undertaken in the late 1960s, including for example in hotels, catering and tourism establishments, the results would have shown a demand for technical education which, if added to the ITAC estimate, would have substantially increased the total requirements.

The need for more technical institutes was then argued by ITAC as follows. Using the multiplying factor of 33% indicated above, and

[43] *Ibid.*

assuming that new institutes would approximate in size to those already approved, and that technical education would be undertaken largely through part-time day classes, the total requirement would be for eight technical institutes calculated as below. This assumes the Polytechnic would cater for the technician education needs for 65% of industry's requirements, and that 85% of all courses would be industrial and run on a part-time day release basis, the remaining 15% being commercial and service industry course. Also, the assumption was made that courses for technicians and craftsmen would be of four and three years' duration respectively.

The number of technical institute places required for technician and craft students would then be:

technician = 2,600 x 35% x 4

= 3,640

(Note: The figure of 2,600 is obtained by subtracting the number of students graduating from the Ordinary Diploma courses at the Hong Kong Technical College form the annual demand figure of 2,890)

craft = 9,650 x 3

= 28,950

Total = 32,590 places

The number of additional technical institutes of approximately 1,300 (the original size of Morrison Hill Institute) full-time equivalent places (6,500 part-time day release places) each would be 32,590/6,500 x 85% = 6 approximately. Taking account of the increase of 33% in industrial personnel since the shortfall in technical education was estimated by ITAC in 1969, it was estimated, eight technical institutes were required.

It must be noted that the method used by ITAC in deriving the number of institutes required were reduced to simple arithmetic, but in practice supply and demand would never be so neatly balanced.

Until the Working Party Report on Senior Secondary and Tertiary Education[44] was finalised in 1977, it was accepted that a total of eight technical institutes would be needed. That is a further three in addition to the five already completed by 1980. According to Education Department internal documents,[45] a considerable amount of work was done on a Technical Education Program Plan. The whole exercise was, however, aborted in 1976. The main reason was that the Director of Education felt a report covering the whole of secondary and tertiary education would be of more use than a document covering technical education only.

The 1978 White paper on the Development of Senior Secondary and Tertiary Education[46] also recommended the need of six institutes, and as a result, the sixth technical institute at Tuen Mun came into operation in 1986. This document, which was a statement of intent by the government, also proposed that extra storeys and annexes should be added to existing institutes.

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[44] Hong Kong Government, 1977. 'Working Party Report on Senior Secondary and Tertiary Education'. HKG Printer.
[45] See 'Ten-year Development Program for New Towns - Technical Institutes, 1973' and 'Technical Education Program Plan, a Draft, 1975'. Education Department internal documents.
[46] Hong Kong Government 1978. *White Paper on the Development of Senior Secondary and Tertiary Education.* HKG Printer.

Another proposal, made by the Working Group on Higher Education in 1980, was that two more technical institutes should be built, making a total of eight.[47] The same figure was also quoted by the Committee to Review Post-Secondary and Technical Education in 1981.[48] It is interesting to see that this figure of eight is the same as the original ITAC figure in 1971. The only difference was that ITAC envisaged having the institutes functioning in the latter half of the 1970s, whereas in practice they did not come into being until 1987. This was because the government was not convinced that eight technical institutes were required in the 1970s and thus the whole program was delayed.

The burgeon of a two-tier technical education system

Another milestone of this growth and expansion stage of technical education was the burgeon of a two-tier system. As described earlier, the main task of the institutes was to provide technical education for both craft and technician students. The institutes were established to run most of the craft courses in Hong Kong, although a limited amount of work has been done by a few non-government institutions. It has never been proposed that these institutes would run courses for technologists, and these were left to the two universities and the Polytechnic at that time. The debatable area, at the beginning, has always been how courses should be divided between the Polytechnic and the technical institutes.

[47] Education Department, 1980. 'Report of the Working Group on Higher Education'. Education Department internal document.
[48] Hong Kong Government. 1981. 'Report of the Committee to Review Post-Secondary and Technical Education'. HKG Printer.

When the Morrison Hill Institute was planned to run both craft and technician courses, it was argued by the Principal of the Technical College that the division of work between the Technical Institute and the Technical College (later the Polytechnic) should be for the Institute to run craft courses only, and for the latter to run all the technician classes. However, by 1968, it would have been difficult to change the policy as the Institute building, then under construction had been so planned, and equipment was already on order.[49] According to Waters, the first Principal of the Morrison Hill Technical Institute, the advantages of running technician courses in institutes included the fact that, under government policy, more senior staff could be recruited, and more resources could be made available.[50] He also argued that, for lower level technician course, there should be more stress on practical work and for this reason students would gain if such courses were offered by the same institution where craft courses were also run, as there would be more workshops and emphasis on practical training.

It was finally decided by the Director of Education, in July 1969, that the Morrison Hill Institute would run technician course.[51] With regard to the proportion of technician courses that should be run in the institutes and the Polytechnic, the ITAC recommended in 1971 that 35% of technician education should be provided in the technical institutes and the remaining 65% in the Polytechnic.[52] Later in 1979, with a view to turn out sufficient craftsmen, the Advisory Committee on

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[49] Waters, D.D. 1969. 'The Morrison Hill Technical Institute Technician Level Courses'. Education Department Planning Document.
[50] *Ibid.*
[51] See Education Department internal document '(2) ED (GR)1/18/4605/68'. July, 1969.
[52] *The Final Report of the ITAC. Op cit.*

Diversification stressed the importance of maintaining a balanced provision between craft level and lower technician level courses to satisfy the changing manpower requirement of the economy.[53] Finally the 80/20 craft to technician ratio was adopted by the technical institutes in the late 1970s and beginning of 1980s.

Regarding the division of courses between the Polytechnic and the technical institutes, it was eventually decided that the bulk of the Certificate and Diploma courses should be run by the technical institutes, and that the Polytechnic should concentrate on Higher Diploma, and Higher Certificate work and above. A two-tier technical education was thus formed. The following table gives change of enrolment number of this two-tier system during the expansion stage from 1972 to 1982.

Mode of Study	Technical College/ Polytechnic	Technical Institutes	Remarks
1971/72			
Full-time	1,700	710	One technical institute, 20% technician, 80% craft
Part-time day	740	809	
Part-time evening	9,340	8,964	
Total	11,780	10,483	
1981/82			
Full-time	7,930	3,516	Five technical institutes, 38% technician, 62% craft
Part-time day	4,680	10,096	
Part-time evening	13,300	16,651	
Total	25,910	30,263	

Table 7.3 Change of Enrolment of Technical Education 1972-82[54]

[53] *Report of the Advisory committee on Diversification 1979*, Hong Kong Government Printer.

[54] Figures summarised from Education Department Enrolment Statistics, various years.

The foregoing paragraphs reviewed the growth and expansion of technical education from the mid 1960s to early 1980s. This period saw rapid expansion of technical education in Hong Kong. Five technical institutes were build alongside with the establishment of the Hong Kong Polytechnic which all together provided more than 56,000 places for technician and craft level education in 1982. This period also witnessed the government's increasing involvement in establishing an infrastructure to develop technical education in response to the growing industrial needs.

Government's augmented involvement stage, 1982 – 1996

As a direct result of the recommendation made by the Hong Kong Training Council in 1978 and the Advisory Committee on Diversification in 1979, the statutory Vocational Training Council (VTC) was established in 1982 to

i) institute, develop, and operate schemes for training operatives, craftsmen, technicians and technologists needed for the industry, and

ii) establish, operate, and maintain educational institutions as well as other training centres.

To enlarge its role in manpower policies, the government undertook two measures. The first was the establishment of the Technical Education and Industrial Training Department to service as the executive arm of VTC. The other was the creation of a ministerial equivalent position, the Secretary for Education and Manpower to co-ordinate policy issues on education, labour, employment, and manpower training. As discussed in the previous Chapter, the Education and Manpower Branch of the Government Secretariat has become the master mind for the consolidation and administration of policy-making on labour and education fronts.

Under this revamped policy formulating structure led by the Vocational Training Council and the Education and Manpower Branch, it is useful to examine what the government has accomplished from the early 1980s to mid 1990s on Hong Kong's technical manpower development.

As discussed in the last Chapter, there were evident signs of an official endeavour to align public education policy more closely in line with the territory's manpower needs. Under the inspiration of the Advisory Committee on Diversification in the end of 1970s, a policy norm was laid down in the sphere of technical education and vocational training, especially at the tertiary level. The 1978 'White Paper on the Development of Senior Secondary and tertiary Education' made explicit reference to the manpower survey services of the Hong Kong Training Council, prescribing for continued expansion of technician and commercial education achieved by upgrading the Polytechnic and building more technical institutes.

This theme of aligning Hong Kong's tertiary and technical education to suit industry's demands was reiterated by the government in endorsing the ideas canvassed in the Report of the Advisory Committee on Diversification. The government thus accepted it as the policy goal to take into consideration the manpower implications of whatever public education policy at the tertiary and technical levels in planning.

During this period under study, Hong Kong entered the stage of transition. Its manufacturing industry underwent tremendous transformation in two directions. The first was the change in product composition which could be referred to product diversification and up-stream production. The second was the expansion of outprocessing operation, mainly to South China, that boosted the development of supporting service industries in Hong Kong and resulted in a dramatic structural shift of the economy. As noted in the last Chapter, the manufacturing sector's share declined from about 25% of GDP in 1980 to less than 9% in 1995, while the combined share of services rose from two-thirds of EDP to about 85%. The change in the structure of employment was equally significant – employment in manufacturing fell from 41% of total employment in 1980, to 13% in 1995, while the share of the key service sectors rose from 37% of the total in 1980 to 63% in 1995.

In sequel to the structural transformation was the demand for higher level manpower such as managerial staff, engineers, technicians, and other skilled workers. Thus, a significant endeavour at educational provision in this period was directed at upgrading the level of existing places. When a panel of OECD advisers made its report to the government in November 1982, recommendations related to technical education were 'expanding the existing universities and the Polytechnic' and 'transferring the lower level courses from the Polytechnic to the technical institutes; upgrading some of the Polytechnic courses'.[55]

Further expansion of technical institutes

As discussed earlier, the government finally agreed in 1980 that there was a need to build eight technical institutes all together to provide the demanded number of places in technician and craft training. At the time when VTC was established in 1982 there were five technical institutes already in operation. By 1986 the construction of two more and larger technical institutes, located at Shatin and Tuen Mun[56], were completed, increasing further the number of technical institute places available at craft and technician level to 9,700 full-time, 16,000 part-time day release and 26,000 part-time evening.[57]

One year later saw the opening of the eighth and last technical institute as well as the commencement of expansion work on two existing technical institutes, bolstering further still the number of full-time, part-time day release and part-time evening places available in technical institute to 12,600, 21,400 and 32,000 respectively. The same year also saw VTC set up the Committee on Technical Education to be responsible for all matters related to the administration, co-ordination and development of technical education provided by the technical institutes. The following Table 7.4 summarises the number of

[55] A Perspective on Education in Hong Kong - Report by a visiting Panel, November 1982. Government Printer, Hong Kong.
[56] Shatin and Tuen Mun are satellite cities close to industrial development areas.
[57] Figure quoted from Leung, K.F. (Deputy Executive Director, VTC) 1993, 'Technical Education and Industrial Training in Hong Kong' in *Proceedings of the International Symposium on Technical and Vocational Education.* Beijing, China.

technician and craft places available in the eight technical institutes in 1987.

	Craft Level	Technician Level	Total
Full-time	5,600	7,000	12,600
Part-time	14,600	6,800	21,400
Part-time evening	16,000	16,000	32,000
Total	36,200	29,800	66.000

Table 7.4 Technical Institute Places in 1987[58]

The City Polytechnic

The City Polytechnic was established as a result of recommendations in the 'Topley Report'[59] after reviewing the tertiary and technical education situation in 1981. The government's intentions were i) to provide more places in technical education for school leavers within the age band from 17 to 20 to satisfy the social demand; and ii) to assist the growth of the economy.[60]

This new polytechnic was planned to have an initial capacity of about 8,000 full-time equivalent students when its new campus was completed in 1988, and it would be capable of expansion to

[58] Source of figures: *Vocational Training Council Annual Report 1987/88, VTC.*
[59] Hong Kong Government, 1981. *Report of the Committee to Review Post-Secondary and Technical Education.*
[60] *Ibid.*

accommodate up to 13,500.[61] Of these, not more than 30% would be studying at degree level. Its other programs would be at Professional Diploma, Higher Diploma, and Higher Certificate levels. It would also run a limited number of Diploma courses. It can be seen that the bulk of the programs were planned at higher technician level, and there was thus little overlapping with the work of the technical institutes, as happened in the past in the case of the Hong Kong Polytechnic. At the beginning there were six departments at the City Polytechnic, namely architecture and building, accounting, business studies, computing, engineering, and social work.[62]

In determining the departments and student numbers, the planning committee, in 1982, considered the results of the Training Council's manpower surveys. However, it was aware of the dangers of too rigid an interpretation of such forecasts, especially those in the commercial sector. Other aspects of economic demand that were considered were trends in technology change, and graduate employment.[63] Regarding the latter, the Hong Kong Polytechnic records were studied.

Eventually, the City Polytechnic commenced classes in 1984 in transitional accommodation before its new campus could be made ready until 1989. The Planning Committed decided, in view of the low property prices at the time, to obtain a HK$260 million bank loan to purchase a 23-storey commercial building in the heart of the business

[61] The Second Polytechnic Planning Committee, 1982. *The First Report of the Planning Committee for the Second Polytechnic.*
[62] *Ibid.*
[63] *Ibid.*

district for use as the Polytechnic's temporary campus.[64] To earn income to pay off the interest on the loan, the first three floors of the building were rented out for commercial use.

When the City Polytechnic was in operation in October 1984, the first intake of 1,230 students was admitted to 12 courses in full-time and part-time evening modes offered by six departments. In 1991, a vocational Faculty was established in the form of the College of Higher Vocational Studies to co-ordinate and administer Higher Diploma and Diploma courses allowing other teaching departments to concentrate on degree course. In 1995, when the City Polytechnic was awarded university status, the College of Higher Vocational Studies offered 12 Higher Diploma courses and 1 Diploma course in the four Divisions, namely, the Division of Commerce, The Division of Language Studies, the Division of Social, and the Division of Technology. In the same year the College enrolled 3,255 full-time and 2,037 part-time students.[65]

Expansion of higher education

This is not the focus of this study, however, as expansion in the sector of education did affected technical education especially in the technician level, its development will be briefly examined.

[64] *Ibid.*

[65] Source of figures: City University of Hong Kong College of Higher Vocational Studies, 1995. Information Leaflet 1 and 4.

Given the educational attainment of the population and Hong Kong's level of economic development, the expansion rate of higher education places during the 1980s was still modest by international standards. It was not until 1989 that new higher targets were set in accord and with the governor's speech, which indicated that one out of four students would find a place in post-secondary education by 1996, and the number of degree places would be increased to 16% of the relative age group.[66] The Government's plan for achieving this was as follows:

1. To expand the University of Hong Kong and Chinese University of Hong Kong to provide 11,500 full-time equivalent student places each.

2. The establishment of the Hong Kong University of Science and Technology in 1991 with a target student population of 5,070.

3. Within a total population of 25,200 full-time equivalent students, to increase the level of degree places offered at the Hong Kong Polytechnic and the City Polytechnic of Hong Kong Polytechnic and the City Polytechnic of Hong Kong from 40% to 65% of their total provision.

4. To expand the Hong Kong Baptist College so as to achieve a student population of 4,000 on degree.courses.

[66] Address by the Governor, Sir David Wilson, at the Opening of the 1989/90 Session of the Legislative Council on October 11, 1989.

5. To upgrade Lingnan College to a degree awarding institution with a total student population of 2,000.

The technical colleges

To enable the two polytechnics to increase degree level places as part of government's overall plan to expand higher education, VTC was invited in 1989 to formulate proposals for the transfer of sub-degree level courses at higher diploma and higher certificate level from the two polytechnics. This proposal planned to transfer 6,750 full-time equivalent students. VTC accepted the invitation and to accommodate the course to be transferred, it was decided to:

i) build a new technical college at Tsing Yi[67] to provide 3,550 full-time equivalent places on sub-degree level courses.

ii) convert and upgrade the existing Chai Wan Technical Institute into a second technical college to provide 3,000 full-time equivalent places on sub-degree level course.

iii) modify and expand the remaining seven technical institutes to enable them to take over the technician courses decanted by the Chai Wan Technical Institute.

[67] Tsing Yi is a newly developed sub-urban area within easy reach to the two industrial cities Tsuen Wan and Kwai Chung.

iv) build a new training centre complex at Pokfulam to accommodate the 3,000 full-time craft level places to be displaced from the eight technical institutes.

As stated in VTC's reports,[68] foundation work for the technical college at Tsing Yi was completed in November 1991 and subsequent work on the superstructure was completed in July 1993. The first intake of students commenced in October the same year and the college offered courses in business administration, computing, construction, design, electronics, mathematics, electrical engineering, mechanical engineering, and manufacturing engineering.

Construction work for converting and upgrading the existing Chai Wan Technical Institute to a technical college started in summer, 1992 and was completed in May 1993. This College admitted its first cohort of students in October 1993 as well in applied science, business administration, computing, electronics, hospitality and tourism, and manufacturing engineering.

The acceptance of the transfer of sub-degree places from the polytechnics also provided VTC the opportunity to rationalise and improve the craft training it offered in the technical institutes and training centres. The rationalisation resulted in the replacement in 1992 of all existing basic craft courses by new Craft Foundation Courses which have a mix of theory and practice most suited to the

[68] See VTC, Vocational Training Council Annual Report 1991/92 and 1992/93.

needs of the industry. The theoretical part of these new courses was taught in technical institutes and the practical part in training centres.

To enable the improvement of basic craft training to take place the Pokfulam Training Complex was completed in August 1992 and the work of re-organising the teaching departments in the seven technical institutes was also completed in September 1992.

Growth from 1982 to 1996

Since VTC is the official authority that has been given 'the mandate to assist in maintaining Hong Kong's competitiveness in the international trading market through ensuring that its industry and commerce will have the trained manpower they needed'.[69] A close look at the growth of its publicly-funded courses will give lights to show government's determination and involvement in developing the necessary skills for Hong Kong's industry and commerce. The following tables 7.5 to 7.7 numerically recorded the growth of technical education since the inception of VTC to 1996.

[69] The Chairman's Forward. *Vocational Training Council Annual Report 1982/83.*

Discipline	Full-time		Part-time Day		Part-time Evening	
	T	C	T	C	T	C
Clothing	79	82	132	114	222	413
Commercial Studies	727	116	257	-	5,084	1,246
Construction	186	41	1,051	1,410	1,727	611
Design	103	38	20	68	328	98
Electrical Engineering	310	426	485	1,348	2,447	1,816
General Studies	-	73	37	200	74	2,884
Hotel-keeping and Tourism	145	-	-	171	240	-
Industrial Technology	71	40	47	183	191	179
Marine and Fabrication	76	39	57	518	57	154
Mechanical Engineering	465	340	577	3,201	1,004	1,811
Printing	68	44	-	272	235	84
Textiles	108	99	13	114	180	98
Total	2,338	1,338	2,676	7,599	11,789	9,394

Note: T = Technician or Post-Secondary 5 level.
C = Craft or Post-Secondary 3 level.

Table 7.5 Enrolments in the Technical Institutes in 1982/83 Academic Session[70]

[70] Table adapted from the VTC Annual Report 1982/83

Discipline	Full-time		Mixed Full-time		Part-time Day		Part-time Evening	
	T	C	T	C	T	C	T	C
Applied Science	236	23	-	-	290	-	178	130
Clothing Technology	295	40	-	-	-	71	393	33
Computing Studies	997	-	-	-	116	-	1,240	472
Construction	387	-	-	44	1,364	1,400	1,236	389
Electrical Engineering	324	-	-	569	250	1,747	993	1,317
Electronic Engineering	997	-	-	373	344	272	1,182	740
Manufacturing Engineering	364	60	-	168	61	255	200	52
Marine Engineering	72	86	46	49	22	70	54	25
Mechanical Engineering	840	-	-	1,582	150	1,360	720	510
Motor Vehicle Engineering	70	-	-	410	108	1,227	212	164
Printing	99	-	-	353	48	71	280	21
Textile Industries	149	-	-	222	28	33	213	34
Accountancy	722	-	-	-	174	-	3,307	185
Commercial Studies	1,670	940	-	-	314	-	3,722	-
Design	630	-	-	173	80	147		176
General Studies	120	524	-	-	176	567	522	4,442
Hotel-keeping and Tourism	513	-	-	-	98	199	112	71
Total	8,485	1,673	46	3,943	3,623	7,419	14,870	8,731

Note: T = Technical or Post-Secondary 5 level. C = Craft or Post-Secondary 3 level.

*Mixed Full-time courses are jointly offered by technical institutes and training centres.

Table 7.6 Enrolments in the Technical Institutes in 1996/97 Academic Session[71]

[71] Table adapted from VTC Annual Report 1996/97

Discipline	Full-time	Part-time Day	Part-time Evening			
	HD	HC	HD	HC	EC	Asso
Applied Science	535	19	42	57	12	-
Business						22
Administration	766	-	-	2,002	-	-
Computing and				716	-	-
Mathematics	728	-	39			-
Construction	342	466	-	778	-	-
Design	280	-	-	285	-	-
Electrical &						
Communication						
Engineering	445	147	-	1,161	-	-
Electronic						
Engineering	375	265	85	748	-	-
Hotel, Catering						
Tourism						
Management	303	-	-	-	-	-
Manufacturing						
Engineering	968	100	414	492	-	38
Mechanical						
Engineering	390	285	-	558	-	-
Total	5,141	1,282	580	6,797	12	60

Note: HD = Higher Diploma

HC = Higher Certificate

EC = Endorsement Certificate

Asso = Associateship

Table 7.7 Enrolments in the Technical Colleges in 1996/97 Academic Session[72]

[72] *Ibid*

A phenomenal growth in the provision of technical education was observed during this period. Lower technician enrolment in all modes of study across disciplines increased from 16,803 to 27,024, indicating 60.8% of growth. Craft level enrolment also increased from 18,331 to 21,766, indicating 18.7% of growth. Besides lower technician and craft level growth, the establishment of the two new technical colleges in 1992 to takeover higher technician courses from the two polytechnics, also provided a total of 13,812 study places (excluding enrolment in Associateship level) across ten disciplines in 1996.

Curriculum Development and Quality Assurance

VTC courses are operated to meet the needs of industry and commerce. Industry and commerce examines the principal jobs and lay out their task requirements in detailed specifications. If a particular principal job is at the technician or craft level, and the manpower survey shows there is a great demand for the skills, VTC will consider running a course for it. If the manpower demand falls short of a viable class size, related principal jobs will be pooled together to sustain a more broad-based, relevant course.

In an article describing courses at the technical institute,[73] Mo, Principal of the Tuen Mun Technical Institute mentioned that when the demand for a course emerge, the concerned heads of departments will explore the feasibility of operating a course to meet this demand. The relevant Industry Training Boards and the then polytechnics will be

[73] MO, Y.M. 1982. 'The Maintenance of Academic Standard at Tuen Mun Technical Institute, Hong Kong' in *The Vocational Aspect of Education.* Vol 44 No 3.

consulted. If reactions are favourable, a proposal for running the course will be considered at the relevant Departmental Board where all heads of departments of the same discipline are members. The Departmental Board considers primarily the academic aspects of the rationale for operating the course. Upon support by the Board, the Planning Committee will scruitinise the resource implications of the proposal. If these are in order, the proposal will be presented to the Academic Board to ensure that it fits in with the overall development of the institutes. The Committee on Technical Education also has the chance of perusing the course proposal when they consider the course plans. The approved course plans will serve as the base for budgeting the financial requirements.

Mo further revealed the process of Curriculum design for a new course. The curriculum, which makes reference to the task specifications of the principal jobs, has to be included in the course proposal for various parties' consideration. After the course proposal is approved, the Course Committee will be responsible for developing the curriculum into objective-format syllabuses. The syllabuses are approved by the Departmental Board. In designing the curriculum some external requirements are superimposed. Many of the technician level courses are validated by the Business and Technician Education Council of UK (the validating body was changed to the City and Guilds of London Institute after 1995).[74] The curricula of these courses have to be endorsed by them. Some courses also prepare the students to take

[74] The author was told this change in an interview with the Vice-principal of Kwai Chung Technical Institute on 8 August 1994.

external examinations or to meet licensing requirements. These have to be taken into account in the curriculum design.

An approved curriculum will undergo a major review in a period of five years. At the same time, teaching departments will be vigilant about the need for continuous updating of the curriculum to keep pace with the changing technology and environment. If the changes to the existing syllabuses are substantial, they will be presented to relevant committees for endorsement.

When the syllabuses for a course are drawn up, as part of the quality and standard assurance, an assessment scheme will be simultaneously devised for each syllabus. The assessment scheme indicates at which stages of the year of study the students should be tested, and how the test questions should be distributed among the different topics within the syllabus and among the different intellectual levels within the cognitive domain. Together with the course assignments, the tests provide a scheme of continuous assessment. Except for subjects of a practical nature, a sessional examination is held at the end of the academic year. The overall assessment for the subject in general comprises three elements which are the test scores, the course assignments and the sessional examination scores. They carry different weightings determined by the various Course Committees.

Considering staff quality and teaching performance important factors that would affect the quality and standard of courses, VTC has prescribed academic and experience requirements for application to the various teaching posts. This ensured that all teaching staff would have reached the desired standard. Administrative guidelines have also been set so that the teaching staff were assigned a reasonable teaching load. The performance of the teaching staff was supervised. Teacher training and staff development programs were made available to the staff. Adequate support was also provided for teachers to enhance the effectiveness of teaching.

CHAPTER 8

DEVELOPMENT OF TECHNICAL MANPOWER IN HONG KONG: PROVISION OF VOCATIONAL AND INDUSTRIAL TRAINING

Introduction

Vocational training differs from technical/vocational education in that it generally falls outside the formal schooling cycle, and thus varies more, both in terms of training duration and of entry requirements. The proportion of practical to theoretical instruction in vocational training programs is higher than in technical/vocational education. Thus, for example, while courses at the technical institutes/colleges will take two to three years of full-time or their part-time equivalent, study to complete vocational training programs provided by the training centres take four to thirty weeks. The main objectives of these programs are to help unemployed worker find jobs; prepare school leavers to enter the labour market, to upgrade the skills of employed workers; and to provide training for university graduates as well as apprentices registered under the apprenticeship ordinance.

The Origins of Vocational Training in Hong Kong

Like technical education, the development of vocational training in Hong Kong was co-ordinated with the economic development of the territory. In the early period while Hong Kong's economic activities were largely connected with entrepot trade, organised industrial training was non-existent except in entrepot-related enterprise such as shipbuilding and ship-repairing and in government departments. England and Rear[1] traced the origins of organised training in Hong Kong to the influence of the British companies such as the 'hongs' and the dockyards and a simultaneous requirement for increased training in certain areas of public service such as the Kowloon-Canton Railway and the Public Works Department. There was no government policy and involvement on vocational training in the territory.

In the Colonial Office's survey on vocational technical education[2] conducted in 1937 it was revealed that both the Taikoo and Kowloon Dockyards ran apprenticeship training for young lads at 16-17. Apprentices were trained for five years and during the training indenture they were sent to attend theoretical courses provided by evening schools set up by the two dockyards.

Provision of training also found at the government's Public Works Department (PWD) and the Kowloon-Canton Railway (KCR). The PWD during 1937 employed four graduates of the Hong Kong University as 'apprentice engineers' on salary. Apart from these, there were only a limited number of young men accepted in the Department's junior surveyor class and trained for promotion in the survey office and in the waterworks workshop for training as fitters. It was unusual for these men to leave government service after training.

It was recorded in the same survey that there were a number of training positions at KCR. First type of trainee was called probationers. Their

[1] England, J. and Rear, J. 1981. *Industrial relations and law in Hong Kong.* Hong Kong: Oxford University Press.
[2] Colonial Office. 1940. *A Survey of Vocational Technical Education.* London, HMSO pp40-41

probationary periods vary from 18 months to 3 years. During this period, they were sent to out-stations where they learnt station account ticket-collecting duties, and general station work. Promotions follow to posts of booking clerk and station master, and in exceptional cases to that of traffic inspector.

Apprentice was the second type of training position at KCR. Apprentice fitters, machinists and carpenters were engaged on a verbal agreement for a period of five years. On completion of their apprenticeship they remained on the establishment as improvers for a period not exceeding two years. Subsequent to that, they were either absorbed into the works as artisans or discharged. During the period of apprenticeship each apprentice attended the drawing office one day a week for instruction in mechanical drawing, elementary science, heat, steam, and applied mechanics.

According to the survey, there were two posts of indentured special apprentices created in 1937 with the objective of training locally-educated youths between 16 and 20 years of age who had passed the Senior Local Examinations or in possession of School Leaving Certificate, to fill such posts as locomotive and workshop foremen.

Drivers and firemen were trained from cleaners, at KCR, in a similar manner to that prevailing in England. All drivers were taught the rules and the care and maintenance of engines. When drivers and firemen were not on running duty, they were employed under engine-fitters in the works.

Vocational training continued to be largely the responsibility of industry and was generally provided during apprenticeship in the 1950s. The youth received instruction in their trade over a period of three or four years and, in some cases, was given a trade test before acceptance as an artisan. There was not official policy regulating any form of training at this stage. Government's involvement in vocational training was limited to the provision of apprenticeship training, at departmental level, in its engineering workshop. Nevertheless, a milestone was made in 1955 when the system of recruitment and training of apprentices in government engineering workshops underwent a radical change.[3] A new mode of training, the part-time day release mode, burgeoned. Apprentices were selected, firstly, by a competitive entrance examination conducted by the Technical College. Short-listed candidates were given an aptitude test and then interviewed by a selection board of engineers from the government workshops. The apprentices finally selected were released on one day per week for attendance at Technical College classes in engineering subjects, English and liberal studies. They had to give two evenings of their own time for a attendance at lectures as well. In addition to this, a progressive scheme of trade training was developed by each workshop so as to produce a competent artisan and a potential foreman by the end of apprenticeship.

The Evolution of Government Training Policy

As discussed in Chapter 6, there was an increased requirement in the areas of the efficient use of labour, the quality of the labour force and

[3] *Hong Kong Government 1958*. See the Director of Education's *Triennial Survey 1955-58. Hong Kong, HKGP.* p55.

the efficiency of industrial training during the 'booming' years of the 1960s and 1970s. At that point of time industrial training provision was far lagging behind the industrial development in Hong Kong. This can be seen as a reflection of a wider neglect by the government and the lack of private sector input. The Advisory Committee on Diversification noted that

> '... few commercial or industrial concern in Hong Kong have either the space or expertise to provide the training required by their staff. Thus individual industries and firms have not generally accepted the responsibility for training assigned to them by government polity...'[4]

The private sectors inactive support was due to two reasons. First, firms in Hong Kong are relatively small and do not have extra resources to spare for training. Second, there was a fear that well trained staff would be poached by other firms competing in the open labour market. Third, the export-oriented characteristic of most Hong Kong industries requires industrialists' pro-active estimates to predict future market trends. Faced with uncertain changes in future product lines would have hampered the desire for firms to make long-term investments in a number of areas including human resource development. The private sector has instead relied on the government to provide the facilities needed for training the labour force at all levels of skills.

Thus, as reviewed earlier in Chapter 6, the government came under mounting pressure form the mid-1960s from industrialists to provide

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[4] Hong Kong Government *Report of the Advisory Committee on Diversification. Hong Kong, HKGP.* p219.

more technical education and vocational training for Hong Kong's demanded workforce. The government in response reoriented its manpower policy and in 1965 set up the Industrial Training Advisory Committee as a consultative body to make recommendations on long-term strategy for industrial training. This was replaced in 1973 by the Hong Kong Training Council with a broader remit. To cater for the pressure for technical upgrading the Hong Kong Productivity Centre was established in 1967 under the aegis of the Hong Kong Productivity Council to provide a wide variety of training and consultancy initiatives for the manufacturing sector.

Further evidence of the changing official attitude was seen in the growing readiness of the authority to take a direct part in industrial training. A recommendation to that effect was made by the OECD educational advisers who visited Hong Kong in 1982. Their report stressed the importance of developing an adaptive inventory of human capital that

> '... Not only by expanding higher education and upper secondary education in terms of general education but also by concentrating on the provision of structured vocational education and training schemes.'[5]

This approach contrasted with the distinction the government formerly drew between public responsibility for technical education and the responsibility of private industry for industrial training.

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[5] Hong Kong Government. 1982. *A Perspective on Education in Hong Kong: Report by a Visiting Panel.* Hong Kong Government Printer.

The transformation of the Hong Kong Training Council into the Vocational Training Council in 1982 with broadened jurisdiction to carry out official policy on technical manpower development can be seen as government's determination to take direct involvement in technical education and vocational training. VTC assumed a broad range of activities at the level both of industry and of the economy as a whole, including those related to industrial training such as assessing manpower demand and training needs in every sector; developing model training programs and trade test guidelines for the principal jobs; advising employers on training requirements and necessary improvements and encouraging them to enter into apprenticeship arrangements; planning and implementing appropriate changes in the scope and activities of industrial training; and enforcing the Apprenticeship Ordinance. As revealed in the last Chapter, the Council established 20 Industrial Boards and several specialised Committees of major economic activities to help the Council in carrying out activities in various aspects of training.

Training Provisions

The main responsibility for industrial training in Hong Kong lies with the Construction Industry Training Authority, Clothing Industry Training Authority, and the VTC. The first two training authorities are funded by the two 1975 statutes which established a tax to be paid by firms in the construction and clothing sectors. VTC is directly financed by government revenue.

The Construction Industry Training Authority

The Construction Industry Training Authority was established in September 1975 by the enactment of the Industrial Training (Construction Industry) Ordinance 1975. It's current statutory functions are to:

- establish and maintain industrial training centres.
- provide training courses for the construction industry.
- assist, including to assist by way of financial provision, in the placement of persons completing training courses.
- make recommendations with respect to the rate of training levy.
- assess the standards of skills achieved by anyone in any kind of work involving or in connection with the construction industry, conduct examinations or tests, issue or award certificate of competence and establish the standards to be achieved in respect of such work.[6]

The Authority discharges its statutory functions with the advice of various standing and *ad hoc* Committees, which are composed of members from different sectors of the industry including one representing VTC and another one representing the Building and Civil Engineering Industry Training Board of VTC.

To perform the above statutory functions, the Authority operates three construction training centres, *viz* the Kowloon Bay Training Centre, Kwai Chung Training Centre, and Sheung Shui Training Centre, one

[6] See introduction to the functions of the Construction Industry Training Authority at the Authority's Web site http://www.cita.edu.hk/abouts/function/function.htm.

Management Training Centre, one Safety Training Centre, and one Trade Testing Centre. These training centres provide various training courses for young persons intending to join the construction industry, adults working in other fields but thinking of switching to construction, and also in-service construction personnel. The trade testing centre also conducts short courses and trade testing for the construction craftsmen who can have their skill levels ascertained and certified.

A full range of formal training courses are currently being provided by the Authority to fulfil the requirements of the Hong Kong construction industry for better trained craftsmen and operatives. The Authority also conducts numerous refresher, up-grading and management courses for the in-service construction personnel.

Courses can be classified into three major categories:

Full-time courses – these courses last for one year are for school leavers who intend to pursue a vocational career in the construction industry by specialising in one stream or key construction trade.

Short courses – these courses are conducted for adults who are originally working in other industries but wish to join the construction industry through attendance of a proper training course. As most of these adults are bread-earners of the family who could not afford to be out of work for long, these short courses are invariably condensed training courses lasting two weeks to six months aiming only to train these adults a specific operative skill.

Part-time courses – the majority of these courses are intended for the in-service construction personnel of different levels who requires re-training and up-grading either in their technical skills, theoretical knowledge or in their management know-how. Some of these part-time courses are offered on an open basis for the whole-industry, whilst an increasing number of these courses are tailor-made to suit the individual needs of construction companies and other related organisations.

The Authority, through its various training centres turned out 12,163 graduates of different skills in 1996.

Unlike VTC, the Construction Industry Training Authority is financed by the construction industry itself. In accordance with the provisions of Section 21 and 22 of the Industrial Training (Construction Industry) ordinance of Hong Kong, levy is imposed at the rate of 0.4% on the value of all construction work exceeding HK$1 million undertaken in Hong Kong.

The Clothing Industry Training Authority

The Clothing Industry Training Authority was also established by statue in September 1975 according to the Industrial Training (Clothing Industry) Ordinance. The functions of the Authority as defined in Section 5 of the Ordinance are:

- to provide training courses for the clothing industry.
- to establish and maintain industrial training centres therefore.
- to assist in the placement of persons completing training courses.

- to make recommendations with respect to the rate of levy.[7]

The Authority comprises 17 members from different sectors of the industry including one nominated by the Executive Director of VTC and two nominated by the Clothing Industry Training Board of VTC.

To enable the Authority to discharge its functions, six committees were formed to take responsibility for specific functions on Finance, Building Development, Course and Equipment, Public Relations, Staff Establishment, and Clothing Technology.

The Authority operates two training centres to offer training courses. The first centre was set up in 1977 at Lai King and the second one in 1984 at Kowloon Bay. These two training centres are well-equipped with up-to-date machinery and equipment including CAD/CAM systems, micro-computers, etc.

The Authority offers full-time courses at technician and craft levels for school leavers, part-time courses for serving staff of the industry, and in-plant training programs for firms. In addition, the Authority conducts retraining courses for displaced workers funded by the Employees Retraining Board. Retrainees attending full-time courses receive a retraining allowance of HK$933 per week,[8] paid by the Employee Retraining Board.

During the year of 1996, a total of 4,570 trainees completed training at the two Centres through sixty different courses and programs.

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[7] See *Clothing Industry Training Authority Annual Report 1996,* p5.
[8] This is the 1996 figure as indicated in the Authority's 1996 Annual Report.

Similar to the Construction Industry Training Authority, the clothing Industry Training Authority is financed by the clothing industry. In accordance with the provisions of Section 21 and 22 of the Industrial Training (Clothing Industry) Ordinance, a training levy is imposed on the F.O.B. value of clothing (including footwear) items exported at 30 cents per HK$1,000 or part thereof.

The Vocational Training Council

The structure, organisation and functions of the VTC as well as government's involvement in maintaining the Council's operation have been discussed earlier. This section will review its *modus operandi* in providing training places for skills demanded by Hong Kong's economic activities.

The Council, with the assistance of the respective training boards and general committees, operates a total of 24 training centres and one management development centre in 1996. Of these, 18 are housed in three large complexes at Kowloon Bay, Kwai Chung and Pok Fu Lam. The Seamen's Training Centre is located in Tuen Mun. The remaining five training centres and the Management Development Centre of Hong Kong are housed within the Council headquarters in Wan Chai. These Centres are:

- Automobile Industry Training Centre (Kwai Chung),
- Banking Training Centre (Wan Chai),
- Electrical Industry Training Centres (Kwai Chung and Pok Fu Lam),
- Electronic Design Technical Training Centre (Wan Chai),

- Electronic Industry Training Centres (Kowloon Bay and Kwai Chung),
- Gas Industry Training Centre (Kwai Chung),
- Hotel Industry Training Centres (Kowloon Bay and Pok Fu Lam),
- Information Technology Training Centre (Wan Chai),
- Insurance Training Centre (Wan Chai),
- Jewellery industry training Centre (Kwai Chung),
- Machine shop and Metalworking Industry Training Centre (Kowloon Bay, Kwai Chung, and Pok Fu Lam),
- Management Development Centre of Hong Kong (Wan Chai),
- Plastic Industry Training Centre (Kowloon Bay),
- Precision Tooling Training Centre (Kowloon Bay),
- Printing Industry Training Centre (Kowloon Bay and Pok Fu Lam),
- Seamen's Training Centre (Tuen Mun),
- Textile Industry Training Centre (Kwai Chung),
- Welding and Related Trades Training Centre (Kwai Chung), and
- Wholesale/Retail and Import/Export Trades Training Centre (Wan Chai).[9]

With the exception of the Management Development Centre, all centres offered training to meet the needs of their respective economic sectors. Full-time courses at different levels were offered to new entrants to both industry and commerce. Various up-grading courses of different duration were also run for the benefit of in-service personnel. Basic workshop training was also provided to engineering undergraduates from three universities to complement their theoretical studies. Similar hands-on practical courses were also arranged for students of technical

[9] This list is adapted from page 14 of the VTC's Annual Report 1996/97.

colleges and technical institutes, as well as students of prevocational and secondary technical schools.

Jointly with the technical institutes, 15 training centres provided the practical training part of the curriculum of Craft Foundation Courses. These courses are for Secondary 3 students. In general, all courses are open to people over the age of 15 and application to short courses is accepted all year round.

In conjunction with various training and education institutions, as well as employers and employees' associations, a number of training boards also organised specially tailored out-centre training courses to improve the skills and knowledge of in-service personnel in their respective sectors. In 1996 the following six Training Boards organised out-centre courses on demand for more than 2,800 persons:[10]

- Accountancy,
- Advertising, Public Relations and Publishing,
- Hotel, Catering and Tourism,
- Journalism,
- Shipbuilding, Ship Repair and Offshore Engineering Industry,
- Transport and Physical Distribution.

[10] See VTC's Annual Report 1996, p14.

The following table shows the number of training enrolments at various training centre in 1996/97 academic session.

Training Centre	Full-time Long	Full-time Short	Part-time Day	Part-time Evening	Self-study
Automobile Industry	-	151	-	68	-
Banking	-	4,659	1,260	805	-
Electrical Industry	-	363	1,053	765	-
Electronic Design	-	794	620	614	-
Electronics Industry	50	528	1,345	264	-
Gas Industry	-	-	77	344	-
Hotel Industry	374	837	454	488	-
Information Technology	-	4,518	93	1,175	1,107
Insurance	-	1,761	1,495	317	-
Jewellery Industry	-	-	-	51	-
Machine Shop & Metal Working Industry	-	1,146	1,465	-	-
Plastic Industry	14	748	1,722	522	247
Precision Tooling	58	572	376	302	-
Printing Industry	27	-	106	229	-
Seamen's	46	2,683	979	-	-
Textile Industry	108	401	-	431	-
Welding & Related Trades	-	1,135	-	-	-
Wholesale/Retail & Import/Export Trades	-	2,890	1,096	767	-
Total	677	23,186	12,141	7,142	1,354

Note: Full-time long – full-time courses of 22 weeks or longer.
Full-time short – full-time courses of less than 22 weeks.

Table 8.1 Enrolment Statistics of Training Centres in 1996/97 Academic Session[11]

Besides running the above short and long training courses, VTC was also responsible for administering and overseeing the following training schemes.

[11] Table adapted from VTC Annual Report 1996/97.

Technologist Training – this is the Engineering Graduate Training Scheme administered by the Committee on Technologist Training of the Council. This scheme aims at bringing about adequate practical training opportunities for engineering graduates and engineering students in sandwich courses to enable them to complete their training as engineers.

Employers participating in the scheme are required to provide practical training of a standard acceptable to the professional institutions for the conferment of their corporate membership. As an incentive to both employers and trainees, the Council subsidizes the salary of trainees in the scheme for a period up to 18 months. The Council helps graduates in securing training places and employers in recruiting graduates for training, drawing up detailed training programs and training supervision arrangements.

During the year of 1996, there were 288 trainees commenced training and 248 successfully completed their training under this Scheme.

Apprenticeship Training – the Apprenticeship Ordinance provides a legal framework for the training of craftsmen and technicians. Young persons aged between 14 and 18, working in any of the 42 designated trades and not completed an apprenticeship must enter into a contract with the employer. The contract must be registered with the Director of Apprenticeship, who is the Executive Director of the VTC. Contracts in respect of other trades, or for apprentices aged over 18 years, may be registered voluntarily. An apprenticeship normally lasts three to four years. Previous qualifications such as completion of craft foundation course may lead to exemption from the first year of the apprenticeship.

Throughout the apprenticeship indenture, apprentices receive practical training and attend technical education at either a technical institute or a technical college.

The Council is responsible for the administration of the Apprenticeship Ordinance. Inspectors of Apprentices are appointed to advise and assist employers in the training and employment of apprentices. They regularly visit workplaces where apprentices are employed to ensure that training is properly implemented. They also assess progress of apprentices, and when necessary, conciliate in disputes arising out of contracts. VTC provides a free apprentice placement service on apprenticeable trades to employers and young people. In 1996, 816 employers offered training vacancies and about 1,900 young people were placed into apprenticeship.

Traineeship Scheme – this scheme is similar to the apprenticeship scheme in the industrial sectors. It is designed to train supervisory and clerical personnel in commercial sectors. The aim of the scheme is to build up a workforce with both practical experience and theoretical knowledge to meet the development needs. The duration of a traineeship is normally two to three years during which an employer, under an agreement of traineeship signed with the trainee, provides organised on-the-job training and releases the trainee to attend a related part-time course. VTC provides assistance to employers in setting up traineeship schemes and recruiting trainees. It also offers placement service to potential trainees.

The scheme has gained well support from employers in the accountancy, insurance and transport and physical distribution sectors. During 1996, 166 new trainees joined the scheme and 89 trainees completed their training. A total of 242 establishments were involved.

New Technology Training Scheme – the purpose of the scheme is to facilitate the adoption of new technologies beneficial to Hong Kong's industry and commerce. The scheme initially involved a provision of a matching grant to assist employers in sending their employers to overseas or local courses or working attachments for acquiring new technologies. To make the scheme more attractive the government approved a number of measures including the raising of the level of grant from the original 50% to 75% of the total cost of training incurred by an applicant, removing the ceiling of the grant, and extending subsidy assistance to the forms of training beyond courses attendance and work attachment. All expenses for operating this scheme are financed by income earned from investment of the New Technology Training Fund which was set up under trust on behalf of the government in 1992.

This scheme is administered by the Committee on Technologist Training of the Council. During the year 1996 these were 1,021 applications to this scheme and 797 of them were approved.

Trade Testing – the Council operates a voluntary trade testing and certification scheme for the purpose of ascertaining and recognising the standards of skilled workers. Tests are conducted for many different trades, among which some trades are tested at VTC industrial training centres and some at the venues of the Construction Industry Training Authority.

Workers with a minimum of four years' relevant experience may apply to take trade test in key craft trades. The test consists of two parts, a trade knowledge test and a practical test. Certificates will be awarded to those who have successfully passed both parts. Trade tests are held for the key trades in the automobile, construction, electrical, mechanical, plastics, printing and jewellery industries.

SECTION

IV

Technical Education and Vocational Training in Taiwan

CHAPTER 9

TERRITORIAL CHARACTERISTICS AS BACKGROUND FOR THE DISCUSSION OF TECHNICAL MANPOWER DEVELOPMENT IN TAIWAN

Geographic and demographic situation

Taiwan, an island situated in the far Western Pacific at the cross-roads of Northeast and Southeast Asia, is surrounded by five seas - the Taiwan Strait; the East China Sea; the Pacific Ocean; the Bashi Channel between southern coast Taiwan and Luzon in the Philippines; and the South China Sea. The satellite islands of Taiwan proper include the Penghu archipelago consisting of 64 islets situated in the Taiwan Strait, together with a few other islands which lie just off the mainland, west of Taiwan. The largest of these is Chinmen which is about 10 km from the Port of Amoy, while five other islands under Taiwan's control, mainly Matsu, lie further north near Fuzhou[1]. The island of Taiwan itself is separated from the mainland by the Taiwan Strait which is about 145 km wide at the nearest point. Taiwan is 35,873 sq km in area, measuring 390 km from north to south and 142 km from east to west, and straddles the Tropic of Cancer. Owing to its mountainous character, only about one-quarter of the island is cultivated, while forests cover about two-thirds of the total land area. The climate is subtropical in the north and tropical in the south.

Taiwan proper and its satellite islands have a population over 21 million which means a populated density of 591.8 per sq km, one of

[1]The capital city of Fujian, a coastal province in south China.

the highest in the world[2]. By 1995, 23.8% of Taiwan's population were under 15 years of age, 68.6% were aged between 15 and 64; and 7.6% of the population were 65 and over[3]. With the expansion of industry, Taiwan's population has become increasingly urbanised. Between 1966 and 1994 the proportion living in towns of 100,000 or more inhabitants increased from 31.0% to 57.4%[4]. The population's annual growth rate dropped from 1.3% in the 80s to 0.99% in 1995.[5] Rapid urban growth and a declining population growth rate signal that Taiwan's population is slowly ageing.

Resources

Taiwan's forests cover over 20,000 sq km which include broad-leaved evergreens, coniferous trees, shrubs and bamboo, but most of these forests are in the rugged mountains. Logging has been curtailed because of soil erosion. Cultivated soil in Taiwan is mainly of the alluvial type. The fertility of this alluvial soil is rather high, and its physical properties are well suited for crop-growing.

Both warm and cold currents pass the island's 1,600 km long sea coast, making nearby fishing grounds historically fertile, but they are now fully exploited. Restructuring in the fishing industry has been taken place as larger vessels are built for deep-sea fishing.

Mineral resources are poor and it is unlikely that important mineral reserves remain to be discovered. The chief minerals produced are

[2]Figures from *The Far East and Australasia 1997.* 28 ed.
[3]*Ibid.*
[4]*Ibid.*
[5]*Ibid.*

marble, poor quality coal, gold and sulphur, other resources of importance include copper, petroleum, and salt. The marble has been extensively developed and is sold into world markets, mostly as finished products. Small amount of natural gas is also available.

Economic development in Taiwan

As discussed in Chapter 2, Taiwan's economic structure shifted from a dependency on agriculture to manufacturing at high speed after the Second World War. So that by 1995 only 3.4% of GDP was originated from agriculture compared with 35.9% in 1952, whereas industry produced 35.2% (with manufacturing contributing 27.4%) in 1995, compared with 21.9% in 1952. The share of the service sector was 42.2% in 1952, had risen to 61.4% by 1995. This transformation in economic structure is unusual because it was associated with a rapid population growth of 3.5% per year in the 1950s and a very rapid annual growth of income per capita of 3.6%, 7% and 6.5% respectively during the 1950s, 1960s and 1970s. Similarly, in 1990-95 real income per capita grew by average of 6.6% per year. In 1995 income per capita, at current prices, stood at US$12,439, compared with US$2,344 in 1980.[6]

Between 1960 and 1973 Taiwan enjoyed an unprecedented economic boom; the value of exports rose 20-fold and real GNP increased 3.3 times. During 1963-72 one-half of the output expansion originated from technical progress and 36% from capital accumulation. The remaining 14% output growth came from labour. In 1952 the shares of labour deployed by primary, secondary and tertiary sectors of the economy were 56.1%, 16.9% and 27% respectively. BY 1995 these

[6] *Ibid.*

had become 10.5%, 38.7% and 50.7% respectively. Even more remarkable was the high level of employment, after 1964 unemployment never exceeded 2% of the workforce in any year. In 1995 only 1.8% of the working population were out of job.[7]

The major contribution to Taiwan's rapid growth is the expansion of foreign trade in the 1960s. Between 1963 and 1972 exports increased nine-fold at a growth rate of 20% annually. Eighty percent of the growth in exports can be attributed to the competitiveness of Taiwan's exports in price and quality in world markets. The sources for this competitiveness, according to Myers (1994), 'are to be found in low-cost, highly-skilled labour, efficient management, the strong profit incentive, and social and political stability'.[8]

In the late 1970s and early 1980s Taiwan's economy began to decelerate because of world recession and other reasons. K.T. Li, a Minister without Portfolio who has long association with Taiwan's economic development described this period as 'the world has been a more hostile one for Taiwan, both politically and for trade'.[9] However, the economy recovered quickly and growth continued to be high, although the rate of growth has sometimes shown fluctuations in recent years. Real GDP rose by 5.4% in 1990, 7.6% in 1991, 7.5% in 1992, 6.4% in 1995, 4.6% in 1998 and 6.0% in 2000.[10]

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[7] *Ibid.*
[8] Myers, R.H. 1994. Economy section in the China (Taiwan) chapter in *The Far East and Australasia 1995*, 26 ed.
[9] Li, K.T. 1988. The Evolution of Policy Behind Taiwan's Development Success, New Haven: Yale University Press.
[10] Source of figures: *Major Economic Indicators.* Economic Research Department, CEPD, Taiwan (http://www.cepd.kcsoft.com.tw/English/statistics/891231/9003/F1.htm)

Industry

Taiwan's industrial structure has altered considerably since 1960. In that year light industry made up 60% of industry's contribution to the net national product and the remainder, which comprised chemicals, machine tools, metals, construction etc., accounted for 40%. By 1977 light industry's share had fallen to 48%. Most basic industries are located in Kaohsiung City. Light industries are situated around Taipei, which uses the facilities of Keelung harbour to import raw materials such as cotton for nearby textile mills.

In 1965 the Government designated Kaohsiung as the site for an industrial zone to stimulate investors and businessmen to develop new export industries on the model of Hong Kong's free entrepot economy. A site of 68 ha was set aside for establishing factories which would produce optical equipment, plastics, electrical appliance, chemicals, garments, furniture and packaging materials for export. By late 1973 two additional zones in Nantze and Taichung were in operation. At the end of 1977, 267 factories operated in these zones. Their combined investment totalled US$300 m and they employed 80,000 workers. In 1979 the exported goods valued at US$1000 million.[11]

Steel production from the integrated and expanding mill at Kaohsiung now produces 3 million tons annually. Taiwan has a number of car manufacturers, and the motor industry is producing units mainly for export. In 1980 new industries emerged. The united Micro-electronics Corporation started to construct an electronics manufacturing plant. The first Science Industry Park

[11]Hon, C.C. 1993. 'Special Industrial Zone for Export' in Kao C.H.C. and Lee, J.S. (eds). The Taiwan Experience: 1949-1989. (In Chinese)

was completed at Hsinchu in late 1980, and 14 high-technology manufacturers, including Wang Laboratories Ltd, received approval to set up plants there. Under the new Scheme for Encouragement of Investment, the Government has offered incentives to hi-technology industries if they use a certain percentage of their revenues for research and development. By 1988 a total of 73 research-based companies had established plants at the Science Industry Park, generating sales worth around US$700 million, and exports worth almost US$500 million in 1987.[12]

Industrial expansion was impressive in the 1980s until 1987 and then declined, but rose by annual growth rates of 7.5%, 4.7%, 3.7% and 7.4% respectively in 1991, 1993, 1995 and 2000.[13]

The education structure

Taiwan's educational system today as shown in Figure 9.1 has evolved over the past three decades in a background of rapid economic growth. The nature of this evolution and the forces that have shaped it will be analysed in future chapters. Only the current education structure is explained here.

Under the current system, it may take 22 years or more for a student to go from the kindergarten through the graduate school. The core of the system is the 6-year elementary school and 3-year junior-high school that formed the national education for all. Beyond national education are two parallel 3-year senior schools, the general senior-high school and the senior-vocational school. From this stage onward, education is divided into two streams – the

[12]Myers, R.H. 1994. *op cit.*
[13]*Major Economic Indicators. Op cit.*

general education stream and the technological and vocational stream. The general stream comprises senior high schools and universities and independent colleges. The technological and vocational stream has a more complicated pattern consisting of senior vocational schools, five-year junior colleges, three-year junior colleges, two-year junior colleges, and institutes of technology. The following sections give more details of each type of institutions in Taiwan's education structure, particularly the institutions in the technological and vocational stream which is the focus of this research.

Elementary school

The Constitution of Taiwan stipulates that all children of age six to twelve be required to take this stage of free fundamental education. The six-year elementary school is aim at 'moral development of the children, ethical principles and correct manners of conduct in order to cultivate them into well-behaved citizens'.[14] By the end of 2000, there were 2,600 elementary schools with 1,925,981 students.[15]

Junior high school

To meet the need of national development by raising educational standards, the fundamental education was extended from six to nine years in 1968, with three additional years of compulsory education at junior high schools. Junior high school graduates may either commence their career or continue their education at the senior high schools, senior vocational schools, or the 5-year junior college.

[14] *Education Statistics of the Republic of China 1993,* p XXII, Ministry of Education, Taiwan.
[15] Source of figures: Summary of Schools for the School Year 2000-01. Ministry of Education, Taiwan (http://www.moe.edu.tw/Statistics/service/f89.pe3).

There were 709 junior high schools with 929,534 students in the school year 2000-01.[16]

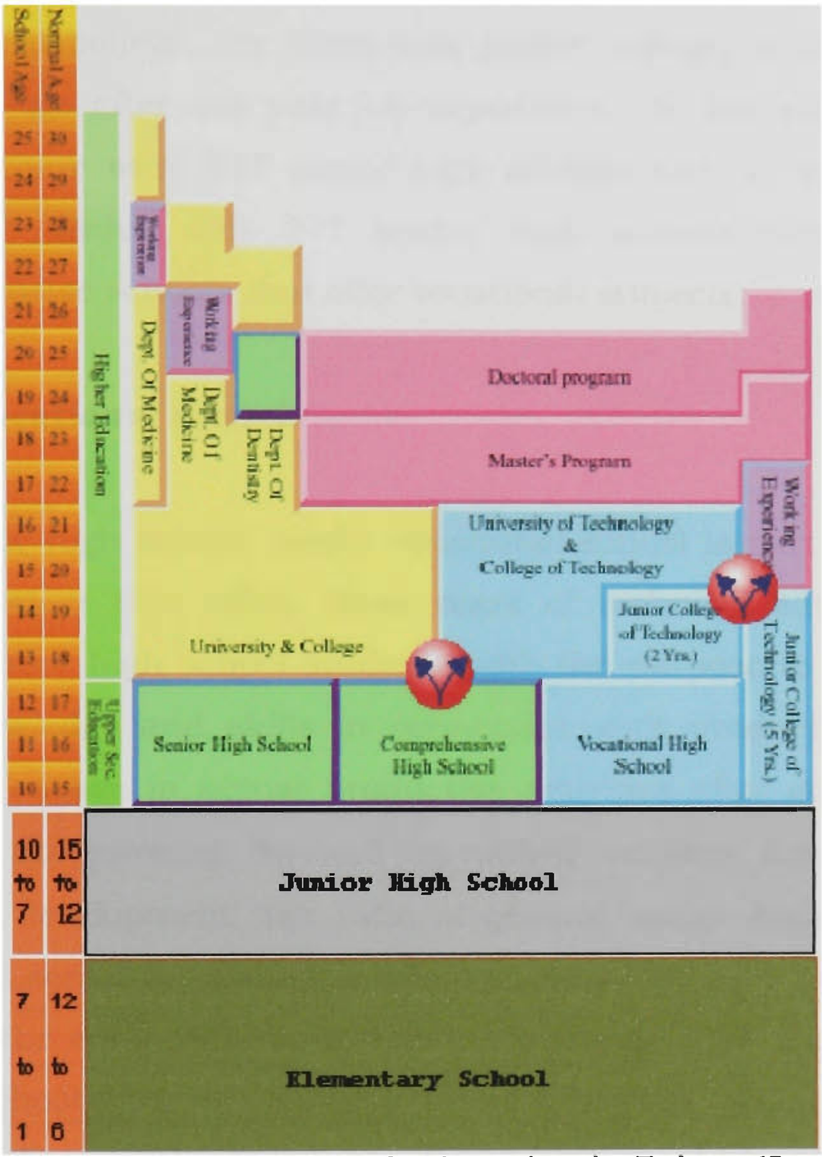

Figure 9.1 System of Education in Taiwan[17]

Senior high schools

Senior high schools admit junior high school graduates. The period of study at this stage of education is three years. The aim of senior high school is 'to nurture a student's capability and interest in

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[16] *Ibid.*
[17] Ministry of Education. 2001. *Education in the Republic of China.* Taiwan, MOE.

learning in order to prepare him for advanced study'.[18] Under the current education system, senior high school graduates may continue to receive further education at the university, the independent college, the three-year junior college, or the two-year junior college after one year job experience. In the school year of 2000-01 there were 277 senior high schools with an enrolment of 356,589.[19] Within this 277 senior high schools there are 121 comprehensive schools that offer vocational subjects.

Senior vocational school

Like senior high school, senior vocational school is part of the high school system that offers three years of technical education. It admits junior high school students with the purpose to equip them 'with knowledge and skills in connection with production so that they can engage in actual productive activities after graduation'.[20] To meet the growing demand in skilled workers needed by the economic development, the ratio of general senior high schools to vocational senior high schools changed from 70:30 in the 1960's to 30:70 in the early 1990 and shifted back to 45.5:54.5 at present.[21] In the school year of 2000-01 there were 188 senior vocational school with a total enrolment of 427,366 of which 43.96% were majoring in industry; 37.05% in commerce; 3.72% in agriculture and 15.27% in marine products, nursing and midwifery, home economics and opera and arts. The following Figure 9.2 is a snap shot of a welding practical class in a senior vocational school.

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[18] *Education Statistics of the Republic of China... Op cit.* p XXII.
[19] Summary of Schools ... *Op cit.*
[20] *Ibid* p XXII.
[21] Summary of Schools ... Op cit.

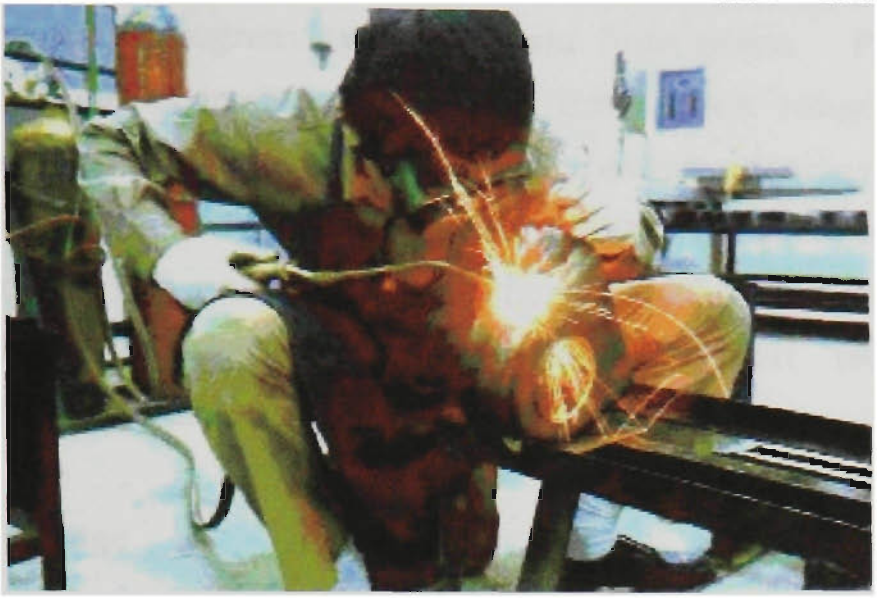

Figure 9.2 A Practical Class in a Senior Vocational School

Comprehensive high school

The comprehensive high school was first introduced on a trial basis in 1996. It offers both senior high and vocational curricula. It admits junior high school graduates who may delay their choice between the senior high and vocational curricula. This kind of education requires a minimum number of years of study and number of academic credits. Areas of study offered by comprehensive schools included domestic language, foreign language, mathematics, social science, natural science, arts, living education, physical education and vocational training. Vocational training has been arranged in a variety of courses for students to choose. In the school year 2000-01 there were 121 comprehensive schools enrolling 61,711 students.

University

University education in Taiwan follows to a large extend the model of the United States. It opens to all senior high school graduates who pass a competitive nation-wide entrance examination. A general undergraduate program typically lasts four years. Professional undergraduate degrees require more time which range from five years for teaching, law, architecture; six years for dentistry; to seven years for medicine. In the school year of 2000-01, there were a total of 53 universities with a total enrolment of 502,016 students.[22] All universities offer graduate studies and support technological research and development in Taiwan.

Junior college

Junior college is one of the tier in the three-level vocational-technical education system in Taiwan. Other tiers include the above mentioned senior vocational school and the university equivalent institute of technology to be described below. Junior college provides students with knowledge of applied sciences and technical know-how in a wide range of professions. There are three types of junior colleges offering five-year, three-year, and two-year programs. The two-year program is designed for the senior vocational school graduates. The three-year program is mainly for general senior high school graduates. The five-year program is articulated with the nine-year compulsory education to admit junior high school graduates. Evening programs are also available. The study period for the evening programs is one year longer than that of the full-time programs.

The curriculum of this tier of vocational and technical education is composed of three areas. They are i) general subjects, including languages, mathematics and others, occupying 23 to 38% of the total hours; ii) professional subjects, including theory and practice, making up 45 to 62%; and iii) elective subjects, taking up 15 to 17%

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[22] *Ibid.*

of the time. Figure 9.3 shows a student receiving computer-aided manufacturing (CAM) training in an engineering class in one of the junior colleges in Taipei.

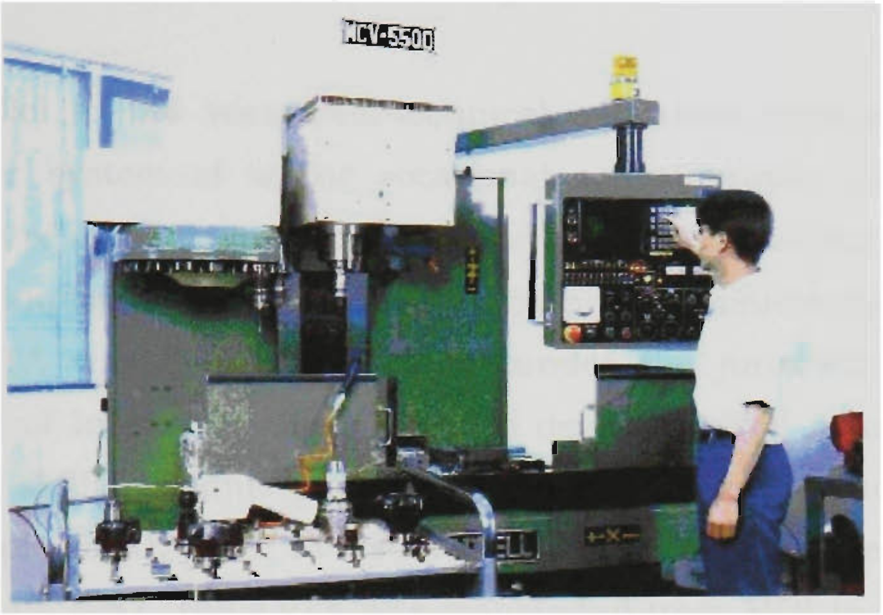

Figure 9.3 Student Involved in CAM Training in a Junior College

In the school year 2000-01 there were 23 junior colleges with total of 444,182 students enrolled.

University/Institute of Technology

This is the highest level in the vocational-technical education system that offers university equivalent education to junior college and senior vocational school graduates. Its aim is to supply Taiwan's demand for higher level technological manpower. The senior vocational school graduates are admitted to the four-year undergraduate programs and those graduated from the junior colleges will be admitted to the two-year program. Masters and doctoral programs are open to graduates from these institutes and other universities. In the school year 2000-01, there were 74 institutes of technology with a total enrolment of 145,904 students pursuing a wide range of courses.

Vocational and Industrial Training

In parallel to the vocational-technical education provided by the three-tier system of senior vocational school, junior college and institute of technology, vocational and industrial training is offered by the Employment and Vocational Training Administration (EVTA). The EVTA was originally founded under the jurisdiction of the Ministry of Interior (MOI) in 1981 to develop skilled manpower; to upgrade skills; to adjust manpower supply and demand; to promote full employment; and to establish an occupational certification system. In 1987, the EVTA was transferred from MOI to the newly established Council of Labour Affairs, within the Executive Yuan.

The EVTA operates training centres in Taipei, Keelung City, Taichung City, and Kaohsiung City to provide

- Pre-employment training for trainees including workers from manufacturing and service industries;
- Upgrading training for instructors and skilled workers from manufacturing and service industries;
- Job-transfer training for employees who need to change their employment to a new trade; and
- Vocational training for the handicapped.

The EVTA also assists industries in setting up enterprise work-based training.

CHAPTER 10

PLANNING OF TECHNICAL MANPOWER IN TAIWAN

Historical evolution and development

The earliest research on manpower supply in Taiwan can be traced back to 1954 while the Executive Yuan conducted the 'Public and Private Sector Enterprise Facility and Manpower Survey'. After this survey, a number of primary researches were conducted. These included the annual 'Transport Industry and Manpower Statistical Report' prepared by the Ministry of Transport from 1956 and three surveys titled 'The Technical Occupation Survey', 'The Provincial Engineers and Technicians Occupation Survey', and' The Full Occupation Survey of Keelung, Taipei and Hsin Tzu' by the Ministry of Education in 1958 and 1959.[1] These early surveys made available only statistics of one kind or another but the definition of terms has not been consistent, and standard occupational and industrial classifications were not used. Data have been collected mainly to meet the requirements of the organisations preparing them, not much of the information were concerned with manpower planning, let alone forecasting.

In the years between 1956-65, Taiwan's population was quite young, 45% of the population was under 15. There were 2.2 million people aged 12 and over joined the labour force. However according to K.T. Li, the then Minister of Economic Affairs, the percentage employed was declining and 65% of the unemployed were under 20 years old. 75% among them had no more than nine years of education, and 80% were seeking employment for the first time.[2] These figures

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[1]Reports cited in Chang, P.C. 1983. *Formulation and Implementation of Manpower Policy.*

[2]Li, K.T. 1988. *The Evolution of Policy Behind Taiwan's Development Success.*

exposed the problems of lack of education and unemployment among the youths. There was a structural shift towards more skilled jobs.

It was against this background that the government invited Harry Weiss of the U.S. Department of Labour to visit Taiwan in 1963 to give advice. He identified a number of problems and made some specific recommendations, *inter alia,* the establishment of a manpower planning organisation to coordinate the manpower activities of the various ministries in order to formulate a sound manpower plan.[3]

Echoed by the government, a Manpower Resources Committee was established in 1964 within the Council for International Economic Co-operation and Development (CIECD) to coordinate and examine plans for the development of human resources. Chester Helper of the US Department of Labour was on loan to render technical assistance at the initial stage of manpower planning work. The Committee was later renamed the Manpower Development Committee (MDC) and was staffed with seven professionals and two secretaries. According to K.T. Li, the then Vice Chairman of CIECD and Convener of MDC, the Committee was charged with the following functions:[4]

- Formulating policies and plans for manpower development.
- Coordinating the several aspects of the plan: such as education, training, recruitment, distribution, and utilisation.

[3]*Industry of Free China,* March 1964.
[4]Li, K.T. 1988. *Op cit,* p 86.

- Keeping the overall plan and the operating programs for development under constant review and adjusting them periodically to meet changing conditions and circumstances.
- Establishing an administration and promoting the public employment service.
- Promoting programs and facilities for vocational training and adjusting the supply of and demand for labour.
- Coordinating the manpower plan with the overall economic development plan.
- Studying special labour problems.
- Collecting, analysing, and assessing all available statistics.
- Studying manpower problems referred by the CIECD.

In spite of the broad charged functions, prior to its merging with the Overall Planning Department of the Economic Planning Council (the replacement of CIECD) in 1973, MDC was more involved in research than implementation. It largely concentrated on the collection of data related to the labour force and on making projections. One of the problems of the merge has been the overlapping of authority and responsibilities assigned to government agencies. Among the agencies dealing with labour administration are a Labour Department in the central government's Ministry of the Interior, and, in the provincial government, the first section in charge of labour affairs in the Social Affairs Department, the Industrial and Mining Inspection Commission, the Labour Insurance Bureau, and several Employment Services Centres. In addition, the provincial Department of Reconstruction has been in charge of wage and labour statistics, and there were other government agencies involved in manpower related matters, such as the Ministry of Economic Affairs, the Ministry of Education and relevant departments at the provincial level. The result of this overlapping and duplication of authority was obvious - inefficient and lack of a unified approach to planning and implementation. In 1977 the Economic Planning Council was again replaced by the Council for Economic Planning and Development and a new Manpower Development and Planning Committee was formed within the Council in 1980 to co-ordinate manpower planning work. This Committee appointed five manpower experts and ten related government ministerial under-secretaries as members with secretarial support from the original group of manpower planning staff of the Council. It was until 1985 a proper Manpower Planning Department was established within the Council. This was Taiwan's first manpower planning office formally set up at departmental level inside the Executive Yuan, charged with the power of appointing its own expert staff to undertake manpower planning and implementation responsibilities for the whole territory.

Manpower Development Plans in Different Phases

The first national manpower development plan (MDP) was prepared by the then Manpower Development Committee of the CIECD and presented to the National Manpower Conference for consideration in 1964, and was subsequently approved by the Executive Yuan in the same year. In drafting this first MDP, more than one hundred experts from the Ministries of the Interior, Education and Economic Affairs and the Directorate-General of Budget, Accounting and Statistics were organised into eight task forces studying various aspects of manpower development. Their reports formed the basis of the first MDP. The first MDP then became the model for all subsequent MDPs to follow both in scope and in methodology. MDPs were formulated in long-term (10-15 years), intermediate-term (4-5 years) and short-term (2 years) periods. The periods covered in the nine MDPs are shown in Table 10.1.

	Long-term	Intermediate-term	Short-term
1st MDP (1966)	1965-1975	1965-1970	1966-1967
2nd MDP (1968)	1967-1977	1967-1972	1967-1969
3rd MDP (1970)	1971-1980	1971-1974	1971-1972
4th MDP (1972)	1972-1980	1973-1976	1973-1974
5th MDP (1977)		1976-1981	
6th MDP (1981)	1980-1989	1980-1984	
7th MDP (1986)	1986-2000	1986-1989	
8th MDP (1990)		1990-1993	
9th MDP (1994)		1994-1996	

Table 10.1. Periods Covered by Various MDPs

The first four MDPs covered long-, intermediate-, and short-terms. For the short-term periods, specific and achievable measures or policies were usually suggested to implement the objectives stipulated in the intermediate-term and long-term plans. At the end of each short-term period, a new MDP was to be formulated in light of previous performance. This is why the first four MDPs were made within a period of eight years. The first and second MDPs were formulated at the time when the 4th 4-year Economic Development Plan was in place while the third and fourth MDPs were drawn up to match with the 5th and 6th 4-year Economic Development Plans respectively.

The fifth MDP covered a medium term of six years with 1975 as the base year and 1981 the target year. This MDP was formulated to match with the manpower demand of the 6-year National Economic Development Plan set in 1976.

The sixth MDP covered both long and medium terms. This MDP was drawn up to provide a framework for preparing the manpower needed for the 10-year economic Plan initiated in 1980. This was a long-term plan besides the 6-year economic Plan in 1976 and was a perspective plan to provide direction for the long range economic development and served as a guide for drafting medium and short-term plans. To match the nature of this long-term plan the 6th MDP only listed detail implementation schemes for the first five years (1980-84) while plans for the second five years were flexibly drafted to allow modifications and variations.

The seventh MDP was drawn up based on the manpower policies laid down in the Long-term Economic Outlook for Taiwan, and the Ninth Medium-term Economic Development Plan both drafted in 1986. This MDP covered medium- and long-term periods. The years 1989 and 2000 have been set as the plan's medium- and long-term target years. This plan listed detail manpower statistics and implementation guidelines for relevant government departments.

The eighth MDP was prepared at the same time when the 10th Medium Term Economic Development Plan was formulated. Besides listing the fundamental policies of manpower development for the period 1990-93, this MDP also revised the statistical bases for long-term development leading to the year 2000.

The ninth MDP was compiled to relieve the manpower problem arose from industrial restructuring with manufacturing activities moving from labour-intensive industries to capital-intensive and technology-intensive industries as the result of the six-year National Development Plan (1991-1996). This MDP further aimed to train the skilled manpower required i) to accelerate the economic restructuring process and ii) to capitalise Taiwan's position as a regional operational hub for the Asia-Pacific region. These were the key goals of the 'Chen-Hsing Ching-Chi Fan-On' (the Economic Stimulus Plan) drafted in 1993.

An Examination of the Basic Purpose of the MDPs

The basic purpose of all the MDPs is to predict or project future manpower requirements and to determine what measures are needed to meet them. Related issues of manpower development are also included in the MDPs. Since education is the most important instrument of manpower development, it is the focus of discussion in all the MDPs. Apart from making detailed estimates of the supply for and demand of various types of workforce, these plans provided the basis for:

- improving the quality of education at all levels including the implementation of the 9-year free education policy introduced in 1968[5].
- establishing guidelines for enrolment distribution of senior high schools. For instance, in the third MDP, the enrolment ratio between senior vocational schools (including 5-year junior technical colleges) and general senior high schools was planned to rise from 5.5 to 4.5 in 1970 to 6 to 4 in 1980[6]. This ratio was revised to rise to 7 to 3 in 1980 in the fourth and fifth MDPs[7].
- increasing the proportion of enrolments in natural sciences and engineering higher education.

[5]See 2nd MDP p 9, 68
[6]See 3rd MDP p 3, 70
[7]See 4th MDP p14 and 5th MDP p 4, 72, 77

- establishing a policy of educational expenditure indexed at a proportion of the GNP. It was proposed in the third MDP the total expenditure for education should be increased to 6% of GNP by 1980.[8] In the interim time, it was planned to raise the proportion from 5.1% in 1971 to 5.4% in 1976 and it was also suggested that the ratio of public expenditure for education to private expenditure for education should be lowered from 4:1 in 1971 to 3.5:1 in 1976.[9]
- expansion and improvement of vocational training. Nearly all important phases of vocational training: legislation, administration, funding, setting up of training centres, coordination between training programs and technical education, skill certification, apprenticeship, etc. were covered in the various MDPs.
- establishing and strengthening a statistical network for collecting data on employment, wages, working hours, labour terms etc.
- achieving full employment not only in terms of reducing unemployment to a minimum (for example below 1.3%)[10] but also in terms of reducing underemployment and increasing the proportion of the economically active population, that is, to increase the labour force participation rate. Employment opportunities were to be created by accelerating capital formation rates.
- changing employment structure both by industry and by occupation sector-wise, the trend is to reduce the share of employment in agriculture and increase the proportion in industry and services. Occupational-wise, it is to increase the proportion of professional, technical and skilled workers.

[8]See 3rd MDP p 27.
[9]See 4th MDP p 41.
[10]See 6th MDP p 3.

Manpower Policy and Taiwan's Development

Human capital has been Taiwan's most important resource, and its utilisation has accelerated Taiwan's development. Studies in the history of developed countries revealed that the process of improving the knowledge, skill, and productivity of the workforce in a society were essential to the transition from traditional agrarian societies to societies exhibiting modern economic growth. This modern growth, as defined by Kuznets[11], started in England in the late eighteenth century and spread to Western Europe, North America and then Japan in the nineteenth century, is characterised by sustained high rates of economic growth based on advancing science and technology and the necessary institutions that they demand. As discussed in Chapter 2 people is important in the interplay between technology and institutions because the quality of manpower contributes to the effectiveness in the importation, absorption, dissemination and adaptation of technologies through institutions.

Since the end of World War II, Taiwan has been among the few NIEs that successfully caught up with its forerunners. This success, as discussed in Chapter 2, is attributable to many factors, but government policies in manpower development to support the development of science and technology at different stages of growth are *inter alia* the most instrumental. This section will examine the status and development of manpower policies and their role in Taiwan's different stages of developmental growth.

[11]Kuznets, S. 1979. 'Growth and Structural Shifts' in Galenson, W. (ed). *Economic Growth and Structural Change in Taiwan: The Postwar Economic of the Republic of China.*

Kuo *et al*[12] divided the post-war Taiwan development from 1952 to 1978, into two phases with the period before 1961 as inward import-substituting industrialisation phase and the period after 1961 as outward export expansion phase. However, for a closer review of Taiwan's post-war manpower policies and their effects on the employment market, this study will divide Taiwan's development into four stages.

Economic reconstruction stage (1945-1952)

This stage began in 1945 and was completed in 1952. This was a period of turmoil and instability for Taiwan. The Japanese surrender in 1945 was followed by the repatriation of the Japanese and the return of the island to the Nationalist Chinese. Four years later, the Nationalist lost the mainland to the Chinese Communists and sought retreat in Taiwan. With an annual inflation rate as high as 300%[13], the government's first mission was to find ways to accommodate millions of retreated government troops and refugees from the mainland. Therefore, during this period economic development focused on the quick repair of war-damaged infrastructures and the resumption of agricultural and industrial production in order to bring inflation under control and to stabilise the economy.

As an agricultural economy, the first step was to restore Taiwan's agriculture, the government assisted in returning displaced farmers to their land, thereby ensuring an adequate supply of agricultural labour. Other improvement measures such as in farming technologies and supply of fertilisers plus the later land reforms

[12]Kuo, S.W.Y. et al 1981. *The Taiwan Success Story,*
[13]Hwang, Y.D. 1991. *The Rise of New World Economic Power: Postwar Taiwan.*

soon regained Taiwan's agriculture production to its highest pre-war capacity.

The urban and rural industries, mostly were labour intensive, also began to develop to meet domestic needs and to substitute imports, generating many jobs. Constrained by inadequate financial and high skill manpower resources forced the government to carefully prioritise industrial development plan. Three industries were selected to be developed first, they were electrical power, textiles, and fertilisers. Other industries that experienced expansion during this period were flour processing, cement, oil refinery, paper, chemical, and steel. New industries built included sewing machine, bicycle, and electrical fan manufacturing.

During this rehabilitation stage, the government, limited by available resources, could do no more in restoring the agriculture and basic industries than other measures to improve the labour absorption rate, let alone any strategic manpower planning for better labour utilisation. The labour force expanded by 90,000 people annually within this period. About 30% of them were absorbed by agriculture, 20% by industry, and the rest 50% by the service sector.[14] According to available statistics agriculture employed the largest workforce and industry the least in 1946. By 1952 with the labour instensive industries started to grow, generating many jobs, agriculture employment began to decrease. Table 10.2 shows the percentage of workforce by sector at the beginning and end of the restoration stage.

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[14] *Taiwan Provincial Census Statistic Abstract, 1946; Taiwan Statistical Data Book,* various editions.

	Agriculture	Industry	Service	Total
1946	69.1%	6.1%	24.8%	100%
1952	56.1%	16.9%	27.0%	100%

Table 10.2 Employment by Sector (1946-1952)[15]

Taiwan successfully rebuilt its economy and began to industrialise by 1952. The manpower needed for the initial phase of industrialisation was supplied by the influx of mainlanders escaped to Taiwan. Among the mainlanders were administrators, entrepreneurs, engineers, technicians, and doctors - many of china's elite educated class. The government's role in regulating the supply and demand of workforce during this stage was not significant due to financial constraint.[16]

The stable growth stage (1953-1964)

In the second stage three consecutive four-year economic development plans were implemented. Economic aid from the United States resumed. Given the physical and organisational improvement of the environment infrastructure and the pervasive package of land reform the growth of the agricultural sector during these years was impressive. The real net domestic product of agricultural increased by 80% at an average rate of 5% a year. Total agricultural production rose by 78%.[17] Despite the substantial growth in agriculture between 1952 and 1964, rural underemployment was high. This led to farmers increasingly sought off-farm employment in the rapidly growing rural industrial sector.

[15] *Taiwan Provincial Census Statistic Abstract, 1946*; *Taiwan Statistical Data Book*, various editions.
[16] Kuo, S.W.Y. etal. *Op cit*
[17] Economic Planning Council. *Taiwan Statistical Data Book,* various editions.

The primary objective of Taiwan's policies in these years were export promotion and encouragement of investment in labour-intensive industries. A limited domestic market and lack of foreign exchange earnings induced the government to pursue an aggressive export-oriented economic policy in the late 1950s. The government awarded incentives to all industries to produce and invest, but the export industries received the most favourable treatment. As a result, industries, especially labour-intensive ones, expanded rapidly, created massive employment opportunities for the low-skilled including farmers migrating out from agriculture. Taiwan's industrial growth during 1952-64 was phenomenal - the industrial sector grew at an average annual rate of 11%. Most of this growth was the result of the emergence of the manufacturing subsector. Its share in net domestic product (NDP) grow from only 11% in 1952 to more than 20% in 1964.[18]

During this period manpower policies were diverse and lack of an integrated approach among various ministries in planning. There was no specific government organisation established to be responsible for manpower planning yet until 1964. Nevertheless, there were some achievements which included the formation of the Veteran Guidance Committee in 1954 to create job opportunities for the people returned from national services; the establishment of the China Productivity Centre in 1955 to provide management and supervisory training for middle grade administrators; and a number of in-house training centres set up within some public organisations.[19] But to the fast-growing private enterprise, poaching

[18] *Ibid.*
[19] See Chang, P.C. 1983. *Op cit.*

of skilled manpower from other employers was the common practice to solve the labour supply problem.

In examining the contents of the first four-year economic plan it is clear that one of its goals was to alleviate the unemployment problem. The second four-year plan essentially continued the program of the previous plan. The implementation of these two development plans helped develop a large number of light industries, to name a few: plywood, cement, glass, plastic products, and electronic product assembly. These industries together with the growing ones like textiles and food processing absorbed the abundance of labour relieving the unemployment problem. However, as economic development plans *per se* they listed only policies and measures to accelerate industrialisation for economic growth with manpower policy being rarely touched. With continuous industrial growth demand for properly trained manpower became imminent and to maintain a balance in the supply and demand of trained manpower requires manpower planning. It is under this circumstances that a group of technical educationalists formed the Taiwan Technical Occupation Investigation Committee to study the prevailing conditions of manpower demand.[20] The Committee intended to use the findings to assist in formulating educational development policies. But due to lack of concerted efforts from government organisations, no further follow up action was carried out after this study. As mentioned earlier in this Chapter it was until 1964, after the American adviser's recommendation, a manpower resource planning committee was founded to officially plan and co-ordinate manpower policies.

[20] Chang, P.C. 1983. *Op cit.*

The rapid growth stage (1965-1980)

This stage was marked by rigorous economic growth and Taiwan's economic independence from foreign aid. The island's domestic savings, business investments, and exports experienced an enormous growth after 1965. Through these developments Taiwan had attained a new structure capable of promoting accelerated growth, which did in fact occur in the 1970s. During this period, the economy averaged an annual growth rate of 9.9 %,[21] which put Taiwan as one of the few economies that had achieved an extremely high growth. Growth also took place in industries that employed higher technologies and demanded larger capital investments such as synthetic fibre, plastic materials, steel, machinery, automobile, and shipbuilding. The average annual industrial growth from 1965-1980 was at a record-setting rate of 15.6 %.[22] Since the stability and growth of most industries depended on the international pricing and supply of needed industrial materials and product components, and that the industrial sector already had the capability to produce the materials and components industry needed, the government in the 1970s started to promote the development of heavy and chemical industries. It was hoped that these industries would supply the island's industrial intermediaries. This move raised the curtain of a new phase of industrialisation: the development of heavy and chemical industries. The material production industries such as steel, copper, and aluminium, transportation industries such as shipbuilding, automobile, and motorcycle, the petro-chemical industries, and the machinery, motor, and electronic components industries had all experienced high growth in the 1970s.[23]

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[21]Averaged figure from *Taiwan Statistical Data Book,* various editions.
[22]*Ibid.*
[23]As reported by Hwang, Y.D. 1991. *Op cit.*

The oil crisis of the 1970s brought a blow to Taiwan's economic growth. The oil shortage of 1974 severely affected its growth, reducing the rate to a record-low of 1.1 %. The effect of this blow did not last long, the economic performance caught up very fast and Taiwan produced the highest economic growth record of an average annual rate of 13.9% between 1975 and 1977. Growth in industry topped all other sectors with an annual rate of 22.5 %.[24]

The fast industrial growth at the beginning of this stage soon saturated the domestic market and the continuous growth rushed industrialisation into the most prosperous export expansion period. As manufacturing accelerated, demand for labour and real wages continued to rise. Expansion in labour-absorbing industries, as well as service, created massive number of jobs. Between 1965 and 1975, employment in these two sectors increased by over 1.7 million[25], or 85% of the number employed in 1965. There was also a sharp increase in female labour participation during the period, with a rate rising from 22.6% in 1960 to 38.7% in 1980.[26]

Taiwan's labour intensive industry, after a period of rapid growth, gradually faced with a tight supply of labours and since the mid-sixties many job vacancies in the lower-paying sectors, such as the textiles and apparel industry, could never be easily filled.

During this stage of development, policy planners in Taiwan have realised the importance of manpower planning in industrialisation and the first Manpower Development Plan was formally promulgated

[24] *Ibid.*
[25]Figure derived from data in *Taiwan Statistical Data Book,* various editions.
[26]Hung, R. 1986. The Great U-Turn in Taiwan' in *Journal of Contemporary Asia* Vol 26 No.2.

in 1966 by the Executive Yuan. With a view to generally improve the quality of the people, 9-year free education was implemented in 1968. Faced with labour supply shortage, the government, besides formulated the first Manpower Development Plan, has also undertaken initiatives to promote immediate manpower policies to relief the problem. According to P.C. Chang, Director of the Manpower Planning Department, measures included

i. implementation of Junior High School Career Guidance Plan to help and encourage graduates from this sector of education who are not prepared to continue further education to enter employment in an orderly way;
ii. strengthening of the capacity of the public training centres and extending the training basic level manpower demanded by the industry;
iii. expansion of the social employment service to enhance industrial relation; and
iv. acceleration of agriculture automation to reduce the pressure on the demand of farmers.[27]

Four more Manpower Development Plans were formulated and implemented during this stage to supply necessary human resources demanded for economic development.

The steady growth stage (1981-1996)

As Taiwan entered the 1980s, there were new economic developments that might have affected manpower demand and

[27]Chang, P.C. 1985. *A Study of the Current Manpower Planning and Organisation.* Big Wave Publishing Co. Taipei. (In Chinese)

supply. The increasing protectionism in international markets, wages, and competition from other developing countries for Taiwan's market share of low cost manufacturing products forced Taiwan's industry to change. The government pursued an industrial upgrading policy to develop those industries which produced high value-added goods. With this changing emphasis, industrialisation in Taiwan began a new phase - the development of hi-tech industry. Information science, advance electronics, and aviation received particular attention from the government. In 1986 Taiwan has undergone substantial structural change in manufacturing. Using alterations in the pattern of trade over a period of time as a measure of structural change, we can see the direction of industrial shift. Table 10.3 shows the distribution of Taiwan's exports in 1970 and 1986.

Table 10.3 shows there has been considerable alteration in Taiwan's pattern of exporting. The share of primary products declined from 23.3% in 1970 to 8.7 percent in 1986. Also declining was the share of traditional light manufactures, particularly textiles and wood products, from 38.8% to 29.7% of exports. The industries in which the relative share of exports has increased are those in the high-skill light category. The share of exports accounted for by machinery rose from 15.8% to 24.8%. The export share of other industries almost doubled, as firms rapidly increased their exports of precision instruments, musical instruments, photographic equipment, etc.

	Percent of Total Exports	
	1970	1986
Heavy Manufactures	7.5	8.4
Iron and steel	3.5	1.4
Nonferrous metals	0.7	0.3
Chemical and plastics	2.4	2.8
Transportation equipment	0.9	3.9
High-Skill Light Manufactures	30.4	53.1
Machinery (non-electrical)	3.4	9.7
Electrical machinery	12.4	15.1
Metal products (non-electrical)	1.8	4.9
Other industries	12.8	23.4
Traditional Light Manufactures	38.8	29.7
Textiles	13.9	7.7
Wood products, paper	7.2	2.5
Rubber products	0.4	0.7
Leather products	0.4	0.6
Clothing, footwear	16.9	18.2
Primary Products	23.3	8.7

Table 10.3 Distribution of Taiwan's Export 1970 and 1986[28]

The structural change observed in Taiwan's industry during the 1980s hence can be characterised as a shift out of primary products and traditional light manufactures, into products that require skilled labour, but not a lot of capital. This shift continued into the 1990s, according to Hung,[29] between 1983 and 1992 heavy industries grew at an average annual rate of 9.8% and production in traditional light industries suffered a decline of 4% between 1987 and 1992. The number of manufacturing workers shrank by 438,000 between 1987 and 1991, 82% of whom were in the light industries. The rapidly growing service sector has been able to absorb the excess labour

[28]Source: UN Trade System as cited in Dollar, D. and Sokoloff, K. (1994) 'Industrial Policy in Taiwan and South Korea' in Aberbach, J. (Eds) *The Role of the State in Taiwan's Development.* M.E. Sharpe, New York.

[29]Hung, R. 1996. 'The Great U-Turn in Taiwan: Economic Restructuring and a Surge in Equality'. *Op cit.*

from the light industries. The employment share of the service sector increased from 38.0% in 1980 to 49.9% in 1994. Table 10.4 shows the sectoral employment share in 1980, 1985, 1990, and 1994.

	Agricultural %	Industrial %	Service %	Employed Number ('000)	Unemployment Rate %
1980	19.5	42.5	38.0	6,547	1.23
1985	17.5	41.6	41.0	7,428	2.90
1990	12.8	40.8	46.3	8,283	1.66
1994	10.9	39.2	49.9	8,939	1.56

Table 10.4. Sectoral Employment Share[30]

It can be seen from Table 10.4 that the labour market has been extremely tight, with unemployment rate only 1.56% in 1994. According to a Ministry of Economic 1988 survey, the main labour shortages were in the unskilled labour market, with junior high school, senior high school, and senior vocational high school graduates in the shortest supply.[31] In a study of Taiwan's labour shortages, Wu and Chang[32] repeated that there was a great demand for low-skilled workers in the 1980s.

The government's manpower policies, as reflected in the 6th to 9th Manpower Development Plans, during this stage of economic development were to adjust and improve technical and vocational education to ensure adequate supply of labour for the new

[30]Source: Various issues of *Taiwan Statistical Data Book*. CEPD, ROC.

[31]As reported by Fields, G.S. 1992. 'Living Standards, Labour Markets and Human Resources in Taiwan' in Rains, G. (Ed), *Taiwan: From Developing to Mature Economy*.

[32]Wu, H.L. and Chang, C.H. 1991. *A Study of the Labour Shortage and Foreign Workers in Taiwan.* Taipei: Chung-Hwa Institution for Economic Research. (In Chinese)

technology-intensive industries and to expand retraining programs to eliminate structural unemployment. Since the service sector has become the largest absorber of labour, training programs in such areas as tourism, international trade, retailing, and information processing were all targeted for expansion.

A review of the major supporting measures correspond to the manpower development policies during this stage shows

i) the ratio of enrolment between general senior high school and vocational senior high school was maintained at 3:7, which was in line with the target;

ii) three phases of the Plan for Improvement of Industrial Education were implemented to revise curricula for technical and vocational education and to upgrade the quality of teachers and equipment in vocational schools;

iii) in 1981, the Ministry of Interior formally established the Employment and Vocational Training Administration (EVTA) as the authority responsible for organising, planning, supervising and co-ordinating vocational training, skill testing, and employment services on a nation-wide base;

iv) the draft of 'Vocational Training Act' and the 2nd 'Act of strengthening Vocational Training' were passed and approved by the Legislative Yuan and Executive Yuan respectively in 1983 and 1986 to provide the EVTA a legal base to establish vocational training related systems.[33]

[33] Ministry of Education, *Education Statistics of the Replublic of China*, various years; council of Labour Affairs, *Employment and Vocational training Administration Annual Report*, various years.

Manpower policy summary

This Chapter has explored some of the relationships between Taiwan's economic development and manpower planning in the course of growth. To promote and sustain economic growth, improvement in productivity is essential. The effectiveness with which capital, technology, and natural resources are used depends on the efficiency of the workforce, which in turn depends on manpower planning and development. Taiwan is no longer a labour-surplus economy, and the pattern of demand changed along with different stages of industrialisation and structural changes in the economy. Of all those employed, the proportion with more than nine years of general or vocational education rose from 14% in 1968 to 26% in 1978 and to 34% in 1983[34] as more skill- and technology-intensive industries emerged. This proportion jumped to 51% in 1993[35] as industrial upgrading intensified. This meant that both manpower planning and educational and training programs have been strengthened to provide the workforce needed for the economic growth and restructuring in the past three decades. A number of basic policies have been formulated in response to the changing patterns of manpower demand. These included effective enforcement of the nine-year compulsory education program, improvement of the educational structure to ensure a higher proportion of senior vocational high school enrolment, expansion of training programs by specialised training centres and industry, improvement of teacher training, and upgrading of equipment and facilities for technical education and vocational training.

[34]Figures computed from *Manpower Indicators, Taiwan Republic of China 1994.*
[35]*Ibid*

CHAPTER 11

DEVELOPMENT OF TECHNICAL MANPOWER IN TAIWAN: PROVISION OF TECHNICAL EDUCATION

Introduction

It is very clear from the various Manpower Development Plan that education is a key element of the overall manpower policies in Taiwan and one of the instruments to push for economic growth. For example, the 7th Manpower Development Plan titled 'Middle and Long Term Manpower Plan for Economic Development in Taiwan: 1986 – 2000' specifically suggested, based upon economic consideration and human resource evaluations, that the Ministry of Education (MOE) should regulate the access, content, and structure of education in accordance with the type and amount of manpower needed for economic development.[1] Such manpower policies and the centralised administrative system have enabled the MOE to regulate access to education, and to achieve official targets on the number of students enrolled.

The intent of manpower planning is to effect better management of the labour market, and effective manpower planning is achieved only when the demand and supply for manpower is. In other words, whatever methods and assumptions are used for manpower forecasts, they can be of no use unless forecasts of the occupational structure can be translated into levels and types of education. This translation process involves educational planning and implementation which in the case of technical manpower

[1] See the 7th Manpower Development Plan. 1986, Council for Economic Planning and Development. Taiwan.

development are the responsibilities of the Department of Technological and Vocational Education of the Ministry of Education and the Employment and Vocational Training Administration (EVTA) of the Council of Labour Affairs. The different manpower development plans formulated from time to time, as discussed in the previous chapter, set the direction of educational development and enrolment quotas. They also establish indices for total expenditure on education as a proportion of GNP. From these, the various departments of the Ministry of Education and the EVTA would set fees and plan enrolment levels for the specific schools, both public and private, as well as the training centres, at all levels and types of education and training.

From 1966 onward, educational expansion in Taiwan was characterised by a strong shift to technical and vocational education and has been guided explicitly by manpower development plans. The first manpower development plan promulgated in 1966 began this trend by setting a target to change the enrolment ratio of vocational high school to general high school from 4 : 6 to 6 : 4.[2] This emphasis was continued in subsequent manpower development plans to expand all levels of technical and vocational education. Implementation of these plans required a strong and effective system of educational administration. Taiwan has established, by constitution, a unique administration system to direct and guide all areas of educational development, including technical and vocational education as well as industrial training.

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[2] 1st Manpower Development Plan. 1966. Council for Economic Planning and Development. Taiwan.

Technical and vocational education

Administration and finance

Taiwan's education system is highly centralised. The Ministry of Education (MOE) is responsible for education in Taiwan at all levels. Control is sometimes directly exercised by the MOE but in other cases it is delegated to other bodies. Because the Nationalist Government claims jurisdiction over the whole of China, Taiwan is governed as one province of the Republic of China and there is also a Taiwan Provincial Department of Education that functions under the direction of the Provincial Government (This Department was phased out with the abolition of Taiwan Province in 2000). There is also the Bureau of Education at the level of the counties, cities and special municipalities. Institutions which are directly controlled by the Central Government are officially referred to as 'national' institutions, while the term 'provincial' is officially applied to institutions under the supervision of the Provincial Government. Institutions under the control of cities are referred to as municipal institutions. Within the MOE are seven departments, five bureaus, four offices, one computer centre, and ten committees respectively in charge of planning and supervision of educational programs at various levels of administration.[3]

The administrative structure of TVE in Taiwan has three levels which are central, municipal, and local authorities. The central authority is the Department of Technological and Vocational Education under the Ministry of Education. The Department established four divisions to take charge of national TVE and to control and supervise colleges/universities of technology, national and private junior

[3] *Education Statistics of the Republic of China,* 1997. Ministry of Education, Taiwan.

colleges of technology and national vocational high schools. The Department also shares responsibility with the third division of the central-region office of the MOE, the first division of the Taipei Education Bureau and the Kaohsiung Education Bureau, together forming an organizational network for TVE in Taiwan. The third division of the central-region office is responsible for the supervision of national and private vocational high schools in the regions other than Taipei and Kaohsiung Cities. Likewise, the relevant divisions within the city governments of Taipei and Kaohsiung supervise TVE in municipal and private vocational high schools, and the local governments administer technical arts programs in junior high schools. The following Figure 11.1 shows Taiwan's administration system of technical and vocational education.

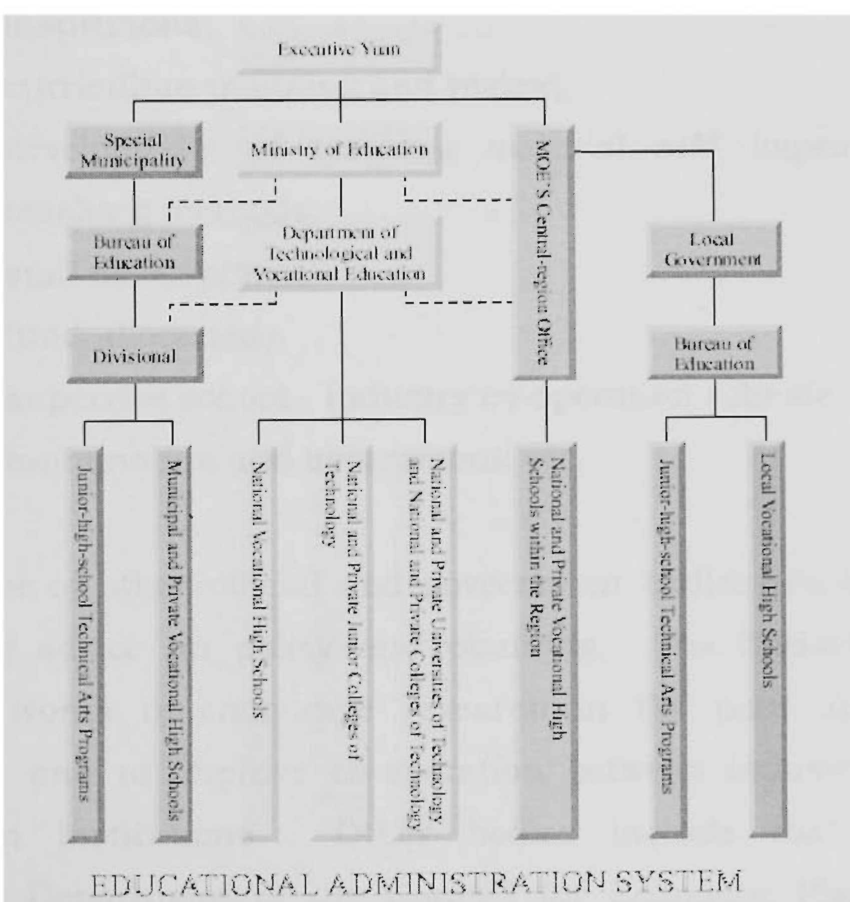

Figure 11.1 Educational Administration System of Technical and Vocational Education in Taiwan[4]

[4]Figure adapted from A *Brief Introduction to the Technological and Vocational Education of the Republic of China*, 2001. Taipei, Ministry of Education.

Within the Department of Technological and Vocational Education are four divisions charged with responsibilities such as:

- research, planning and development of technical and vocational education;
- implementation of various education plans;
- draft, amend, and expound laws and regulations of technical and vocational education;
- establishment of vocational schools; junior colleges, and institutes of technology;
- student enrolment (institutes of technology, junior colleges, and national senior vocational schools);
- approval and registration of boards of directors of private institutions;
- curriculum planning and review;
- development of teaching material and improvement of teaching methods;
- staff development;
- fund allocation;
- supervise school - industry co-operation scheme;
- examination and assessment; etc.

A number of other official and government bodies are involved in providing advice on policy and planning. The National Science Council works to encourage research in the pure and applied sciences, and to improve co-operation between industry and the education institutions. Other bodies include the Manpower Planning Department of the Council for Economic Planning and Development (responsible, *inter alia,* for advising on the co-ordination of manpower policies and education development program), the EVTA (advises on educational programs running in parallel to those training courses organised by EVTA), and various research institutes with expertise in scientific and industrial fields.

The funding of public senior vocational schools and junior colleges is controlled by the MOE, together with the appropriate provincial, municipal, city or county authority. Private vocational schools and junior colleges receive some financial support from the Government. Fees are charged by both public and private institutions set by the MOE. Tuition fees at private institutions are often three or four times higher than those at public institutions. Financial assistance is normally available to needy students. Teacher and academic staff salary scales for public institutions are also set by the MOE, and staff at private schools and colleges are paid at a similar level to their counterparts in the public system.

Taiwan maintains a reasonably high expenditure in education. The figure as a percentage in GNP has never stood below 4.5 since 1980 and in 1996 the figure was 6.95%.[5] By Constitution, each level of government in Taiwan is required to set aside not less than 35% of its budget for education, science, and culture. This expenditure requirement has been met by governments at all levels in past years. In an example cited by Kai,[6] in 1988 there were eight out of the twenty one municipal and county governments have spent over 50% of their budgets in education, science, and culture. Of the total expenditure on education in 1996, 7.99% (US$ 1,405.25m) was

[5] Source from *Education in the Republic of China.* Bureau of Statistics. Ministry of Education, 1997.
[6]Kai, J.S. 1993. *Education Economic and Planning*, Wu Nam Books, Taipei . (In Chinese)

devoted to senior vocational schooling, 6.79% (US$1,193.69m) to junior college education.[7]

Provision of Technical Education to Satisfy Manpower Needs in Different Phases of Development.

Over the past forty years, Taiwan has changed from a net importer, dealing mainly in agricultural goods, to a leading exporter of industrial products. Average annual per capita income has increased from under US$200 in the 1950s to over US$12,000 in the 1990s, and Taiwan has become the world's thirteenth largest trading nation, gaining considerable global prestige from this economic miracle.[8] Now Taiwan is one of the developed nations. Looking back into its path of development, it is not difficult to see how technical and vocational education has kept pace with national economic growth, industrial changes, social needs and technological advancement, by continuously adjusting to meet the real market demand of the workforce.

In the 1950s, when domestic production was still labour-intensive, provision of entry-level competency training at junior high school level ensured a sufficient supply of manpower to meet the demands. In the late 1960s, with production gradually becoming more skill-intensive, this system was abandoned as nationwide nine-year compulsory education came into effect. Senior vocational schools were developed and junior colleges were established to train entry-level and mid-level technicians and managers.

[7] Source from *Education Statistics of the Republic of China 1997*. Ministry of Education, Taipei. Currency exchange rate at 1US$=28.65NT$.
[8] Taiwan Statistical Data Book, various years.

By the early 1970s, the transition to a skill-intensive production economy was complete, and industry was moving into a capital-intensive phase. As a result, persons with higher level technical and managerial abilities were in great demand. It was at this time that the first institute of technology at university level was founded to give senior vocational school and junior college graduates opportunities for further education.

The following is a detailed examination of the different stages of technical and vocational education development in Taiwan with particular reference to the forces that shaped the changes and the authority's measures in response to these forces.

The improvement and expansion stage of the 1950s and 1960s

After relocation to Taiwan in 1949, the Nationalist Government after a short period of rehabilitating the economy of the island, started a series of economic development plans which bore significant influence in shaping the planning and provision of technical and vocational education during this period of time in Taiwan. Economic development strategies, as discussed in the previous Chapter, included

i) land reform to achieve rapid economic growth through the development of the agricultural sector;

ii) fostering the development of labour-intensive industries with the foreign exchange provided by the export of agricultural products;

iii) encouragement of industrial development with productions to substitute for imports.

The improvement of technical and vocational education was thus important to the supply of needed manpower for national economic development. The first Manpower Development Plan promulgated in 1966 with details of manpower forecast for the national need also provided strong guidance in shaping this form of human capital formation in the late 1960s. Perhaps the third 4-year Economic Development Plan initiated in 1961 can be used to illustrate the way the socio-economic system and the educational system have interacted to determine the direction and pace of progress. The objectives of the plan were to increase agricultural and industrial production, expand export trade, raise the national income, create employment opportunities, and to balance international receipts and payments. The education system was given the responsibility for preparing workers suited to the changing manpower requirements demanded by various fields of economic activities.

Another factor that was important to the development of senior vocational high school was the high unemployment among senior high school graduates. In the mid 1960s, the ratio of student enrolments between general high schools and vocational high schools was 6.4 to 3.6[9]. This meant that the majority of students at this level were in general stream. And since the places in universities and colleges were very limited, a great many senior high school graduates who could not pass the competitive joint matriculation examination were denied access to higher education. On the other hand, since they did not possess the skills needed for employment, they could not easily find jobs in the labour market.

[9] Chan, K.T. (ed), 1978. *China Yearbook 1978*. Taipei; China Publishing company.

This became the concern of the then Council for International Economic Co-operation and Development (CIECO). Trying to overcome the problem of under-utilisation of human resources, the Council sought a solution to the problem by organising two seminars on manpower development. Government officials, educators, and industrialists were invited to exchange views. They concluded that the development should be strengthened and that the ratio of students in general education to those in vocational education should gradually be adjusted[10]. This led to subsequent reform in senior vocational education to increase its share of student enrolment up to 70% of all the students receiving schooling at this level of education.

If what have discussed above were the forces that influenced the design and planning of technical and vocational education during this period of time, then the United States aid program would have paid a key role in helping Taiwan to establish a vocational education system and other support facilities. This system, as one can imagine, was based on the American model at that time. The U.S. aid to Taiwan during 1950-1965 made important contributions to the stabilisation of economy and subsequently to the successful implementation of development projects, including the 'Sino-American Industrial Vocational Education Co-operative Project' which had great impact in the restructuring of Taiwan's early vocational education system. During the period 1951-1965, the United States allocated a total aid of US$1,092 million to four sectors of Taiwan's economy.[11] Out of this amount, the equivalent of

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[10] On this, see the opening remarks in the Symposium sponsored by the Economic Development Board of Singapore on 10 April, 1991 by K.T. Li. (Li was the vice Chairman of CIECO and Minister of Economic Affairs in the mid 1960s. He became a Senior Adviser to the President of Taiwan in the 1990s).

[11] See Kao, Y.S. and Chuang, H.C. 1995, 'Utilization of U.S. Aid for Economic Growth and Human Resources Development in the Republic of China' in *Industry of Free China*. Oct.

more than $40 million was spent in primary, secondary, higher, professional, and vocational education.[12] In the field of technical and vocational education, American assistance was concentrated on teacher training, pilot demonstrations, and provision of equipment. Aid was provided to eight pilot industrial vocational higher schools and to twenty-six agricultural vocational high schools to train mechanics, technicians, and skilled workers for the economic development needs.

Having examined the background forces that influenced the planning and provision of technical and vocational education during this period, the nature of its development from 1949 is the central concern of the remainder of this section.

At the time the Nationalist Government retreated to Taiwan in 1949, there were three types of vocational schools – junior vocational school, senior vocational school, and junior/senior joint vocational school. Their development focus during this very early stage was to

- ensure the aim of junior vocational school was to produce entry level technicians and craftsmen. Skill training became the core of the curriculum.

- ensure the aim of senior vocational school was to cultivate middle level technicians. The curriculum covered both the basic theories and skill training.

Technical and vocational education was categorised at that time, according to occupation, into industrial vocational education,

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[12] *Ibid.*

agricultural vocational education, maritime vocational education, and home economic education. Development of each type will be examined.

Industrial vocational education

Reform in industrial vocational education began in 1952 when a short-term consultant team headed by Dr. S. Lewis Land from the Pennsylvania State University was invited to Taiwan to study the situation and to propose an orderly approach to improve technical and vocational education. The resulting report suggested plans to establish a teacher training institution for industrial education and to modernise the existing curricula of industrial vocational education.

Pursuant to the consultant team's recommendations, a contract financed by the U.S. aid was signed between the then Taiwan Teacher College (now the National Taiwan Normal University) and the Pennsylvania State University in February 1953 to establish one industrial education department and one home economic department at the Taiwan Teachers College. Pennsylvania State University provided advice and assistance to the planning and running of the teacher training programs.

With counterpart funding, two buildings were erected for the department of industrial education in three years. They provided floor space of about 35,000 square feet that offered drafting rooms, classrooms, offices, a library, a projection room, an exhibition room, a curriculum laboratory, conference rooms, and the following eight workshops: machine, electrical, wood-working, graphic arts, sheet metal, ceramics, home mechanics, and a general shop.[13] The establishment of this department was a breakthrough in Taiwan's history of technical and vocational education to make available a well planned program to train qualified teachers to teach in the industrial vocational high schools. C.S, Yung, the one time Director of the Department of Technological and Vocational Education, Ministry of Education remarked 'The establishment of this department marked a milestone in the history of vocational-technical education in the Republic of China [Taiwan]'.[14] Courses offered by this department included two-year and five-year programs for industrial arts teachers as well as one-year program for workshop teachers.

The most important function of technical and vocational education is to provide right kind of training to students that would enable them to find appropriate employment. Prior to 1953, due to unbalanced curriculum design and poor training facilities, industrial vocational school graduates were not much welcomed by employers. C.H. Lin, the principal of Taipei Municipal Vocational Senior High School at the time, pointed out in an article.[15]

> 'The aim of vocational senior high schools is to train skilled technicians but the curriculum pays too much emphasis on theories. There are too many technical subjects whose contents are far beyond the students' comprehension and lack of practicability. Besides, teaching facilities are

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[13] Details see International Economic Co-operation Development Council. 1964. *Evaluation on US Aid Education Projects.* Taipei, IECDC.
[14] Yung, C.S. and Welch, F.G. 1991. 'Vocational and technical education ' in Smith, D.C. (ed), *The Confucian Continuum: Educational Modernisation in Taiwan* (p239).
[15] See, Lin, Chin-huei, 1958. 'An Introduction to Taipei Municipal Vocational Senior High School ' in *Vocational Industrial Education*, June. (In Chinese)

> far too poor. Consequently, graduates fail to meet the requirement of the industry.'

To secure information on the manpower needs of the rising industrial sector, an all-island industrial occupational survey was conducted in February 1953 by the Normal University in collaboration with the Provincial Department of Education to investigate the need for skilled workers. This survey was assisted by the Pennsylvania State University team as part of the US aid project. Based on the findings of the survey and suggestion from the consultant team, a unit-trade training model was introduced to prepare industrial vocational students for entry-level jobs in single, specific trades or occupations to satisfy the employers need for skilled workers.

To promote the unit-trade training model, a curriculum laboratory was set up at the Taiwan Normal University to develop the course of study for such training based on an analysis of the trade to be taught. The content of the course was worked out and arranged in the order in which it could best be taught, using as many 'real world' examples as possible. Unit-trade courses for training machinists, electricians, radio mechanics, auto mechanics, carpenters, pattern makers, foundry men, plumbers, printers, and sheet metal workers were set up.

In 1955, eight industrial vocational schools including seven provincial schools (Hsinchu Senior Vocational high, Chiayi Senior Vocational High, Tainam Senior Vocational High, Kaohsiung Senior Vocational High, Hualien Senior Vocational High, Taichung Senior Vocational High, and Chenghua Senior Vocational High) and one municipal School (Taipei Municipal Senior Vocational High) were selected for the pilot implementation of the unit-trade training curriculum. The curriculum paid strong emphasis in the learning of practical skills of a related trade and was supplemented with relevant theories. The aim was to produce technicians for specific trades. To allow ample time for learning the skills, the practical hours were increased to not less than 15 hours per week on average.

As mentioned earlier, the schools were, however, severely handicapped by the shortage of training facilities. With the help of the Education Office of the International Co-operation Administration of the United States, the situation was improved in three years time. By 1958 US$841,800 was spent on equipment and tools, and NT$8,049,000 was provided to supplement the Taiwan Government appropriations for workshop construction and purchase of locally-made tools.[16] Thirty two teachers and administrators were sent for training in the U.S. and Japan for a period of nine months to one year to enable them to implement unit-trade curriculum in these schools.

Employers had shown more intimate concern about the new curriculum and the schools were getting better and better support from the general public. Closer co-ordination between vocational schools and the industry was built, and many factories and firms participating in the planning and occasionally provided direct assistance in the form of training material and experienced personnel to the schools. Seeing the effective instructional outcomes of the eight pilot schools, Taiwan began to implement an over-all industrial vocational education model for all senior vocational high schools – the adoption of the American originated unit-trade training system.

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[16] Kao, Y.S. and Chuang, H.C. 1985. *Op cit.*

To find a guide for further refinement, adjustment, and possible extension of training plans, the Taiwan Industrial Vocational Education and Training Committee was set up in 1958 to conduct a second occupational survey of the skilled and semi-skilled job market in the whole island. The Committee investigated in detail the nature of industry based on the aspects of skills and education required for the industrial manpower. Results of this survey confirmed the directions in implementing the unit-trade training system and consequently, the curriculum, course design, and facilities were improved and courses in furniture making, designing, drafting, and welding were added.

To meet the changing needs of skilled manpower demanded by the rapid growth of the industry in Taiwan's transformation from an agricultural economy to an export-oriented industrial economy, the Ministry of Education commissioned a full curriculum revision for all vocational schools in 1962. The revision process took two years to complete and in 1964 the Ministry was able to promulgate new curriculum standards for agricultural, industrial, commercial, fishery, nursing, midwifery, and home economics vocational schools.[17] To provide an extra avenue for elementary school leavers to study in vocational high schools, the Temporary Guidelines for the Establishment of Five-year Vocational High Schools was released in 1965 to found a number of senior vocational high schools to admit elementary school graduates for a five-year study program and junior high school leavers for a three year period of study. However, these schools enjoyed a very short life span and were abolished together with junior vocational schools in the fall of 1968 when the Legislative Yuan passed the 'Enforcement Ordinance for Nine-year

[17] Details see Institute of Modern History, Academia Sinica (ed). *A Chronology of the Curriculum Standards for Various Types of Vocational Schools Promulgated by the Ministry of Education.* (In Chinese)

National Education' to extend compulsory education through the junior high level.[18]

With regard to administration and national policy on technical and vocational education, two issues one worth mentioning. In May 1968 the Ministry of Education established the Department of Junior College and Vocational Education (renamed the Department of Technological and Vocational Education in 1973). This Department is the highest administrative authority responsible for technical and vocational education in Taiwan. Beginning in 1969, the Ministry of Education in response to the first two Manpower Development Plans' projection of the technical manpower needs for industrial development, gradually adjusted the ratio between the number of students in general high schools and the number in vocational schools. The enrolment in senior vocational school started to expand and outweighed the number of students in senior high schools the first time in 1976.[19]

Agricultural vocational education

More than 50% of the population of Taiwan were farmers and on average about 720,000 families depended on farming for a living in the 1950s. The agricultural vocational schools had to train 24,000 new farmers annually to satisfy the demand of labour force in agricultural activities.[20] This was a large figure as more than half of the working force in Taiwan during that time was engaged in farming work (1,780,900 out of 3,428,525).[21] It was, thus, very important to

[18] Ministry of Education (ed.) 1974. *The 4th Chronological Report of Education of the Republic of China.* Taipei, Chung Cheng Press. (In Chinese)
[19] Kao, Y.S. and Chuang, H.C. 1995. *Op cit.*
[20] US Technical Co-operation Education Projects in the Republic of China, 1959. *The Road to Tomorrow; A Progress Report.*
[21] Figure taken from *China Yearbook 1962-63.* Taipei: China Publishing Co.

train farmers knowledge and skills of modern farming so as to boost agricultural output to support the growth of industry. This was part of the national construction policy of the 1950s.

With financial aid from US amounted to US$1,500,000 and NT$10,000,000,[22] agricultural vocational education underwent major improvement during the period from 1953 to 1964. The curriculum was revised to emphasise comprehensive training in the knowledge of farming in general instead of specialising in a single area. The vocational subjects in junior agricultural school were simplified into courses in general agriculture, farm mechanics, and farm practice. At the senior level, schools were no longer divided into departments. The focus was again on general training with agronomy, horticulture, animal husbandry, forestry, processing of farm products, farm mechanics, and agricultural meteorology taught to all students. With improved equipment and facilities, teaching materials were developed to meet local needs and to be in step with seasonal changes. Throughout the course of study emphasis was placed on practical training in the school farms.[23] In 1954, twenty five agricultural vocational schools were selected as pilot schools to experiment with the new curriculum.[24]

To meet the need for a teacher training program, the Department of Agricultural Education was established in 1955 at the former provincial Taichung Agricultural College, now the National Chung Hsing University. It provided a four-year program of study to train competent agricultural teachers.

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[22] Kao, Y.S. and Chuang, H.C. 1995. *Op cit.*
[23] Lee, H.W. 1964. *Educational Development in Taiwan Under the Nationalist Government, 1945-1962.* University of Pittsburgh, unpublished PhD thesis.
[24] Ministry of Education. 1960. *Secondary Education in the Republic of China.*

During the mid-1960s, however, the economic structure of Taiwan reached a turning point. Industry had developed, the annual growth rate of agricultural production dropped to 5.7% in 1965-68 with trends of further drop.[25] And the total share of agricultural production in GDP dropped to 24.9% in the same period.[26] From 1964 to the early 1970s might be called the transitional stage from agriculture to industry, that is, the decline of agriculture amidst industrial boom. Before 1964 the agricultural sector always contributed a larger share than industry to total national production, but after 1964 this order was reversed.

Consequent to this structural change in the economy, young men and women were increasingly attracted to business and industry and no longer desired to study in agricultural vocational schools. To fully utilise the building and grounds, physical and human resources of the agricultural schools, the government began to convert some of these schools into agro-industrial schools in 1967. Five provincial agricultural vocational schools in Yilan, Taoyuen, Miaolip, Taitung and Yuenlin were selected for this pilot conversion.[27] More and more agricultural schools were converted into industrial schools afterwards.

Vocational education in other disciplines

Along with the development in industrial and agricultural education, significant development had also been made in fishery and maritime education and home economics education. In the fishery and maritime schools the government's effort had been concentrated on

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[25] Figure computed from various issues of *Taiwan Statistical Data Book*. CEPD, ROC.

[26] *Ibid.*

[27] Yuen, L.Q. 1983. *Technical Education.* Taipei, Three People Books Publication. (In Chinese)

improvement of educational equipment and facilities. A special fund was made in 1959 to purchase four new fishing boats for the three fishery vocational schools.[28] The Taiwan Provincial Maritime Junior College at Chilung (a fishing port at the northern part of the island) was responsible for training qualified teachers for these schools.

The greatest difficulty of home economic education in Taiwan in the early 1950s had been the shortages of qualified teachers and teaching resources. A 1957 survey showed that out of the 175 serving home economic teachers, only 12 of them had four-year college education.[29] In response to this evident need for better trained teachers, the Department of Home Economics established at the Taiwan Normal University in 1953 (received US aid in 1956 to improve teaching facilities and resources) started both full-time and part-time teacher training programs to prepare teachers for subjects such as food and nutrition, clothing and textiles, child care and development, home handicrafts, etc. The Department also co-operated with other agencies such as the Provincial Department of Education, the Joint Commission for Rural Reconstruction, farmers' associations, and women's associations to provide training for home economics extension workers.

Junior college education

For training middle-level technicians and managers and to provide further study opportunities for senior vocational school graduates, the junior college education was revised. A modern system of post-secondary technical and vocational education was established in 1960 when three-year junior colleges were started and funded by the

[28] Lee, H.W. *Op cit.*
[29] *Ibid.*

government as well as the private sector. These colleges were followed in 1963 by the establishment of five-year public junior colleges. These five-year colleges provided both technical and commercial programs for junior high school graduates (equivalent to grade 9 in Australia) to study at the first instance a three-year senior high school curriculum followed by a two-year junior college level curriculum. The five-year junior colleges soon gained public favour because they provided a continuous five year curriculum which could relieve students from taking a competitive college entrance examination. The National Kaohsiung Institute of Technology was one of the pioneer five-year colleges set up in 1963 to train middle level industrial and commercial personnel. During the period from 1963 to 1967, as the result of the government's policy in encouraging and facilitating the establishment of privately funded junior colleges, there were 9 private five-year junior colleges founded.

The end of the 1960s saw rapid expansion of junior college education. Number of colleges increased 5.6 times from 1961 to 1971 and student enrolment expanded 15 times at the same period. This expansion was the result of the implementation of the first and second Manpower Development Plans (MDPs) on the projected manpower requirement of junior colleges graduates from 1965-1972. The following Table 11.1 shows a break down of the supply and demand of junior college manpower as indicated by these two MDPs.

	1st MDP	2nd MDP
Period covered	1965-1969	1967-1972
	unit: person	unit: person
Projected manpower requirement[a]	42,400	88,000
(Industrial discipline)	(8,400)	(25,500)
Projected manpower supply[a,b]	41,400	67,000
(Industrial discipline)	(6,800)	(14,500)
Total short-fall	-1,000	-21,000
(Industrial discipline short-fall)	(-1,600)	(-11,000)

a. Aggregated number of all occupational disciplines

b. Based on the 1965 and 1967 educational statistics

Table 11.1 Break-down of Supply and Demand of Junior College Manpower 1965-1972[30]

The improvement and consolidation stage of the 1970s and 1980s

The 1970s and 1980s witnessed Taiwan's two economic growth stages, the rapid growth and steady growth periods, as discussed in the last Chapter. The bloom of manufacturing of labour intensive products like textiles, toys, and low-end electronics started in the 1960s continued and reached its peak in the 1970s. However, when Taiwan moved into the 1980s traditional labour-intensive industries began to stagnate and high-skill industries emerged. Since a country's economic growth is related to its labour market in the way that the demand for labour is derived from the demand for its products, this shift from labour intensive to capital/skill-intensive industries has been a directing force in formulating manpower

[30] Source of data from the 1st and 2nd MDPs. *Op cit.*

development plans which provided guidelines in the planning and provision of technical and vocational education in these two decades.

In 1973 Taiwan started its famous ten major national development projects. These large scale projects required an estimated technical workforce of 64,000 people. Of this workforce, 85% needed to be elementary level technicians, supplied through the vocational school sector.

There was a profound structural change in the economy during these two decades. The agricultural sector shrank from 33% in 1972 to 17% in 1986, while the industrial and services sectors expanded from 31.8% and 35.2% to 41.5% and 41.5% respectively during the same period.[31] Both had an impact on the manpower requirement, especially in the occupation types. Needless to say, this affected manpower planning and the education providers had to adjust the curriculum and intake enrolment to different courses of study to avoid mismatch.

Guided by these factors, the following were measures taken by the government to improve and consolidate the development of technical and vocational education during this stage.

Senior vocational school education

In response to the demand of the basic level technical workforce, the authority set top priority in developing this type of school by adjusting the enrolment ratio between senior high school and senior vocational school to 3:7 in 1980. To provide enough places in senior vocational schools to meet this ratio, some general schools were

[31] Figure from *Taiwan Statistical Data Book, 1995.*

converted to vocational schools and industrial courses were added to agricultural schools and even commercial schools.

As part of improvement measures, the Ministry of Education in 1976 conducted an evaluation on technical and vocational education. This was a comprehensive evaluation exercise to assess the efficiency of school administration and management as well as the effectiveness of teaching. Based on information gathered through this evaluation three three-year Plans for Improving Vocational Industrial Education were developed and implemented between 1980 and 1988. A total of NT$6.6 billions were spent to improve vocational industrial education programs.[32] As a result, old facilities were replaced by new ones, the senior vocational school curriculum was revised, and the quality of teaching staff has elevated.

In order to encourage students to learn by working, and to acquire real world practical experience as well as professional knowledge demanded by the industry, programs of co-operative education between designated industrial organisations and the schools that first implemented in 1969 were strengthened and further promoted in the 1980s.

With fast changing technology and product types, the unit-trade training curriculum that introduced in the 1950s proved to be not flexible enough to train graduates to meet the needs of employment market. Hence, in 1984 a new curriculum adopting a vocational cluster design concept was introduced to selected schools. Instead of streaming students into to study single trades, the new curriculum grouped the 32 unit trades into five clusters:

[32] Yung, C.S. and Welch, F.G. (1991). *Op cit.*

- mechanical engineering,
- electrical and electronics engineering,
- civil engineering and architecture,
- chemical engineering, and
- industrial arts.

Students study in the first year the common core skills and knowledge required by all the trades in a cluster to broaden their industrial understanding. In the second year of study, students choose two to three trades in the cluster for more specific and deeper study. In the final year, students further concentrate on only one trade of study to prepare them for employment. The aim of the cluster curriculum was to develop students' specific professional trade skills on a broad cross trades foundation to improve students' flexibility in seeking employment to meet the changing labour market demand. With satisfactory results from the trial, the cluster curriculum was officially implemented to all senior vocational schools in 1986.

As part of an effort to improve the quality of the workforce, the Ministry of Education put in place a program called 'Vocational Based National Education Extension' in 1983 to provide junior high school graduates, who were under 18 years of age and were not willing to pursue further high school study, two years of supplementary vocational training at senior vocational schools before joining the labour force.

In response to the changing emphases and to provide more flexible occupational choices for vocational education students, the Ministry of Education published a revised curriculum standards and guidelines for each area of study. The new curriculum implemented in 1986 for industrial and marine trades and in 1988 for agriculture, business, and home economics stressed a broader academic foundation and technical skill competency.

Junior college education

Up between 1973 and 1990, four distinct structures had been implemented to help fuel the burgeoning need for a well-trained technician level labour force. The five-year junior college combined a three-plus-two curriculum of three year of high school plus two year of college. The three year junior college was open to graduates of senior high schools. The two year junior college admitted graduates from senior vocational schools. The fourth category was that of evening programs leading to the junior college diploma. There were two programs – the three year program admitted senior high or senior vocational school graduates who had completed or been exempted from military service. The two-year program admitted senior high school graduates with 3 years' working experience or vocational high school graduates with one year working experience who had completed or been exempted from military service.

Junior colleges are classified into study fields of industry, agriculture, business, home economics, marine technology, pharmacology, nursing, medical technology, journalism, etc. To supply the right type of middle level technician for Taiwan's industry to move towards technology-based production in the 1980s, the majority of junior colleges are in industrial field with over 60% of total junior college enrolment studying science and technology related programs.[33] To satisfy the demand from industries set up at different geographical locations, flexibility in course design was

[33] Yung, C.S. and Welch, F.G. 1991. *Op cit.*

approved by the Ministry of Education for a few institutions to offer programs that addressed local needs. These programs included metallurgical engineering, tool and die making, power and mechanical engineering, industrial design, and food processing.

Until 1974, students pursuing junior college education, were in effect, enrolled in a terminal program. Apart from a few who could afford to seek study opportunities abroad after graduation, the remaining would join the work force. With a view to meet the social demand in the provision of an articulated system for technical and vocational education in the island, the government established the National Taiwan Institute of Technology in 1974. This university level institute offers two-year degree programs to junior college graduates and four-year degree programs to senior vocational school graduates. Since then, technical and vocational education in Taiwan has been integrated into one articulated system: Senior vocational school ⟶ junior college ⟶ institute of technology.

The structural adjustment stage of the 1990s

In moving into the 1990s, Taiwan's technical and vocational education system faced challenges from two directions. One was from the changing society, given the sustained growth in national income, parents were more able to support their children for further education beyond high school level than two decades ago. They demanded more educational opportunities for senior vocational school and junior college graduates. The society was not satisfied with the student articulation ratio among senior vocational school, junior college, and institute of technology to be 100:20:0.6.[34] Such a

[34] Data source from the National Institute of Educational Information (ed), 1994. *An Evaluation Study of the Development of Technical and Vocational Education in Taiwan.* (In Chinese)

narrow passage to high education could never met with the students' increasing desire for further studies. Rise in the standard of living has also brought a rise in aspiration from students and their families. Students in the 1990s view work-related education in a different light from students two decades ago.

At the beginning of the 1990s, educational reform movements and reports have mushroomed in Taiwan.[35] As a main track running parallel to general education, technical and vocational education has been certainly affected by claims made by these movements and reports. These reform aims related to technical and vocational education include:

i) One year practical skills training should be added to the nine-year compulsory education for junior high school graduates who decided not to continue their education.
ii) The ratio between the number of enrolment at senior vocational schools and senior high schools should be adjusted form 7:3 to 1:1.
iii) More junior colleges and institutes of technology or universities of technology should be established to provide senior vocational school and junior college graduates with more opportunities for advanced study.

Secondary technical and vocational education that has undergone rapid expansion in the last three decades was criticised for its oversupply in terms of the number of schools and students. It has completed its main mission of occupational preparation education.

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[35] See for examples, the Report made by the 410 Educational Reform Alliance in April, 1994 and the later MOE's white paper *Educational Report of the Republic of Chine on Taiwan* published in January, 1995.

There were voices calling for downsizing of this form of high school education.[36]

The second challenge came from Taiwan's aim to move from newly industrialised status to that of fully developed status. The 1991 Six-year Economic Development Plan and the 1993 'Chen-Hsing Ching-Chi Fan-On' (the Economic Stimulus Plan) called for an investment of NT2.7 trillion dollars (US$108 billion) in the area of transportation and telecommunication. The plan also called for investment of US$303 billion to revitalise the island's industry. Emerging industries such as telecommunication, information products, consumer electronics, semi-conductors, precision and automation equipment, aeronautics, advanced material, special chemicals and medicines, and environmental protection will be given special attention. In her pursuit to become the Regional Operational Centre and Advanced Technology Centre of the Asian Pacific in the year 2000, Taiwan needed to, as indicated by the 9th Manpower Development Plan, re-focus its technical and vocational education development to supply the necessary human capital demanded by this stage of National development.

Attempting to articulate national development with educational development and to satisfy the social demand in reforming education, the authority has adopted the following courses of action:

1. Readjustment of the technical and vocational education system to broaden the avenue to further study The student ratio of the 3-tier system (the senior vocational, junior college, and institute of technology) would be improved. It was planned by the year of 2000 the percentage of the student number in each tier of the

[36] *Ibid.*

system would become 63.38% (senior vocational school); 26.16% (junior college); and 10.45% (institute of technology).[37] To achieve this goal more junior colleges would be built year by year. For example four junior colleges *viz* Huafan College of Technology, Chung-Hua Polytechnic institute, Dai-Yeh College of Technology, and Kaohsiung Polytechnic Institute were established in 1990 to provide two-year programs for vocational school graduates. Three-year junior colleges because of their blurred educational function that overlapped with universities were phased out in 1996. These colleges were either upgraded to university level institutes or transformed to become two-year junior colleges depending on whether they had met the basic

requirements of campus area, faculties, equipment and funds as set by the Ministry of Education. There were ten public and private colleges involved in the restructuring process which included National Taipei institute of Technology, Ping Tung Junior College of Agriculture, Ming Chuan College, Tam Sui Junior College of Industry and Commercial Management, Taiwan Junior College of Nursing Technology and other five colleges offering non-industrial study programs.[38] It was planned that upgrading of these colleges together with the newly established ones, such as the National Yunlin Institute of Technology and the National Institute of Technology at Kaohsiung, would be able to improve the avenues to furthering studies. Most of the upgraded institutions were also required to offer junior college programs in parallel to degree programs in a

[37] Figures quoted from Tsong-Ming Lin (Director, Department of Technological and Vocational Education, MOE), 1994. The current system and prospect of technological vocational education in the Republic of China. Paper presented to the 9th Technological and Vocational Education Conference, Yunlin, Taiwan.
[38] *Ibid.*

manner similar to some of the CAE-turned universities in Australia.

To make technical and vocational education more flexible, the Ministry of Education has started formulating new ordinances on the governance of institute of technology and vocational schools to allow universities run industrial programs for senior vocational school graduates. The Ministry of Education also planned to allow some junior colleges to co-operate with universities in running two-year in-service degree programs for junior college graduates. Selected senior vocational schools would also be allowed to set up junior college sections within the school premises.

Because of the expected increase in the demand for advanced technologists and decrease in the demand for basic technicians due to industrial upgrading, the number of vocational school students were set to decrease with years, from 68% of all students at senior high level in 1990 to 60% in 2000.[39] This downsizing of senior high school level vocational education was also a response to the voice of those educational reform groups.

Flowing from the idea of institutionalising a more flexible technical and vocational education system in the island, a new type of high school, comprehensive high school, began to burgeon. This type of school provides students with occupational-, general-, and academic-oriented pathways. In 1996, 18 senior high and vocational schools took part in a pilot conversion to become comprehensive high schools. This type of school combined vocational and academic programs, enabling

[39] *Ibid.*

students to select from a much wider range of courses before deciding on either the academic or vocational tracks. This broadens the knowledge base of the students prior to selection between the two tracks. Besides academic subject, various technical courses are provided for students taking skilled trades and semiprofessional careers. Graduates may enter the labour market or take the joint entrance examination for colleges, universities/institutes of technology, or two-year colleges.

2. Updating of curriculum structure and renewal of teaching facilities - to produce the human resources needed for high value-added and high-tech industrial development, and for establishing Taiwan as the Regional Operational Centre in the Asian Pacific, the Ministry of Education has taken measures to update the curriculum of different levels of study aiming at producing graduates with knowledge and skill in research and development, quality assurance, automation, environmental protection, foreign languages, finance, transportation, telecommunication, information technology, and international business.[40]

   In regard to curriculum planning, institutes of technology were given full autonomy, in similar status as universities, to plan their own curricula. While junior colleges were allowed 40% of the total curricula to be planned by individual colleges. However, at the senior vocational school level in order to ensure a uniform standard across the island the Ministry of Education still exercised direct control in the revision and finalisation of curricula. Working committees comprising members from

[40] Ministry of Education· 1995, *Educational report of the Republic of China in Taiwan.* Chapter 5. Taipei, Taiwan.

various sectors of technical and vocational education were set up in 1994 to fully review the goals, contents, and teaching hours of the curricula of all areas of study. Fully revised credit-based curricula were finalised in summer 1996 and implemented in the 1997 school year.

One criterion of judging the quality of technical and vocational education is the availability of updated equipment and training facilities. To maintain the quality of equipment and facilities, public schools receive direct funding as part of the annual budget from the government to upkeep and renew them. Since 1979 private schools were also allocated funds to purchase important equipment and in the past two decades, NT$1,234 million had been granted to private industrial and vocational schools to improve their teaching facilities.[41] To enhance the teaching of courses that required expansive sophisticated instruments, the Ministry of Education has planned to establish centrally maintained centres of sophisticated and precision instruments for students from different schools to use in turns. This would improve the teaching effectiveness without causing maintenance problem to individual schools.

3. Improvement of teachers' practical skills – As the expansion of technical and vocational education in the past three decades has been faster than that of the teacher training institution, there was a great shortage of qualified teachers. Many of the teaching positions were occupied by unqualified teachers with very little practical skills in the fields they were teaching. Consequently they were incapable of passing on technical skills to students

[41] Tsong-Ming Lin. 1994. *Op cit.*

that were demanded by the employers. To improve the situation, the Ministry of Education has taken steps to

- co-ordinate with the Employment and Vocational Training Administration to organise technical skills certification for teachers. By passing relevant trade tests teachers will be awarded licentiate practitioner status in designated trades and professions.
- organise practical study classes and on-site industrial practice for teachers. Special arrangements have been made to allow teachers to be seconded to the industry for a considerable period of time to acquire updated practical experience.
- design new teacher training programs to be operated inside some institute of technologies to provide better practical training opportunities for intending and servicing technical teachers.

To summarise this stage of development, it can be seen that technical and vocational education in Taiwan is now going through a critical period of transition, the authority is gradually moving from a planning-directed to a more market-oriented approach in developing this type of education to adapted to social needs as well as predicted changes in worldwide trends.

What the Figures Say

The development of technical and vocational education in the past four decades in Taiwan and the forces that shaped its policy and development have been discussed in detail, however, without the support of citing real figures, the whole story of growth cannot be revealed. This section will examine the quantitative growth of technical and vocational education in the three stages of development discussed before.

The 1950s and 1960s

In order to meet the growing need for skilled manpower in business and industry, efforts have been made to open new senior vocational high schools as well as to expand existing ones. It is in this respect that the most impressive gains have been registered in entry level technical education during the 1950s and 1960s. Table 11.2 presents the number of schools/colleges and student enrolment in the technical and vocational education system from 1950-1969.

		Senior Vocational School		Junior College	
		School No.	Student No.	College No.	Student No.
1950-	Private	5	861	1	374
1951	Total	77	11,226	3	1,286
1955-	Private	10	2,765	1	992
1956	Total	95	21,186	5	4,545
1960-	Private	24	10,564	6	2,854
1961	Total	109	44,617	12	7,888
1965-	Private	41	23,208	20	18,022
1966	Total	130	74,114	35	29,534
1969-	Private	63	63,702	49	70,149
1970	Total	141	137,642	69	95,988

Table 11.2 School Number and Student Enrolment by Institutional Types, 1950-1969[42]

During these twenty years, senior vocational school enrolment increased twelve times with figures doubled each five years. Junior

[42] Table compiled with data adapted from *Education Statistics of the Republic of China, 1997.* Ministry of Education.

college enrolment also underwent a huge growth. The number increased 746 times from 1950 to 1969. A phenomenal expansion was recorded at the late 1960s due to great demand of this level of manpower by the industry and business when the industrial sector took over the agricultural sector as the major contributor to the GNP.

The 1970s and 1980s

The number of schools/colleges and student enrolment continued to grow during these two decades. Table 11.3 shows a break-down of school/college and student numbers of technical and vocational education from 1970-1989.

		Senior Vocational School		Junior College		Institute of Technology	
		School No.	Student No.	College No.	Student No.	Institute No.	Student No.*
1970-	Private	70	89,154	50	79,882	-	-
1971	Total	146	175,650	70	108,328	-	-
1975-	Private	101	163,372	56	110,527	0	0
1976	Total	177	282,415	76	150,226	1	850
1980-	Private	110	205,634	56	140,292	0	0
1981	Total	191	349,138	77	183,134	1	1,900
1985-	Private	113	255,298	56	181,178	0	0
1986	Total	201	421,784	77	236,824	1	2,076
1989-	Private	120	259,445	62	243,690	0	0
1990	Total	214	438,140	75	293,204	1	3,857

*Undergraduate students only

Table 11.3 School Number and Student Enrolment by Institutional Type, 1970-1989[43]

[43] Table compiled with data adapted from *Education Statistics of the Republic of China, 1997,* and *Education Statistical Indicators, Republic of China, 1997.* both published by the Ministry of Education, Taiwan.

Figures showed significant growth in all types technical and vocational education during the 1970s and 1980s. To meet the labour market demanded by the expanding industrial and service sectors as well as the ten national development projects that took place in the 1970s, Senior vocational student number doubled from 175,650 in 1970 to 349,138 in 1980 and the growth rate slowed down in the 1980s especially in the late 1980s while Taiwan began industrial upgrading leading to a higher demand for technologists than entry level technicians. On the other hand, junior college student number grew slower in the 1970s at an average annual figure of 7,480 and more rapid in the 1980s at an average annual figure of 12,230. In response to social demand and to train higher level manpower for the emerging technology-based industry, the first institute of technology was established in the mid-1970s enrolling 850 students and this number was increased four times in the late 1980s to satisfy the increasing demand.

The 1990s

As discussed previously Taiwan has started industrial restructuring in the late 1980s. The pace toward high-skilled, technology intensive industries has been taking place throughout this stage. The more toward high value-added industry and sophisticated commercial and business services has succeeded reasonably well. In response to the high-level manpower required for this industrial up-grading, the authority started to regulate the pattern of technical and vocational education provision. The following Table 11.4 shows the growth pattern of this type of education from 1990 to 1996.

		Senior Vocational School		Junior College		Institute of Technology	
		School No.	Student No.	College No.	Student No.	Institute No.	Student No.
1990-	Private	121	271,006	62	264,500	-	-
1991	Total	216	449,111	75	315,169	1	4,036*
1994-	Private	111	333,064	59	318,571	-	-
1995	Total	206	523,982	72	378,860	6	13,908#
1995-	Private	107	332,512	58	330,291	-	-
1996	Total	203	523,412	74	394,751	10	30,806#

*Undergraduate student only

#All students

Table 11.4 School Number and Student Enrolment by Institutional Type 1990-1995[44]

Figures showed a steady growth of student number in Junior College and a fast growth in both institution and student number in the university level Institute of Technology. On the other hand, due to factors discussed earlier, senior vocational schools after three decades of rapid growth reached its peak level in 1994 with a total enrolment of 523,982 started to decline in 1995.

Curriculum planning and development

Administration and the development process

In Taiwan, curricula for senior vocational schools and junior colleges are standardised and promulgated by the Ministry of Education. Curricula are revised approximately every ten years by the Ministry. The general steps adopted to develop and revise curricula are as follows:

44 *Ibid.*

1. Drafting of a curriculum revision proposal.
2. Establishment of a curriculum revision committee with membership comprising TEVT administrators, teacher educators, teachers and curriculum specialists.
3. Formation of curriculum drafting task forces, which include
   a) a general principles task force, in charge of drafting instructional goals, courses, the offering sequence and teaching hours for each program, and
   b) a research and design task force, in charge of drafting revision principles, a curriculum standard framework, revision models, etc.
4. Drafting of syllabuses for every course.
5. Revision and refinement of drafted curricula.
6. Promulgation and implementation.

Five Ministry funded curriculum development centres have been established in affiliation with four national institutes of technology and a national comprehensive university to be responsible for curriculum design, review and development. These five centres respectively look after the following trade areas:

- Industrial studies.
- Business studies.
- Home-economics and agricultural studies.
- Nursing studies.
- Marine studies.

The following Table 11.5 shows levels of the curriculum development process and their respective responsible bodies.

Level	Development Process	Responsible Body
I	Comprehensive framework	Committee organised by the Ministry of Education
II	Division of trade areas (eg Business, Industrial)	Committees organised by one of the curriculum development centre
III	Program development (eg Accounting, Electronics)	Committees organised by one of the curriculum development centre
IV	Subject development (eg English, Introduction to Circuit Board Design)	Co-opted representatives from various trades (invited by program level committees)

Table 11.5 Levels of Curriculum Development in Taiwan

Curriculum structure

Senior vocational schools

According to the official 'Curriculum Guidelines', the curriculum for senior vocational schools is structured as follows:[45]

<u>Part 1 – Compulsory general subjects</u>
Including Chinese, English, Social Studies and others, taking up 27-40% of total class contact hours.

<u>Part 2 – Compulsory technical subjects</u>
Including (i) Fundamental subjects such as Physics and Introduction to Computers, taking up 6-19% of total class

[45] Hwang, J.J. and Lee, L.S. 1996. 'The construction of guidelines for revising senior vocational school curriculum' in *Educational Research and Information.* Vol 4, No 2. (In Chinese)

contact hours; (ii) Major technical subjects (Theory and Practice), taking up 33-60% of total class contact hours.

Part 3 – Elective subjects

This group of subjects take up 4-16% of total class contact hours.

Part 4 – Common activities

These activities take up 5-6% of total class contact hours.

To meet with the skills demanded by the increasingly technology- and knowledge-based industry, the senior vocational school curriculum was revised in 1996. The new curriculum was aimed to strengthen students' basic academic skills to equip them with higher flexibility of adapting to changes in their future employment. A greater number of jobs in Taiwan now require higher cognitive and affective skills to handle than psychomotor skills. This suggests that the curriculum has to be changed from traditional vocationalism of preparing individuals for low-skill, low-wage employment to new vocationalism of preparing individuals for high-skill, high-wage employment.

Junior colleges

According to the official 'Curriculum Guidelines' implemented in 1995, junior college courses are divided into the following three categories:

1. Common courses, including four clusters *viz* Languages, Social Studies, Mathematics and Sciences.
2. Specialised fundamental courses such as Economics.

3. Specialised core courses such as Financial Management.

A minimum of 220 credits is required for graduation from five-year colleges and 80 credits is the minimal requirement at two-year junior colleges. The weighting distribution of these courses in the college curriculum is shown in the following Table 11.6.

Program	Graduation Requirement	Course Category			
		Common	Fundamental	Core	School-Based
5-year	220 credits (100%)	68 credits (30.9%)	20 credits (9.1%)	52 credits (23%)	80 credits (36.4%)
2-year	80 credits (100%)	20 credits (25%)	6 credits (7.5%)	24 credits (30%)	30 credits (37.5%)

Table 11.6 Curriculum Structure of Junior Colleges

Control of curriculum and textbooks

It is obvious from the curriculum development process that Taiwan has adopted a top-down approach in planning and reviewing curricula for senior vocational schools and junior colleges. In fact, curriculum development at all levels of education in the island, public or private, is centrally administered. Schools and colleges have to observe the official 'Curriculum Guidelines' promulgated by the Ministry of Education which specifically mandate teaching hours, methods, goals, textbooks and objectives of each subject taught.

In sequel to the recent appeal for educational reform, 4-year universities and colleges are now allowed to design their own curriculum. And at the senior vocational school level, schools are also allowed certain degree of freedom to develop their own curriculum. These schools are now permitted to design school-based subjects up to 15-35% of total curriculum to suit demands from local industry and business. This indicates that the Taiwan authority has undertaken measures to improve the flexibility of its technical and vocational education system to provide people with a broad-based training to meet the industry's demand for adaptable workers. Hence, it can be seen that Taiwan is moving closer towards a more flexible education and manpower provision system as depicted by Example 'B' in Figure 4.5 of Chapter 4.

Just as the planning of curricula is centrally controlled and administered, so also is the preparation of textbooks. The textbooks are standardised and published by the National Institute of Compilation and Translation. The compilation of textbooks in each subject area has to follow and fulfill the specific 'subject goals' set up in the respective Curriculum Guidelines. The Institute organises sub-committees and working parties to develop major core subjects such as Chinese and Civics. Textbooks in technical and vocational areas are normally compiled by individuals or by committees organised by the publishers, but the manuscripts have to be screened by eminent scholars in the relevant fields through the Institute before publication.

CHAPTER 12

DEVLOPMENT OF TECHNICAL MANPOWER IN TAIWAN: PROVISION OF VOCATIONAL TRAINING

Introduction

Vocational/Industrial training builds workers' skills and meets skill needs of employees in the context of a simple company, occupation, or industry. Vocational/Industrial Training is a way of human capital formation and has been used to complement vocational and technical education in Taiwan to develop the right type of workforce demanded by the labour market. Vocational and technical education in Taiwan is given in schools or classes and is conducted to prepare individuals for gainful employment as semiskilled or skilled workers or technicians or paraprofessionals in a range of occupations or to prepare individuals for enrolment in more advanced studies. It is part of the formal education system and as though its curriculum is structured round general studies in languages, mathematics, sciences, liberal study in addition to specialised studies. While vocational/industrial training is normally conducted in a training centre or at the workplace to improve the employability of the trainee in the current job market or to raise the productivity of the employee at work. Since vocational/industrial training aims to enable immediate employment or to introduce skills rightly needed for improving productivity, the form and content of training must be able to keep pace with or even in advance of the rapidly changing technology in order to produce a workforce equipped with the right kind of skills at the right time of the labour market. This Chapter will review the development of vocational training in Taiwan from the

1950s and examine how policies formulated by the authority have matched with the changing economic and social needs.

Administration and Organization

In order to develop skilled manpower, upgrade manpower quality, adjust manpower supply and demand, promote full employment, and to establish an occupation certification system, the Employment and Vocational Training Administration (EVTA) was founded under the Ministry of Interior in 1981 according to the revised organisation statute of the Ministry of Interior. EVTA assumes the responsibilities of organising, planning, supervising and co-ordinating vocational training, skill testing and employment services nationally. EVTA was transferred from the Ministry of Interior to the newly established Council of Labour Affairs under the Executive Yuan.

After four decades of development vocational and industrial training in Taiwan has formed a unique system along side with technical and vocational education. The scope of training provided by this system included institute-based, enterprise-based, and special training for the disabled. The following Figure 12.1 illustrates the scope of the present training system in Taiwan.

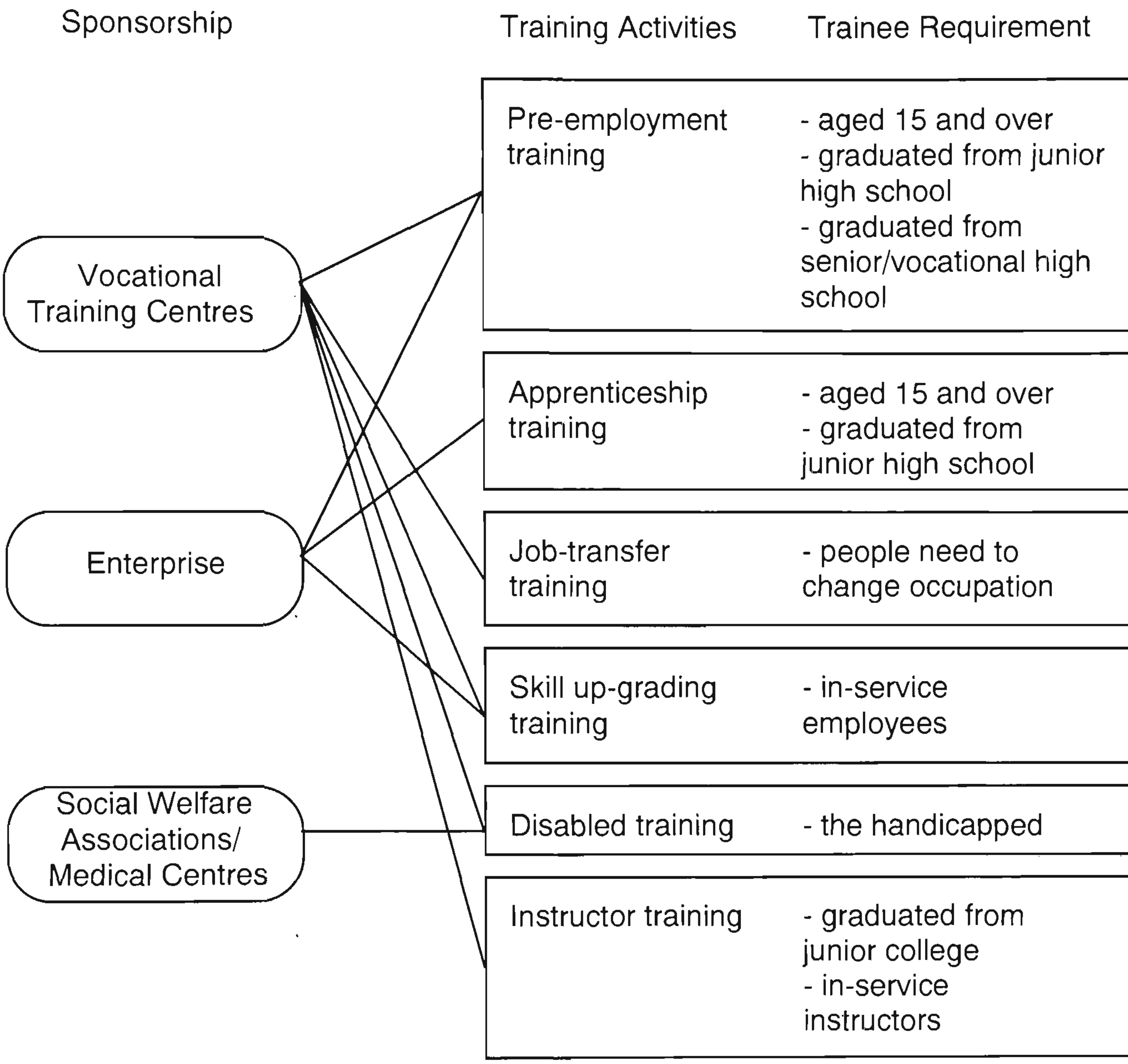

Figure 12.1 Vocational Training System in Taiwan[1]

To oversee proper functioning of the system, the EVTA was organised into the structure as shown in Figure 12.2 to

- plan and promote vocational training, skill testing, and employment services.

[1] Figure adapted from *Employment and Vocational Training Administration*, 1989 Published by EVTA, Taipei.

- register vocational training programs conducted by private enterprise.

- prepare annual budget for vocational training and related activities.

- administer training centres.

- appraise the qualification of trainers and professional staff engaged in vocational training.

- develop curriculum and approve training standards as well as training materials for vocational training programs.

- supervise and administer skill tests and issue certificates.

- supervise vocational training programs conducted by private enterprise.

- sponsor the national vocational training competitions and participate in the international vocational training competitions.

- provide employment services through the establishment of the Employment Service Centres.[2]

[2] Adapted from the second clause of the Organisational Statute of EVTA.

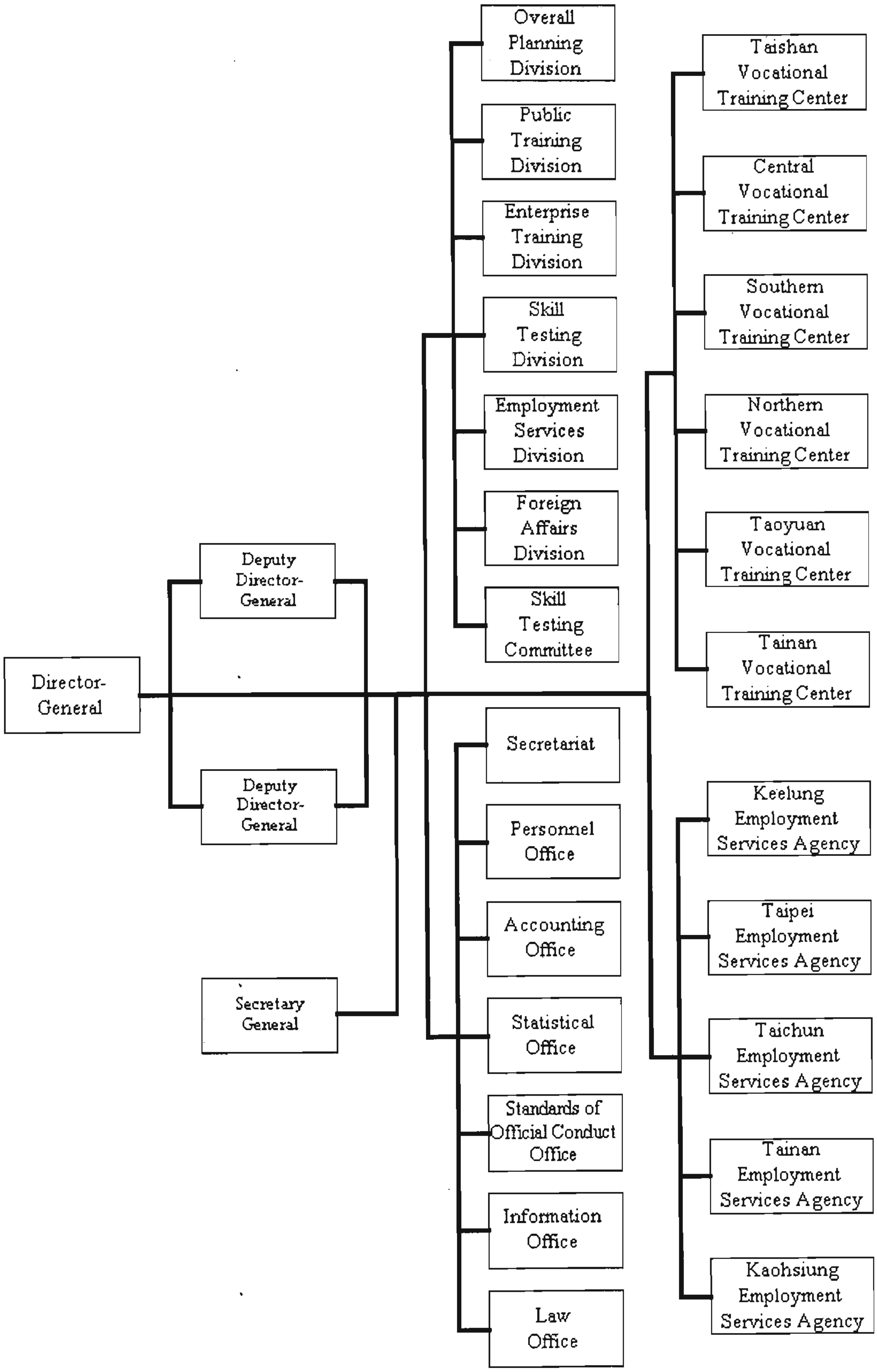

Figure 12.2 Organisational Chart of EVTA[3]

[3] Figure adapted from *Employment and Vocational Training Administration. Op Cit.*

A Review of the Development of Vocational Training in Taiwan

Unlike technical and vocational education which has a long history of development in Taiwan, vocational and industrial training has only been officially conducted in the past two decades in response to the labour shortage needs in the various stages of economic development. According to T.L. Pang, a senior official of the Manpower Planning Division of the Executive Yuan, development of vocational and industrial training in Taiwan can be divided into four different stages.[4]

From 1952 to 1965

This was the stage of development before any clear and proper government policy was formulated. Training programs were organised and offered by the government and private sectors separately to address individual needs. There were no overall planning and co-ordination in training provisions. Most of the training was organised and conducted by public organisations with strong emphasis on administrative and supervisor training. Limited enterprise training was found in larger companies to train their own journeymen, craftsmen, and semi-skilled workers. To cope with the increasing demand of skilled worker from the emerging labour-intensive industries and to encourage the private sector to set up enterprise training, eight training centres were established by the government with assistance from the United Nation and the U.S.A. With limited training capacity, these centres offered training in the

[4] Pang, T.L. 1989. *Theory and Practice of Manpower Development.* The Three People Book Company, Taipei. (In Chinese)

areas of industrial, agricultural, automobile technology, and metal technology to school leavers and adult workers. Training provisions burgeoned at that time were more of demonstration nature then having real functions in regulating the labour market needs.

From 1966 to 1975

As discussed in Chapter 10, Taiwan began manpower planning in the mid-1960s to cope with the rapidly growing industries. It was against this background that the first Manpower Development Plan had provided some guidelines for the authority to formulate objectives and policies on vocational and industrial training. Significant training schemes put into effect during the first part of this stage included:

- the set up of the Industrial and Vocational Training Association to assist the government to plan for a training system, formulate training purviews, improve training materials and methods;

- the promotion of a new form of apprenticeship training which integrated education and skill training together to help enterprise cultivate high quality technicians and craftsmen in the long run;

- the organisation of nation wide skill competition to stimulate young men and women to improve skill standards;

- the conduct of skill certification to facilitate employment and to provide an alternate means assessing the students graduating from the vocational education system;

- the establishment of the Southern and Northern Vocational Training Centres in 1969 and an automobile training centre in 1970. These training centres began offering a full range of training courses to school leavers and working adults.

Faced with the rapid industrial growth in the late 1960s and the early 1970s, the educational system was unable to supply the technical manpower demanded by the labour market. To increase manpower supply and to provide training opportunities for the growing number of junior high school graduates who were not able to continue study in senior high schools, there was a need to expand the entire training system throughout. It was against this background that the Training Levy Act was promulgated in 1972 to enable the government to establish a vocational training fund. This legislation stipulated that firms in the manufacturing, constructions, mining, energy, and transportation sectors were required to contribute to the fund an amount equal to 1.5% of their wages bill. Under the supervision of relevant government agencies a board of trustees was organised by the trade associations of various industries to apportion the fund among them accordingly. Supported by this training fund, more and more workplace type training was set up to train in-house employees. Moreover, this training fund had also contributed timely to training the technical manpower needed by the ten national development projects taking place at that time. These projects had played a very important role in Taiwan's economic modernisation and in raising its capabilities for further growth and development. Unfortunately, the economic recession, as the aftermath of the 1974 oil crisis, had forced the government to cease this training levy at the end of 1974. The termination of the Training Levy Act also ended a stage of vocational training in Taiwan but paved a way to another more mature stage of development.

From 1976 to 1983

Without financial support from the training fund, both the private and public training were affected. Most of the training programs offered by the enterprise and the public institutions could not continue. To satisfy the great demand of skilled manpower by the industry and to raise the productivity of the workforce for the planned industrial restructuring, the Executive Yuan established in 1976, the Professional and Vocational Training Unit to oversee and co-ordinate all the training programs organised by public institutions.

In 1977 the Executive Yuan further promulgated the Vocational Training Implementation Five Year Plan to

- support ten public training organisations by providing them with direct funding from government annual budget. These organisations offered vocational training for entry level craftsmen.

- strengthen in-service instructor training in order to improve the quality of instruction.

- set up a system for skill certification and vocational counseling.

- conduct annual vocational training needs assessment to gather information for the planning of training provisions.

Thus, after two years of inactive period vocational training in Taiwan continued its growth again.

In 1981 the statutory Employment and Vocational Training Administration was found within the Ministry of Interior to assume overall responsibility of vocational training in the island. Three months after the inception of EVTA, the Executive Yuan announced Phase 1 of the Vocational Training Strengthening Working Scheme to bridge up the Implementation plan. The aim was to produce the foundation technical manpower demanded by the revised 4-Year Economic Development Plan. The scheme was successful in

- expanding the capacity of vocational training, regulating training categories, setting training institutions a target of producing 10,000 basic craftsmen and 15,000 skill workers for the enterprise each year.

- improving training standards to provide training for high level technicians to meet the demand for structural up-grading.

- building up a vocational training system and infrastructure in the island.

To provide the EVTA a statutory standing in developing and overseeing an effective vocational training system in the island, the Vocational Training Act was promulgated on 5th of December 1983.[5] Related regulations and statues were published at the same time for related agencies to observe. In terms of training capacity, 12 specialised vocational training institutions had expanded their facilities to accommodate about 7,000 trainees, up from 5,309

[5] *Employment and Vocational Training Administration. Op Cit.*

previously.[6] A new training program for precision machinists, jointly sponsored by the EVTA and Philips Corporation of the Netherlands, commenced in September 1983. This was a new mode of co-operation between enterprise and training institutions to provide up-dated training opportunities in advanced areas of technology.

From 1984 to 1996

With all foundation and statutory work completed during the last stage of development, Taiwan eventually established a unique vocational training system. The system

- provides five different types of training, *viz.*
    - pre-employment training to cater for people aged over 15 and are graduates from either junior high schools or senior/vocational high schools. Training aims to equip trainees with specific skills to enter employment,
    - apprenticeship training to admit junior high school graduates aged 15 or over for one to three years of in-house on the job-training. Apprentices study at training institutions to receive theoretical and related knowledge. An apprenticeship certificate will be awarded to those who have successfully completed the training indenture.
    - skill up-grading training to provide in-service workers opportunities to refine or master new skills when new technologies are introduced. These are normally short-term training programs,
    - job-transfer training to those people in the workforce who need to change occupation. Trainees take up short-term

[6] Djang, T.K. 1991. 'Survey Report: Republic of China' in *Industrial Relation and Labour Management Consultation Asian Experiences.* Asian Productivity Organisation, Tokyo.

  courses in which basic skills and knowledge for new occupations will be introduced,
  - training for the disabled.

- established a public training structure to plan, compile budgets, and implement training programs. In 1986, training programs in 77 occupation categories were offered through 13 public institutions of which
  - 4 were administered directly by the EVTA,
  - 1 was administered by the Youth Counseling Association of the Executive Yuan,
  - 1 was administered by the Veterans' Counseling Association,
  - 4 were administered by Provincial and Municipal Councils, and
  - 2 were ran by charity organisations.

- promotes enterprise training by
  - assisting companies to establish training departments,
  - assisting Guilds of different trades to organise training programs for their members,
  - co-ordinating programs of co-operative education mounted between designated industrial organisations and senior vocational schools,
  - introducing new training methodologies successfully adopted by overseas highly regarded enterprises, and
  - organising enterprise training promotion campaign activities.

- established a set of national skill testing and occupational certification procedures.

To strengthen and further develop the training system, Phases 2 and 3 of the Vocational Training Strengthening Working Scheme were promulgated in 1986 and 1992 respectively by the Executive Yuan. These Working Schemes set out detailed procedures for the EVTA to evaluate public training, supervise public training organisations to formulate mid-term development plans, develop training curriculum and facility standards, prepare instructional materials, and strengthen the co-ordination of training across different sectors.

This period also saw the joint venture type advanced skill training continued to develop. An electrical-electronic technician program, jointly sponsored by the EVTA and Siemens Corporation of West Germany was set up in 1985.

In order to meet the current and future demands of industry, the following measures were put in place to provide the right types of training:[7]

i) Constant updating of training types – to keep in pace with skills required by the structural up-grading of the industry, specialised planning committees were established to assist public training institutions to organise localised training programs satisfying needs of emerging skill-intensive industries in different demographic locations.

ii) Close co-ordination with educational change - with over 85% of junior high school graduates able to continue senior high or senior vocational high schools, co-ordination between the EVTA and the Provincial Education Departments was set up to revise the contents

[7] Council for Economic Planning and Development, 1991. *An Evaluation Report on the Implementation of the Mid- and Long-term Manpower Development Plan.*

of the training programs that were originally planned for junior high school leavers. New programs were designed to provide more advanced and specialised training opportunities to meet the demand of senior high school graduates, especially those from senior vocational schools. At the same time, technician apprenticeship training schemes were strengthened to incorporate skill-intensive specialisations such as precision machining, industrial electronics, electro-mechanical engineering, etc. The aim was to attract more senior high schools graduates to join the scheme.

iii) Introduction of industrial automation and related training programs – as part of Taiwan's technological up-grading since the mid 1980s, industrial automation has become increasingly popular in various sectors of the industry. Employees engaged with industrial automation must possess knowledge and skills in information technology. To meet the demand, the EVTA has formulated guidelines to assist the training institutions to plan and develop training programs in automation and related information technology to produce qualified technician for the industry. Programs in computer literacy were also developed for semi-skillful workers employed by professions that required computer knowledge. From 1983 to 1990, there were 15 programs in production automation conducted and a total of 30,093 people received training. Since 1991, the training was expanded to industrial automation to cover the manufacturing industry, construction industry and commerce.

iv) Introduction of enterprise commissioned training – to satisfy the need of regional industrial development, those training institutions under the aegis of EVTA had strengthened all skill enhancement and job transfer training programs for servicing employees. In addition to these in-service training, the four EVTA training centres also run training classes directly commissioned by the industry and other organisations. The following Table 12.1 shows some examples of commissioned training in 1992 and 1993.

Nature of Training	Places	Commissioned by	Run by
Cold Forging	7	Taiwan Plastic Heavy Industries Co.	Northern Training Centre
Basic Language	60	Keelung Municipal Government	Northern Training Centre
Argon Arc Welding	20	China Ship Building Co.	Northern Training Centre
Carbon Dioxide Welding	17	Lung Te Co.	Northern Training Centre
Computer-aided Drafting	14	Harbour Affair Bureau	Northern Training Centre
Electro Instrumental Control	6	Du Pont Chemical	Southern Training Centre
Electronic Repairing	16	Taiwan Machinery	Southern Training Centre
Metal Finishing and Treatment	10	Military Cadet Group	Southern Training Centre

Table 12.1 Examples of Commissioned Training[8]

[8] Table compiled with data taken from *EVTA Annual Report 1993.*

Manpower for high value-added industries

Besides providing industrial training to satisfy the general demands of industry, the Taiwan government also played an active role in influencing the demand for those skills which are required to move into the next phase of economic development.

With an aim to provide training for skills that are required for high value-added industries in Taiwan's planned industrial up-grading, the Industrial Development Bureau of the Ministry of Economic Affairs commenced a five-year manpower training plan for industrial technology in 1990. With information stated in an evaluation report to the implementation of the plan,[9] the government allocated 1,500 millions NT dollar to fund this plan. The plan was implemented from 1990 and lasted for five years. The objectives of the plan were to provide:

- pre-service training for college graduates in science and engineering. The aim was to equip them with the required work skills in areas of high value-added industries as early as possible.

- in-service training for engineers in work. The aim was to polish their knowledge and skills so as to raise the technology standard of the whole industry in which they were employed.

- job-transfer training for engineers employed in traditional industries. The aim was to teach them new knowledge and

[9] Industrial Development Bureau, MOEA. 1992. *Long-Term Evaluation of the Industrial Technology Personnel Training Plan: The Evaluation Report on Its Implementation in 1991*. Taiwan Institute of Economic Research.

skills required in new areas of industrial development so as to enable them to transfer to new jobs.

In 1991, there were 30 programs in 7 different categories of training provided under this 5-year training plan. Table 12.2 shows details of programs offered.

Training Items	Training Organised By
1. Product Quality Improvement	
a. Implementation of GMP System in pharmaceutical industry A	Pharmaceutical Guild of Taiwan
b. Implementation of GMP System in pharmaceutical industry B	Association of Pharmaceutical Development
c. Lost wax casting and foundry products	Association of Powder Metallurgy
d. Food products	Food Research Institute
e. Total quality assurance	China Productivity Centre
f. High-tech manufacturing	Metalworking Centre
2. Industrial Design	
a. Footwear manufacturing 1	China Productivity Centre
b. Footwear manufacturing 2	Guild of Footwear Manufacturers
c. Footwear manufacturing 3	United Technical College
d. Automobile structural and system design	Chung Wei Centre
e. Commercialisation of industrial products design	Cheng Kung University and Taipei Institute of Technology
f. Electro-lighting technology	Self-Strengthening Society
g. Application of artificial intelligence	Capital Strategic Society
g. Electronic components and semi-conductor design	Self-Strengthening Society

3. Production Automation Training	
a. Electro-mechanical system integration planning	Industrial Research Institute, Taiwan
b. Industrial computerisation planning and software application design	Capital Strategic Society
c. The Five-year Industrial Automation Training Plan study	Taiwan Institute of Technology
4. Industrial Production	
a. Paper production technology	Guild of Paper Production
b. Bio-technology training	Bio-tech Development Centre
c. Synthetic dyeing and colouring technology	Guild of Dyeing and Colouring
d. Printing technology	Guild of Printing Industry
e. Special purpose chemical product making technology	Self-Strengthening Society
f. Compound material production technology	Self-Strengthening Society
g. Rubber technology	Rubber Research and Testing Centre
h. Leather production technology	Pin Tung Agricultural College
i. Plastic technology	Plastic Development Association
5. Industrial Pollution Prevention	
a. Industrial pollution prevention	Hsing Ling Industrial Research Centre
b. Food processing sewerage treatment	Guild of Aquatic Products
6. Enterprise Founding Plan 1 and 2	Best Strategy Management Consultant Company
7. Industrial Technology Personnel Training Plan Evaluation	Taiwan Institute of Economic Research

Table 12.2. The 1991 Program of the 5-year Industrial Technology Personnel Training Plan, Ministry of Economic Affairs[10]

During the year of 1991 the Industrial Development Bureau injected NT $114 millions into the operation of all these 30 training

[10] *Ibid.*

programs. These programs totally trained 20,333 people. Training programs were offered by chosen higher institutions, Guilds of trades, professional associations, and private enterprise under the auspices of the Bureau. There were a total of 299 classes held in

1991 with the largest enrolment in the area of Production Automation and smallest enrolment in the area of Industrial Pollution Prevention.

The implementation of this 5-year Industrial Technology Personnel Training Plan was an example of how the Taiwan government had played an active role in influencing the demand for labour and co-ordinating as well as supplementing the work of the EVTA in the supply of educated and trained personnel in order to meet the current and future needs of industry.

From mid 1990s onward in order to accommodate the social and economic development further training initiatives were put in place by the EVTA. These included:

Training of hi-tech professionals for knowledge-based economic activities — A training scheme aimed at college graduates whose major area study are in other disciplines to receive training in the identified hi-tech areas which Taiwan is moving into. These areas included information software, bio-technology, aeronautical study, semi-conductor production, multi-media technology, communication technology and pharmaceutical processes. In 1999, 1.1 billion NT$ was spent in running training programs in these areas which provided 3,800 enrollments. The objective of this scheme is to engender the required hi-tech, knowledge-based professionals for Taiwan to become an Island of Science and Technology, as well as to achieve the Asian Pacific Regional Operation Centre status.

Grant subsidy for approved enterprise-based training — To encourage and support enterprise to establish work-based training facility. Organisations offering in-house training programs are eligible to seek grant subsidy up to NT$ 100,000 for any EVTA approved programs.

Provision of training vouchers — To assist those non-voluntarily unemployed to be trained for new jobs, training vouchers are provided for them to purchase training from a range of accredited courses run by private providers. Participants in this scheme will be subsidised up to NT$ 10,000 a month for six months.

Implementation of competency-based training — a plan was drawn up in 1998 to implement competency-based training in the Island. Subsequent work in analysing competency requirements in various trades, compiling training materials, developing instructional media, training of the trainers and trialing of the plan were made ready for 100 different professions.

SECTION

V

Conclusions and Postscript

CHAPTER 13

DISCUSSIONS AND CONCLUSIONS

The research problem recapitulated

After examining in detail the development of technical human capital in the two leading Newly Industrialised Asian Economies, Hong Kong and Taiwan, the next step is to consider whether their case studies do embody a model of skill formation as hypothesised in the research problem of this thesis.

This research proposed that Hong Kong and Taiwan have adopted a skill formation model to develop technical manpower for economic transformation since World War II. This model provides institutions and mechanisms to link skill formation policy closely to specific stages of economic development. The important features of this model are restated here, to facilitate the drawing together of concluding remarks:

i) There are clear mechanisms which ensure that the manpower requirement of the existing and future industries are used to guide the development of the education and training system.

ii) The government has strong control over the education and training system which ensures a fast response to changes in the skill demands of industries.

iii) Changes in the education and training system are closely linked to changes in the economy.

The Hong Kong case

As we have seen, Hong Kong developed in the context of an explicit ideology of non-intervention by the government. Apart from providing a basic infrastructure, imposing ground rules and legislative framework within which market forces are allowed to operate, the government did not play the same role as in Taiwan in establishing industries and shaping the economy. However, even guided by this ideology of non-intervention, the government did undertake some interventions in certain key areas. In the formation of technical manpower, it has adopted measures to set up a system of technical education and vocational training (TEVT) to develop the skills demanded by various sectors of the economy.

In short, Hong Kong's philosophy of education and training derives from an approach that is both interventionist and liberal on the part of the authorities. It is interventionist in the sense that, by comparing manpower surveys with vacancy statistics, it provides manpower forecasts of industries and professions. The public technical education and vocational training system is responsible for implementing programs to better adjust supply and demand in the labour market. The approach has remained quite liberal. The system remains open to any future training needs by firms, who are neither induced nor constrained to use it.

The development of TEVT in Hong Kong when analysed in the framework of state theory as discussed in Chapter 3 revealed that before the mid-1970s, in particular during the initial stage of industrialisation and skill formation, the state operated largely in accordance with the notion of the 'positive non-intervention' philosophy which it espoused. Education and training were primarily delivered through the market with the government restricting its activities to the provision of a legal framework, efficient administration and the basic infrastructure required for commercial operations and initial industrial growth. However, even in this stage of supposed laissez-faire, the government also intervened to varying extents in other important areas. In the field of training, it did established an advisory committee and help the construction and clothing industries set up their own training systems, financed by a levy on their members.

During later phase of development, particularly after the mid-1970s, there were more and more occasions showing the changing role of government towards a developmental state. This was no where more evident than in its response to the problem of skill shortages and task of upgrading the skills of the labour force. If the future of Hong Kong's future was in diversifying the economy and moving into higher value-added forms of production, then it was clear that only the government was in a position to move quickly enough to develop an appropriate skill infrastructure. After unsuccessful attempts to persuade the social partners (employers) to run training for their workers, the government recognised that it had to take up responsibility. The establishment of the Vocational Training Council and public training centres was a good examples of the government's direct involvement. Moreover, while there was never any industrial policy or strategy, there was at least a consensus about the direction in which the economy needed to go, as illustrated by the highly influential 1979 Report of the Advisory Committee on Diversification.

To what extent does Hong Kong approximate the first feature of the proposed model?

Given the Hong Kong government's firm commitment to its positive non-intervention ideology, there was no official attempt to influence economic activities and hence there were no clearly articulated macro level trade and industry policies to co-ordinate. Therefore, unlike Taiwan where there is a powerful cabinet level Council for Economic Planning and Development to merge manpower and industrial development policies, Hong Kong relies on the market to provide the signals about the trend of economic development.

It was within this scope that a system of education and training was established and operated in a more loosely manner. Within this system each of the constituent mechanisms was to ensure its operation did effectively key into the overall needs of the economy. As reviewed in Chapters 4 and 6, the mechanisms of the education and training system consisted of:

- the Education Commission;
- the Education and Manpower Branch; and
- the Vocational Training Council.

The Education Commission and the Education and Manpower Branch are powerful bodies. The Education Commission, constituted by representatives from the government, education, industry, and business sectors (albeit in its advisory role) does have a significant influence on the formulation of public policy in this area.

The Education and Manpower Branch, a department within the Government Secretariat, formulates and reviews education policy, secures funds in the government budget, liaises with the Legislative Council on educational issues, and oversees the effective implementation of educational programs. This Branch also conducts manpower projection studies at macro levels from time to time to provide statistical projections of manpower supply and requirements by educational level for the purpose of assessing whether, under current and planned education and training provisions, the mix of manpower supply in terms of educational levels will be broadly in line with the future needs of the economy.

In the more specific field of TEVT, my findings show that the government plays multiple roles. It is, first and foremost, the policy-maker, in the sense that it sets goals and objectives, provides appropriate guidance for the program, and receives advice from the relevant bodies or individuals. Secondly, the government is also the 'resources provider'. It secures and allocates the necessary funds for the programs. Thirdly, it acts as the 'supervisor' by ensuring that activities of the various delivery agencies are implemented in accordance with relevant public policies and priorities, and that public resources are used cost-effectively. Finally, the government also takes up the responsibility of 'law-making' and 'regulating'. It provides the necessary legislative framework through the introduction of relevant laws for the imposition of training levies for the Construction Industry and Clothing Industry and it appoints the two related statutory training authorities.

The role of the Vocational Training Council is to collect manpower information and assess the training needs based on findings of biennial manpower surveys, recommend to the government regarding allocation of necessary resources, implement education and training programs, and assess and evaluate the performance of institutions that implement the programs. As discussed in Chapter 7, the work of the Council is assisted by a group of training boards and general committees which focus on the respective industrial or commercial sectors. With the delegated power from the Vocational Training Council, they become the decision-making bodies of vocational training in the various sectors of the economy. Regarding the composition of these training boards and general committees, there are no members who are directly selected and appointed by the government, except those who directly represent related government departments. The majority of members are nominated by key trade associations and business organisations such as the Hong Kong General Chamber of Commerce, the Chinese Manufacturers Association of Hong Kong and the Federation of Hong Kong Industries. Associations of foreign investors, like the American Chamber of Commerce, are also included. As discussed in Chapter11 of this thesis, Hung, in an investigation of types of members for all the training boards and general committees, found that members nominated by these trade and business associations represented 44.5% of the total membership.[1] These groups of members provide important forums for various training boards and general committees to collect views and feedback on current and future development trends of various industry and business sectors. Based on these market signals

[1] Hung, H. 1998. 'A study of the decision-making bodies of the Vocational Training Council in Hong Kong' in *Journal of Vocational Education and Training.* Vol 50, No 1.

and findings from the biannual manpower surveys, respective training boards and general committees are able to determine the manpower estimates for their sector and to make recommendations on how these needs should be met.

With close formal and informal linkage between the membership of the Education Commission, the Education and Manpower Branch, the Vocational Training Council, and government departments, consensus on policy and decision can normally be sustained. Thus, it can be said that the Hong Kong government has developed sophisticated mechanisms to ensure the market requirement of the existing and future industries are used to guide the development of the education and training system to enable it to respond rapidly to changes in the skills required by the economy.

To what extent does Hong Kong approximate the second feature of the proposed model?

TEVT in Hong Kong is planned, designed and implemented in accordance with the policy determined by the government. The work of formulating such a policy is primarily the responsibility of the Education and Manpower Branch. The official objectives of the policy is to put in place a comprehensive system of technical education and vocational training which is suited to the developing needs of Hong Kong.

As examined in Chapter 7, technical education was first introduced and directly administered by a technical education division within the Education Department of the Hong Kong Government. Given the rapid industrialisation and diversification in the 1970s, skill shortages became apparent and it was under this pressure the Vocational Training Council was created in 1982 by the government to oversee all aspects of manpower policy, including industrial training. The main thrust of the policy, given the large manufacturing base at that time, was to create an new infrastructure which would ensure an outflow of young people trained in transferable occupational skills to satisfy demands from the changing industries. Both the Education Department and the Vocational Training Council are public authorities funded by the government, the government is therefore able to maintain firm control over the provision of technological institutes, the curriculum, and the type of subjects taught. Provision of higher technical education was expanded with the establishment of two polytechnics in the 1970s and 1980s to meet the requirements of the emerging knowledge-intensive industries. Again, the government has high control over the enrolment and type of subjects taught at these two institutes through the University and Polytechnic Grant Committee.

The Vocational Training Council provided a highly centralised system of government funded TEVT which linked both technical education and training provisions closely to the demands of the economy. Throughout the 1980s and 1990s, the Council on both fronts has delivered a fairly comprehensive public system of skill formation up to intermediate level. Moreover, putting both technical education and industrial training under the control of a simple statutory and autonomous body – the Vocational Training Council, has created a highly flexible system that is capable of producing quick results. Within this flexible system are mechanisms to ensure that manpower projections responded rapidly to demands in the market.

Thus, there are clear findings to support the claim that the Hong Kong Government has strong control over the education and training systems which ensures a fast response to changes in the skill demands of industries.

To what extent does Hong Kong approximate the third feature of the proposed model?

What my analysis has revealed is that in the initial phase of industrialisation and skill formation, the government operated largely in accordance with its proclaimed ideology of 'non-intervention'. However, in the provision of TEVT the situation was different. Findings from Chapter 7 showed that there were growing government involvement in the expansion of manpower training and education.

The government has undertaken initiatives to formulate policies on the development and provision of TEVT to respond to the different phases of economic and structural transformation. Recognising the increasing importance of Hong Kong as a manufacturing and industrial centre, the government as early as in 1951 set up a Technical Education and Vocational Training Investigating Committee to collect information about the facilities available in Hong Kong and to obtain evidence about future requirements. Reports prepared by this Committee led to extensions of the old Hong Kong Technical College, the seeding institution which supplied the intermediate level technical manpower for the light-industry bloom in the 1950s and 1960s, and the establishment of the Standing Committee on Technical Education and Vocational Training in 1954.

The mid-1960s saw the rapid expansion in the manufacturing sector, particularly in the textile, garment, and plastic industries. In response to the manpower demand for the industrialisation, the Industrial Training Advisory Committee (ITAC) was established in 1965 as a consultative government machinery to suggest long-term strategies of industrial training. In 1973 the ITAC was replaced by the Hong Kong Training Council (HKTC) with broader terms of reference to advise the government on the measures necessary to ensure a comprehensive system of manpower training geared to meet the developing needs of Hong Kong's economy.

The economic recession in 1974-5 made the government aware of the importance of restructuring of the manufacturing sector by broadening the industrial base. To bring about this most possible industrial restructuring the Advisory Committee on Diversification was set up in 1979 to examine and advise the Government on strategies to diversify the economy by the establishment of new activities in the manufacturing and other sectors of the economy. The Committee in its Report suggested, *inter alia*, a more active attitude on industrial development, and augmented involvement of the government in sponsoring and financing training schemes. Consequently, the Vocational Training Council was reconstituted from the HKTC with enhanced jurisdictional authority in formulation of manpower policies and provision of TEVT to satisfy the changing needs of Hong Kong.

In managing industrial changes it is important for course provision to be flexible and up-to-date. Hong Kong's manufacturing companies, as a response to rising labour cost and recruitment difficulties, started in the 1980s relocating their manufacturing operations across the border into China resulting in the great reduction of numbers employed in the Territory in the 1990s.[2] In the same period Hong Kong diversified rapidly into a financial and servicing centre. The numbers employed in the tertiary services sector increased over 70% over the decade. In response to the changing needs, emphasis on course provision in the technical institutes has shifted in recent years from courses for the manufacturing industry to courses for the commercial and services sector as well as from craft level to technician level courses. The number of full-time equivalent enrolment studying manufacturing and production courses shrank from 16.0% of total enrolment in 1986/87 to 7.1% of total enrolment in 1995/96.[3] Consequently, the Council decided to merge the manufacturing engineering department with mechanical engineering department in one technical institute to accommodate a new computing studies department to meet the growing demand for information technology manpower. To assist the two polytechnics to concentrate their resources on degree level courses and to train more higher level technicians for industrial upgrading, two technical colleges were opened by the Council in the early 1990s to take over most of the higher diploma courses ran by the two polytechnics.

In response to the increasing demand for supervisors and managers to work for companies with business in China, the Council's Management Development Centre initiated a project 'Managing in China' in 1994/95. This project aimed to identify the training needs of Hong Kong managers who have management responsibilities in China and determine the most suitable learning resources.

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[2] See Chapter 6, Figure 6.2 of this thesis.

[3] Source: VTC Committee Paper VTC (CTE GC) INF 11/96: Classification of Technical Institute Courses by Natural and Change of Course Provision in Response to the Hong Kong Economy in the Past Decade.

One way to manage change is to anticipate change and to provide training to people prepared to engage in new industries and to retrain those who want to change career. The VTC since its inception has taken active steps in providing the necessary pre-service and in-service training program to newly emerging industries. For example, a Watch Repairing Course was offered in 1979, when a new technical institute was opened, to supply the necessary manpower for the then new and blooming watch and clock making industry. This was the first and only course of this kind in the Territory.[4]

Other examples are the development of those electronic and computer technology related training centres, such as the Electronic Design Technology Training Centre in 1990, and the Information Technology Training Centre in 1995, to provide training infrastructures to escalate the territory's technology into the field of high value-added engineering and marketing.[5]

Thus, it can be seen the Hong Kong Government has, although reactive in nature, responded in a pragmatic manner to link changes in the education and training system to changes in the economy through time.

Summary of the Hong Kong case

This case study of Hong Kong has revealed that the government has created a centralised system of skill formation which attempted to respond rapidly to the changing needs of industry and commerce.

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4 See Hong Kong Vocational Training Council. 1980. *Vocational Training Council Annual Report 1979-80.* Hong Kong, VTC.

5 See Hong Kong Vocational Training Council. 1980. *Vocational Training Council Annual Report 1995-96.* Hong Kong, VTC.

Quick response is achieved through various mechanisms put in place, such as the work of the Education Commission, Education and Manpower Branch and in particular the Vocational Training Council. These mechanisms ensure the economy's skill demand is defined by the industry and commerce, not by the government. My findings support the view that Hong Kong's skill formation approximates the three distinct features of the proposed model – mechanisms to ensure trade and industry manpower requirements are linked to the TEVT system; the government has established and exercised centralised control; and it has maintained the links to economic changes through time.

The Taiwan case

Taiwan has been able to achieve rapid economic growth and major structural transformation over the past fifty years as Hong Kong. *But unlike Hong Kong, Taiwan's economic development has been government guided.* The government has not done this through direct planning or the institution of a totally planned economy. Rather, it has led the island through several key structural transformations that have allowed it to establish and benefit from a niche of 'comparative advantage' in the international economic system while maintaining a market-based domestic economy.

Government policy created a broad economic environment in which entrepreneurial activity could flourish and transformed that environment from time to time as the island's comparative advantage in the global economy changed. *The combination of government-led and market-based approaches has created a flexible economy that is able to maintain continuous growth in the highly competitive international* *market, even after the 1997/8 Asian economic crisis.* Different to Hong Kong, the evolution and development of the education and training system in Taiwan has been a product of the government's central planning. Over the past decades those major educational policies that have dominated the content, process, ideology and institutions of education have been under total government direction. From the government's point of view, education should serve the needs of the state and be used to meet its social and economic goals as depicted by the Input-Output paradigm described in Chapter 4.

The examination of educational policies against the background of Taiwan's economic development in Chapter 10 shows that the government has included education in its overall manpower development plans. The expansion of the education and training system is expected to contribute to economic growth by providing well-trained manpower to serve the needs of business and industry. The state is able to manipulate the process of human capital formation by regulating the various levels of education and training according to the different stages of national development.

For much of recent decades there has been a system of developmental skill formation in Taiwan. The key element in this system has been the institutional structure in which the CEPD, at the centre of decision-making for the developmental state, has co-ordinated skill formation policies alongside its economic policies. Given this hierarchy of institutions, the process of manpower policy making in Taiwan has been and still is a top-down affair. The ministries concerned send policy initiatives up to the CEPD where they are considered in light of over all policy objectives. There is little input from other social partners into policy although influential business people with government connections do attend various elite policy-making forums. The main element where the developmental state had not been successful was in requiring firms to participate in training. This is because Taiwan, like Hong Kong, its economy is massively make up of small and medium enterprises (SMEs) and they have substantial disincentive to spend on training when frequent labour turnover is likely to wipe off their investment in a short period of time.

With the onset of democratisation, liberation, accession into the WTO and convergence to Western living standards, a key question will be whether the state is able to engender sufficient skill formation within enterprise. One optimistic response to this question indicates that a training deficiency is less of a problem for Taiwan than it may be for other countries. Taiwan can continue to solve the problem by its traditional emphasis on vocational education and by the public training centres.

To what extent does Taiwan approximate the first feature of the proposed model?

It is apparent, from Chapters 10, 11 and 12, that Taiwan has instituted mechanisms for coordinating the supply of educated and trained human capital to meet the current and future demands from business and industry. The Council for Economic Planning and Development (and its predecessor the Council for International Economic Cooperation and Development) works with the government in generating the industrial strategy and ensures that other ministries fall in line to meet the objectives of the economic plans. The Council is responsible for ensuring the education and training system do supply the appropriate skills to meet the requirement of the economy as identified by the industrial Development Board. Since 1966, the development of TEVT had been guided very explicitly by Manpower Development Plans. Plans were developed from economic projections of growth by industrial sector and forecasts of occupational requirement at various education levels then derived. To meet specific targets for employment levels, the Plans set enrolment distribution among senior high schools, senior vocational schools, and junior colleges. Finally the Plans set the enrolment quotas.[6]

In devising the Manpower Development Plans, the Council provides the overall strategy and the Manpower Planning Department, which is subserved within the Council, carries out the more detailed planning and direction of policy. The planning process mobilises the various sectors of the government and industry into discussion and negotiation about the current and future demand for skills. Once Plans were agreed upon they were implemented according to a strict timetable with deadlines. Over time the Council for Economic Planning and Development has been a powerful force in overseeing the direction of the policy and ensuring the TEVT system delivers the appropriate skills required to sustain economic development.

As reviewed in Chapters 10, 11 and 12, for example, how to meet the demand for semi-skilled labour resulted from the surge of the export-led industrialisation in the early 1960s has become the focus of the first Manpower Development Plan in 1966. Guided by the projected requirements from business and industry, the Plan set a target to shift

6 See various Manpower Development Plans. Taiwan, CEPD.

the emphasis from general to vocational high school education. This emphasis was continued in subsequent plans aiming to achieve a ratio of 70:30 (vocational to general high) by 1980. In the latest Plan, the Council still plays an important role in ensuring the requirement of skilled labour and professionals for the national construction project of making Taiwan to become the Regional Operational Centre and Advanced Technology Centre of the Asian Pacific has been observed. The ratio of enrolment between senior vocational school and senior high school was adjusted back to nearly 50:50 by 2000 to reflect Taiwan's future demand for a workforce with higher generic skills.

As shown earlier, the other part of the education and training system, the Employment and Vocational Training Administration (EVTA), in order to meet the current and future demands of industry has put in place measures to provide the right types of training. These include, *inter alia,* establishment of specialised planning committees, introduction of enterprise commissioned training, and commission of industrial technology training plan for high-value added industries.

The above have shown that mechanisms are clearly visible in Taiwan ensuring the skill requirements of business and industries, both existing and future, are used to inform the development of the education and training system.

To what extent does Taiwan approximate the second feature of the proposed model?

Various measures have been adopted by the Ministry to exercise control over education at all levels. As revealed in Chapter 11, the administration of TEVT is subject to government control, and is divided into three levels in accordance with the hierarchy of the government system. It seems clear that the administration of educational affairs in Taiwan is highly centralised, with all fundamental policies decided by the central Ministry of Education. The Ministry regulates matters such as finance, personnel, curriculum, tuition, entrance examinations and student quotas for public schools. The curriculum, for example, has to follow the official 'Curriculum Guidelines' which specifically mandate teaching hours, methods, goals, text books and objectives of each subject taught in schools and junior colleges.[7]

With the strong control over education the authority has been able to regulate the education output quick enough to meet the changing demands of the industries. To supply the semi-skilled workers for the labour-intensive industries in the first phase of industrialisation in the 1960s, the government enhanced the senior vocational school development. In response to the industrial expansion and national project requirements in the 1970s and 1980s, the government altered the ratio and increased the proportion of vocational enrolment in relation to general academic enrolment. Curriculum-wise, realising the inflexibility of the long introduced unit-trade training curriculum in providing the skills demanded by the changing technology and product type, the authority tried out in 1984, a new curriculum adopting a vocational cluster design concept. This cluster curriculum was able to improve students' flexibility in seeking employment that met the changing labour market demand. As revealed in Chapter 11, with its

[7] Interview with Mr Gin Sing Young, Principal of Taipei Municipal Ta-An Senior Vocational School on 11 May 1994 by the author.

strong control the government was able to officially implement this cluster curriculum to all senior vocational schools in 1986.

As Taiwan started to move towards higher value-added production in the late 1980s and set its goal of becoming the Regional Operational Centre and Advanced Technology Centre of the Asian Pacific in 2000, the government expanded rapidly the junior college education and established more technological universities to provide higher level skills and professionals demanded by the changing business and industry.

With regard to training, the government implemented in the 1960s a new policy which has gained mixed success. Publicly funded training centres were established for small and medium enterprises who could not afford to provide work-based training. In the 1970s, the government imposed training levies on firms but it was abandoned in quick response to the employers request at a time while the economy was slowing down because of the oil crisis. The government has to provide publicly funded training for less skilled workers employed by the dominant small and medium-sized industrial firms.

Thus, it can be shown that the Taiwan government has exercised strong control over the education and training system and has enabled a relatively fast response on the part of the system to the changing skill demands of industries.

To what extent does Taiwan approximate the third feature of the proposed model?

Taiwan's growth trajectory has been steep and fast. The island's economic strategy has been primarily based on responding to market forces, both internal and international. Yet the government has played a significant role in formulating development strategy in guiding the economy through a series of concerted policy changes in TEVT development and structural transformations that have proved vital to Taiwan's economic dynamism.

As pointed out in Chapter 10, four key strategic decisions may be discerned that created different policies and stages in Taiwan's development from immediately after World War II to the mid 1990s:

(1) the economic reconstruction stage focusing on agricultural reform and growth;

(2) the stable growth stage of import-substitutions industrialisation;

(3) the rapid growth stage of industrial expansion led by the export surge; and

(4) the steady growth stage of industrial upgrading.

As discussed in Chapter 10, whenever the economy changed direction, there was a corresponding manpower policy that led to changes in the education and training system. TEVT has been constantly updated to keep pace with the changes taking place in the economy. During the first and second stages of development technical education was first improved and then expanded to produce entry and middle level technicians for the agricultural sector, the ten major national development projects, and the labour intensive industry. An official department was established within the Ministry of Education to oversee the development of technical and vocational education. The ratio of enrolment between vocational education and general education was adjusted with increased weighting on the former. While agricultural production dropped its share in the GDP, agricultural vocational schools were converted into industrial vocational schools. While the government switched to export-led industrialisation and determined to move away from reliance on those earlier industries into higher value-added forms of production, there have been continuous adjustments to the ratio of vocational schools to general schools, as well as a guided expansion in junior college education to provide mid and higher level technical skills required by the industries.

In Taiwan's pursuit to upgrade its newly industrialised status to that of fully developed status and to become the Regional Operational Centre and Advanced Technology Centre of the Asian Pacific, readjustment of the technical and vocational education system to broaden the avenue for further study was articulated to supply higher level technicians and professionals demanded by the various sectors of the economy.[8] A great number of junior colleges were upgraded to become university level institutes of technology to provide places for senior vocational school and junior college graduates to further their studies.

[8] See Chapter 11, pp313-318 of this thesis.

In the field of industrial training, despite government's pull back in the introduction of a training levy in the 1970s, Taiwan has found alternative ways of enhancing the skills of the labour force during different stages of development. It has been revealed in Chapter 12 that, to meet the requirements of Taiwan's industrial firms, which are characterised by their small and medium sizes, the government effectively assumed its role to deliver most of the training through public provisions. However, in addition to public training, the authority also promotes enterprise training by assisting firms and Guilds of trades to establish training departments to provide training that bears more industrial relevance.

In order to keep pace with the different stages of structural up-grading in the economy, the authority has diversified its training initiatives, such as the introduction of enterprise commissioned training, joint venture type advanced skill training with multi-national companies, and training for high value-added industries delivered by the industrial Development Bureau of the Ministry of Economic Affairs, to ensure the move to higher level of production would not be hindered by a lack of skilled manpower.

Thus, the above findings have provided evidence to claim that Taiwan has demonstrated its ability to sustain the linkages between the education and training system and the demands of a rapidly changing economy through time.

Summary of the Taiwan case

The case study of Taiwan revealed that post compulsory education level skill formation has been controlled by the centralised Ministry of Education and the Council for Labour Affairs. The demand and supply sides of manpower development are co-ordinated at the highest level in the Council for Economic Planning and Development. The provision of TEVT is monitored and changed according to the economy's requirements. The system of TEVT, including the curriculum, is centrally controlled but the government has rendered it flexible enough to respond to economic changes through time.

General conclusions and implications

In their pursuit to explain the great economic success of the high performance Asian economics, the World Bank and Asian Development Bank researchers have argued that human capital was a contributing factor. They hold the view that the heavy investment in education, particularly in primary and secondary education, with the subsequent spillover effects, has an effect in enabling the high level of growth experienced by these economies. My research into two of the NIEs, Hong Kong and Taiwan, has revealed other factors as well. My findings support the conclusions that, despite differences in the two governments' ideology in orchestrating economic development, Hong Kong and Taiwan have each adopted a model of skill formation to develop technical skills beyond compulsory education as required by industrial growth. Figure 13.1 depicts the putative causal connections among the elements of the model.

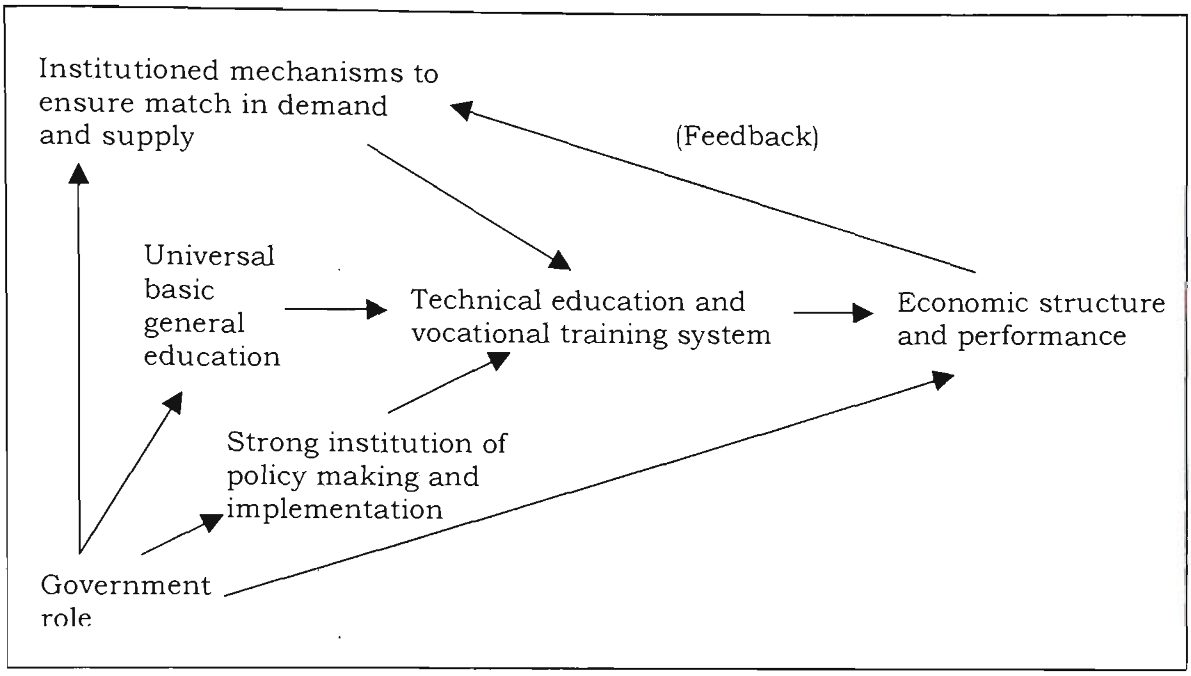

Figure 13.1 Hong Kong and Taiwan's Model of Technical Skill Formation

In compliance with the Input-Output paradigm of development described in Chapter 4, this technical skill formation model is aimed to lead to national development along a desired path.

With universal basic general education in Hong Kong and Taiwan, the TEVT system is able to recruit students and trainees with broad based knowledge in languages, mathematics and science. This has allowed the system to devise a more flexible approach in curriculum design to meet the rapidly changing demands. Pre-conditioned with strong but limited governments in these two territories, the respective authorities have been able to:

i) devise mechanisms to ensure industrial requirements played influential roles in guiding the output of the TEVT system;

ii) establish strong controls over institutions responsible for the provision of TEVT; and

iii) direct the TEVT system in adjusting its provision to match the changing economic needs over time.

This conclusion leads to the question: *Would this model work successfully elsewhere?* To answer this question it is necessary to look at the essential factors that contributed to the success of the model. As education systems are dependent institutions, they require a group of efficient and incorruptible politicians and civil servants to plan and to implement appropriate programs. These institutions need to be built on states that are stable, orderly, cohesive and well managed. These are characteristics of strong but limited governments. A state with a strong but limited government is able to establish an administrative structure that separates the social economic and political functions of government. The government on the one hand limits itself from direct intervention in the markets and on the other hand strongly institutes control mechanisms to integrate economic and educational development. The government therefore plays a key role in setting priorities and allocating public resources to capture the synergy of a co-ordinated approach to articulate the twin growth of education and economic through time.

A second factor for the model to operate successfully is the in place of a universal basic education (6 years of primary schooling plus 3 years of junior secondary schooling) for the TEVT system to base on. TEVT should not be used to replace general basic education but rather be developed at post-compulsory education level with curricula attuned to the requirements of the business and industry. Given the practical nature of their curricula, TEVT programs proved to be more effective with trainees who have certain level of skills in language communication, computation, and science. Basic general education makes people more able to adapt to their environment efficiently.

Besides these two essential factors there is also the need to understand the Hong Kong and Taiwan model in their historical contexts. In these two NIEs, universal general basic education was first achieved to support growth through their initial stage of labour intensive industrialisation. TEVT was expanded within which the close linkages built with the industries underpin the high levels of skill formation. In view of their different histories it would be impractical to suggest that this model would work perfectly in a Western society like Australia. The main issue being that in adopting this model, measures must be taken to create close linkages between trade and industry policies and the TEVT system. This raises policy problems for some of the Western countries, including Australia, where policy issues pertaining to education and training have traditionally been treated in isolation from any consideration of trade and industry policy, if such a policy exists at all. This is especially relevant to the autonomy of the education and training system in the West. The relative autonomy of education and training institutions in the West makes it hard to pursue a detailed manpower policy, even if such a policy is considered desirable.

Nevertheless, it is still possible to learn something about possibilities for one country by examining how things work elsewhere. For example, how Hong Kong's centralised delivery of occupational and industrial skill training can work under different systems of funding, in this case from central government funding (the Vocational Training Council) and a levy system (the Clothing and Construction Training Authorities).

While there are obvious limitations as to how far this model of technical skill formation could be adopted in Western developed economies, it does not necessarily mean that this model is not appropriate for other less developed countries. Countries with strong but limited governments, with general basic education and training systems modeled on those in advanced industrial countries, and with a political imperative to industrialise would find this model appealing. Countries of interest in this respect could be the second generation Asian tiger economies (such as Malaysia and Thailand), China, South Africa, Mexico and Brazil. These countries are either undergoing or have gone through a first 'stage' of industrialisation of low value-added forms of production; they have placed emphasis on expanding primary education; and they have developed vocational education and public training institutions. Of these countries, China, in particular, should find this model more adaptable due to its close economic and social ties with Hong Kong and Taiwan. Hong Kong is increasingly integrated into the regional development of South China, the prosperity of its economy depends much on the future development of China. At the same time, Taiwan continues to expand unofficial interactions and trade exchanges with China. In 1999, a total of US$2.24 billion of Taiwan investment in China was recorded.[9] Indeed, with such increasing integration among these economies the region of China, Hong Kong and Taiwan is now known as the 'Greater China'. With this integration in mind, the model which has been successfully adopted by Hong Kong and Taiwan should

[9] Source of figure: Mainland Affair Council, Taiwan (http://www.taiwanheadlines.com/20000412/20000412np.html)

equally work well in China. However, if any of these countries are to adopt this model for developing technical skills for further industrialisation they may still face different situations at the government level, especially with regard to the nature of the linking mechanisms.

In short, due to the diversity of experience, the variety of institutions, and the great variation in policy making across countries, any transportation or interpolation of this model into other contexts needs to be taken carefully and flexibly.

CHAPTER 14

POSTSCRIPT

Developments after 1996

This study is mainly concerned with the period from post-World War II to the end of 1996, a period when Hong Kong was still under the British rule. However, after that date further development in technical skill formation in Hong Kong and Taiwan was set in train. While to cover 1997 to 2001 in detail, taking into consideration the effect of Hong Kong's reunification with China and the 1997 Asian economic crisis, would require another thesis, the position may be summarised as follows.

In Hong Kong, subsequent to its rapid change from manufacturing to knowledge-based service economy, there were marked changes in the demand for skills. In managing this process of change the government appointed an external consultancy firm, the Segal Quince Wicksteed Limited, to advise to transform the operation of the Vocational Training Council.[1] Thus, in the late 1990s, the Council changed its Executive Director started re-engineering its organisation, upgrading the qualifications, enhancing its labour market intelligence, and specifically improving its responsiveness to service sector business.

During that period of time, a factor which has influenced Hong Kong considerably was the financial crisis that hit the region. After decades of impressive economic growth and full employment, Hong Kong, in common with its neighbours, experienced an unprecedented economic

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[1] Segal Quince Wicksteed Ltd. 1996. Strategic and Organisational Review of the Vocational Training Council: A Final Report to the Secretary for Education and Manpower. Hong Kong.

setback and unemployment rate of over 4%. This, coupled with cuts in public spending, has affected the TEVT system in two ways. The system has to become much more cost-effective without significantly affecting the quality of the services it provides, and it has to identify more closely the education and training needs of the unemployed, particularly school leavers, to enable them to compete for jobs in a more competitive and demanding labour market.

To cope with this economic change, the Vocational Training Council flexibly integrated the provision of vocational education[2] into a single Institute of Vocational Education (IVE) and phased out courses which were no longer relevant in school year 1999/2000.[3] Savings gained were redirected towards new training programs required by employers.

In recognition of the accelerated shift from manufacturing to the services industries, the Council has further reduced its engineering and manufacturing craft courses to halve and cut its apprenticeship provision, replacing them with more generic service-based Certificate in Vocational Studies, plus new trainee places on programs for the hospitality group of industries and for mechanical and electrical services.[4] To ease the rapidly increasing demand of IT skills, an IT training and Development Centre was formed to provide training for employees of the banking, insurance, tourism and other trade and finance related industries where language and IT skills are highly needed.

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[2] This includes the seven technical institutes that offer diploma courses and the two technical colleges that offer high diploma courses.
[3] *Vocational Training Council Annual Report 1999/2000*. Hong Kong, HK Vocational Training Council.
[4] Yeung, K.Y. (Chairman of Vocational Training Council, Hong Kong), Opening Address to IVETA 2000 Conference. August 2000, Hong Kong

To meet the economic trend and manpower market in Hong Kong, the IVE (Tsing Yi Campus) is undergoing a strategic development plan and re-organisation of academic departments, to readdress the balance between engineering and business/ IT courses. It was announced a new Department of "Multimedia and Internet Technology" would be formed to run new courses in multimedia and Internet applications, intelligent product innovation and information systems, in September 2001. These new courses will have a strong orientation towards the application of the multimedia and Internet technology in business and education.[5]

These further improvements in the responsiveness of the Vocational Training Council were introduced after 1997 in line with the initial policy statement of the new government. The Hong Kong Special Administration Region Government has committed itself to extend education provision and encouraged greater innovation and flexibility in the provision. The government encouraged enterprises to develop into higher value-added business. And the government would 'provide every citizen with the opportunity to receive quality education, so that they can master the skills needed to participate in the new economy'.[6]

In Taiwan, economic plans continued to inform manpower policies. The drive to enter the World Trade Organisation (WTO) and to become the Asian Pacific Regional Operational Centre (APROC) has given added impetus to market liberalisation and internationalisation. It would not

[5] See appointment advertisement of the Department Head of the mentioned department in mid-May 2001 (http://www.vtc.edu.hk).
[6] Tung, Chee Hwa (Chief Executive Officer of Hong Kong Special Administration Region of the People's Republic of China), Address to the Provisional Legislative Council Meeting at 8 October 1997, Hong Kong.

be surprised to see a series of individual policy changes in response to the new economic goals after 1997.

As part of the National Plan for Crossing the Millennium finalised in March 1998, a Manpower Development Plan was included.[7] The Manpower Development Plan forecasted the manpower needs for Taiwan by 2006. It detailed the future demands of occupation types from the servicing, industrial, and agricultural sectors in general and the special needs in particular for each part of the Asian Pacific Regional Operation Centre that Taiwan wants to become. Priorities included the promotion of public training, enterprise training, refresher training and life-long learning.

To provide a skilled workforce for the high-tech and service-based economy as well as to complement the APROC plan, different strategies in education and training have been promoted. In technical education, plans to reform curriculum, improve facilities, decentralise administration, etc., covering senior vocational schools, junior colleges and institutes of technology were proposed and some of them trialed.[8] Opportunity was given for students in vocational schools to take an additional year in school to learn further vocational skills. Meanwhile the conversion of senior vocational schools to comprehensive schools continued resulted in a swing back of enrolment ratio towards academic general schools to reflect the public demand. By the school year of 2000

[7] Council for Economic Planning and Development. 1998. Manpower Development Plan for Crossing the Millennium.
http://cept.spring.org.twe/Intro/Org/manp/8703/8703.html (In Chinese).
[8] Reports of these plans can be found online from
http://www.ite.ntnu.edu.tw/~TVEC/announce (In Chinese).

the ratio of vocational to academic (including comprehensive) schools became 54.5:45.5.[9]

In the area of training, plans were implemented to strengthen and re-launch re-training programs for workers; provide job transfer training; strengthen training in the areas of computerisation, industrial automation; and provide training to the service industry.

Future challenges

So far this thesis has discussed the successful side of the skill formation model that provided the technical human capital for Hong Kong and Taiwan's industrial growth. However, the emergence of financial, economic and political disruption in these two territories since 1997 may have hindered the prospects for future growth. It is in that light that is relevant to consider the challenges to the model of skill formation for the future competitiveness of the two economies.

The 1997 financial crisis has pushed Hong Kong's economy into deep recession in 1998 with the year-on-year growth dropped to -6.9% in the third quarter.[10] Part of the reason that caused the deep slump in growth was the burst of the speculative bubble in the property and stock markets that formed in the lead-up to Hong Kong's reunification with China. Though the growth turned positive again after the second quarter of 1999, the economic restructuring that started in the 1980s was accelerated.

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[9] Ratio derived from data from *Education Statistics of the Republic of China 2000*. Ministry of Education, Taiwan.

[10] Source of information: Home page of the Census and Statistic Department, Hong Kong Government (http://www.info.gov.hk/censtadt/eindex.htm).

Indeed, Hong Kong's rapid transformation to become a centre for international finance and a 'digital hub' of Asia has been hampered by a shortage of IT professionals. To meet immediate operation needs of the IT and financial services sectors, the government announced a number of initiatives to attract skills from Mainland China in March 2001. Immigration restrictions have been relaxed in the hope of filling an unexpected shortfall of 120,000 IT experts in the territory over the next five years.[11]

Hong Kong's financial centre position and its role as an intermediary in China's commodity trade in long term is not indisputable. Hong Kong has been the obvious source of capital, ideas, legal advice, accounting practices, tax consultancies and investment-banking services for China's international trade since China adopted its open door policy to trade with the West. But now China is growing most explosively in Shanghai and the surrounding provinces. Shanghai's new manufacturing hinterland will be served by ports in Shanghai. 'Why produce in China and bring it to Hong Kong? It's a waste of time, China is now building the infrastructure to export to the West directly.' Argues Marc Faber, a Hong Kong-based analyst.[12] This will greatly reduce Hong Kong's total exports and the related trade-finance and insurance service.

Another possible impact to Hong Kong and Taiwan's future economy is China's accession to the WTO. According to a study of the possible effects of China's WTO entry to Hong Kong and Taiwan,[13] it is predicted

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[11] MaKinsey, K. 2001. 'Tug of war for IT talent' in *Far Eastern Economic Review.* April 19.
[12] See the *Economist,* 5 September 1998. Financial centres, p27.
[13] Ma, J. and Wang, Z. 2001. 'Winners and losers of China's WTO entry' in *The China Business Review.* March-April.

that these two economies will be positively affected. Hong Kong and Taiwan will have their GDP growth increased by 0.09% and 0.06% more, respectively, over the next five years.[14] But Hong Kong's trade deficit with the mainland would increase slightly because direct trade between China and other countries would increase. At the sectoral level, Hong Kong's information technology sector would expand, while its apparel industry would shrink.[15] The biggest winners in Taiwan would be textiles related producers, while the main losers would be apparel and motor vehicles.[16]

In Taiwan, its economy experienced lower growth but not recession through the 1997 financial crisis and expanded at a rate near the average for the 1990s after mid-1998.[17] Nevertheless, the island still faces important challenges. One of the biggest uncertainties regarding its future is in its relationship with Mainland China. Although business contacts across the Taiwan Strait flourish as never before, the hostilities which now and then take place remind us of the fragile economic and political situation which needs a more stable solution for the future. To cope with the keen international competition in the world economy and to capitalise on intensifying contacts between Mainland China and Taiwan, may Taiwanese firms are now establishing co-operative relationship with research institutions or with public/private enterprises in China to enable them to make full use of the low cost but

[14] *Ibid.*
[15] *Ibid.*
[16] *Ibid.*
[17] Source of information: Council for Economic Planning and Development's published statistics on Major Economic Indicators Web site (http://cepd.kcsoft.com.tw/English/Statistic/891231/9003/F1.htm).

high quality of engineers and researchers there.[18] How to take full advantage of skilled manpower to engage in information-related productions has now become a major topic of interest to these firms. As a response to technological change and globalisation as well as regionalisation of the economy, Taiwanese firms are building closer ties with China through joint development projects, contracted research, and technology transfer across the Taiwan Strait.

Furthermore, the complicated co-ordination of cross-strait production operations requires a high quality of the firms' human capital with skills that cannot by definition be transferred outside of a company but can contribute to successful operations overseas.

To sum up, faced with these future economic development uncertainties and possibilities, it is likely that there will be challenges to which the two territories' economic success has had on the mechanisms for linking the education and training systems to their economic changes through time. In Hong Kong's case, the major challenge would be its system's ability to take pro-active response to future economic demands of skills. In Taiwan's case, with the authority's diminishing power over indigenous capital's investment aboard, the future government will have somewhat less ability than hitherto to determine the industrial direction of the economy. Hence, it will pose a major challenge in planning the island's manpower by linking its education and training system with the government's trade and industry policies where such policies will become difficult to draft.

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[18] For more information on these firms see Gee, S. and Kuo, W.J. 1998. 'Export success and technological capability' in Dieter Ernst *et al* (ed) *Technological Capabilities and Export Success in Asia*. London, Routledge Publication.

However, any weakening of the link between the skill formation system and the economy could be both a problem and a blessing given the need for more creative learning. To maintain the two economies' competitive edge in the future knowledge-based world market, they need a more creative and imaginative workforce. Reduction of government's control over education and training institutions may mean more autonomy in them to respond in appropriate ways to the requirement of employers.

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Interviews

The following interviews were conducted to gather primary resources for this research. Interviews were semi-structured and last from one to two hours.

Hong Kong

Mr K.O. Fung, Vice-Principal Kwai Chung Technical Institute. 8 August 1994.

Dr Stephen Lee, Head Department of Manufacturing Engineering, Tsing Yi Technical College. 18 May 1994.

Mr T. K. Yap, Senior Industrial Training Officer, VTC. 20 November 1995.

Mr W.C. Yeung, Educational Officer, VTC. 19 November 1995.

Mr M.C. Lau, Assistant Executive Director and Mr W.K. Pun, Senior Educational Officer, VTC. 1 July 1996.

Dr H.C. Law, Principal Curriculum Development Officer, Curriculum Development Institute, Education Department, Hong Kong Government. 21 November 1998.

Taiwan

Dr Tien-Jin Chang, President National Taipei Institute of Technology. 4 May 1994.

Dr Wan-Wen Chu, Research Fellow, Sun Yat Sen Institute of Social Science, Academia Sinica. 5 May 1994.

Mr H.C. Yu, Manager Taipei Municipal Training Centre. 7 May 1994.

Mr Pei Chi Chang, Director Manpower Planning Department, CEPD, Executive Yuan. 10 May 1994.

Mr Gin Sing Young, Principal and Mr Shih Shion Liou, Dean of Studies Taipei Municipal Ta-An Senior Vocational School. 11 May 1994.

Professor Shannon Lee, Vice-President National Taiwan Institute of Technology. 11 May 1994.

Interviews

Mr K.T. Chou, Senior Specialist, CEPD, Executive Yuan. 12 May 1994.

Mr Chih-Li Sum, Manpower Planning Specialist, Manpower Planning Department, CEPD, Executive Yuan. 12 May 1994.

Mr Ren Rau Lee, Senior Education Specialist Department of Technological and Vocational Education, Ministry of Education. 13 May 1994.

Professor Joseph Lee, Vice-President Chung Hua Institution for Economic Research. 16 May 1994.