
Training and Skills Development in the East Asian Newly Industrialised Countries: a comparison and lessons for developing countries ^[1]

ZAFIRIS TZANNATOS

The World Bank, Washington, USA

GERAINT JOHNES

Lancaster University, United Kingdom

ABSTRACT In this article we examine the organization and funding of training in a sample of newly industrialized economies (Korea, Malaysia, Singapore and Taiwan, China). The findings lend support to the argument that there is no single training *system* appropriate for all countries, and much depends on the country's developmental stage and specific characteristics including non-economic ones (such as culture and ethnic composition of the population). However, some *characteristics* of training seem to be more appropriate than others. First, late specialization in school curricula and acquisition of specialized skills in-service are desirable features. Second, we would advocate measures that encourage private finance of training without acting as a tax on labour. Third, training institutions should have autonomy for student selection, staff recruitment and choice of courses. Fourth, employers should participate in training to a great extent. Fifth, regular evaluations of training policies should take place, and the results of these should be compared with alternative interventions in the area of human resources.

Introduction

The sources of growth of the East Asia Newly Industrialised Countries (NICs) have been widely researched (Page et al, 1993). Among the explanations offered are, first, sound macro and trade policies and, second, the achievement of universal literacy before the time agriculture ceased to be the main employer. However, the evidence on the specific contribution of training policies is lacking. For example, the 'skills offensive' in Korea was hardly introduced by the time the country reached its 'turning' point, sometime in the late 1960s.[2]

This article provides an overview of in-service training in the NICs in the broader context of human resources development (education and pre-service training). It examines Korea, Malaysia, Singapore and Taiwan, China, taking also into account the diverse industrial policies these countries pursued.[3] The countries studied here have governments which are active in promoting development. This extends to the labor market, where government involvement in education, vocational training and, in some cases, manpower planning remains important. In each country the government provides incentives for investment in both physical capital (new technologies) and human capital (from basic education to in-service training). Management is often characteristically autocratic to the point that it is considered to be counter-productive in the long run – a proposition that needs to take into account cultural considerations which might make such a style less counter-productive in the East Asian setting than elsewhere (Choudhury & Islam, 1993).

The objective of this paper is to examine the skills development system separately for each country and identify aspects that can improve the design of training in other countries, both within and outwith our sample. The skills development system in each country, broadly defined to include education and training, is reviewed in the following sections.[4] In the summary, common characteristics and differences are established and lessons are presented. Summary economic data and a concise description of their vocational education arrangements appear in appendix 1.

South Korea

Korea achieved universal primary education in 1960. Primary education lasts for 6 years (from the age of 6) and compulsory education till the age of 14. Enrollment in post-primary education is high: 95% attend middle school (3 years' duration), and of these 93% proceed to high school (the normal duration of which is a further 3 years). Entrance to general high school is by nationwide examination and to vocational high schools by qualifying examination.

Some of the material met by middle school students is vocational in nature. Students must take a technology education course plus an elective course in a topic (listed below) in which the vocational high schools specialize. Almost a third of all high school places fall into the vocational and technical education (VTE) group. Each vocational high school focuses on a given specialty: agriculture, fishery/marine studies, home economics, commercial studies, or technical studies. With the speedy industrialization of the recent past, the last of these has been expanded rapidly at the expense of the first. Nevertheless, it is the commercial vocational high schools which account for most of the students pursuing the vocational

path through post-compulsory secondary education. Students at vocational high schools undertake up to 6 months of on-the-job training.

A recent innovation is to replace the 3-year vocational high school course with a 'two plus one' system in which 2 years are spent in the classroom and the remaining year is spent acquiring work experience in local industry. Firms participating in this scheme are eligible for loans, subsidies and tax relief. The students themselves receive half the minimum wage while they are gaining workplace experience. This scheme is supervised by the Council for Industrial-Educational-Training which is managed by the Chamber of Commerce and responsible to the Ministry of Labor. The Council was created to avoid direct government supervision of the scheme. It facilitates the assignment of students to participating companies and is responsible for disseminating training information to schools. Government remains responsible, however, for supervising the contracts (Han, 1994).

On leaving high school, students are awarded a general diploma or a vocational diploma. Some 43% of those attending high school proceed to university, most (but not all) of these being students who attended an academic high school. Unemployment amongst school leavers is higher among those who leave a vocational school than graduates of other educational institutions.

At tertiary level students may pursue an academic course through college and university (normally 4 years), or they may receive a more vocational training over 2-3 years at junior colleges. Junior colleges are private or public. Other students graduate from 1-year courses at vocational training centers, and these appear to be considerably more attractive to employers than those who enter the labor market direct from high school. This is suggestive that specific skills can be usefully acquired after academic education is completed.

Over the age range through which education is compulsory, schooling is provided free in the rural areas. In urban locations, middle school pupils are charged fees. Scholarships are available based on need and ability. It is partly as a result of the imposition of fees that about 30% of post-primary pupils enroll in private schools. Attendance at high school involves the payment of fees, and about 60% of pupils at this level enroll in private schools. Some 80% of tertiary level education is provided in the private sector. The central Government provides most of the resources for the education system, but this is supplemented by tuition fees and (to a lesser extent) by contributions from local government. Government subsidies are greatest, as a proportion of total costs, at lower levels of education. The large private sector receives resources from the Government in the form of tax exemptions, subsidies (for capital developments, scholarships, and teachers' pension funds) and loans; this help has increased rapidly over the last 10 years. A recent development has been the foundation of secondary schools by large companies such as

Samsung and Hyundai in an attempt to influence directly the quality of entrants to the labor force (Fairclough, 1994).

Vocational training is coordinated by the Ministry of Labor and the Vocational Training and Management Agency (VTMA). The Ministry has delegated authority to VTMA for setting standards for the approval of programs, development of training materials and supervision of a rigorous examination process. There are 88 public sector vocational training centers, but these are not widely used by firms as a source of part-time in-service training. The centers do, however, offer training at apprenticeship level and at the first two grades of the national skills examinations. These training centers serve about 30,000 students per year, a figure which is broadly comparable to the numbers trained in in-house centers and not-for-profit private sector institutes.

The vocational training centers have enjoyed an increasing degree of autonomy from central Government, and their management boards include as members a cross-section of local employers. Although most of the funding of these centers comes from government subsidy, user fees are also charged. Course provision appears to have been flexible in response to changing needs on the part of industry. Adult education and training is organized so that parity is recognized between qualifications earned within and outside of the formal education system. It is offered by a variety of 'para-schools' and includes night classes run often by industry. These activities can attract a government subsidy or run on a commercial basis.

Complicated legislation aims to promote in-service training. Large firms employing 150 or more workers are required each year to submit to the Ministry of Labor a training plan that includes information on the number of employees who will receive training of a specified type approved by the Ministry. If the firm trains fewer workers than a critical number determined by the Ministry, then a tax of between 0.25 and 0.67% of the wage bill is imposed on the firm. In principle (though this does not appear to be done in Korea at present) the tax revenues could be channelled back into the general education system. The critical number is determined by measures of skill shortage faced by the firm and employment growth within the sector (Salomé & Charmes, 1988) but the percentage of workers employed by all large firms who are required to receive training in any given year – the so-called training coefficient – has declined over time from a peak of 6.7% in the 1970s, to 1.73% in the 1980s. This may reflect in part a reduced need for training as the stock of trained workers in the labor force has increased. In part it may also reflect disillusionment with the policy that may be accompanied by laxity as regards quality of training. Over time, an increasing number of firms have preferred to pay the tax rather than train their workers, and this practice does not appear to have been discouraged by the Government. Indeed, in 1992 some 80% of firms (predominantly smaller companies) preferred to

pay the tax than to train their workers. The corresponding percentage in the 1970s was 33%. This suggests that the benefits of training, even when the direct training costs are fully subsidized, do not offset the opportunity cost of production which is lost due to the time spent learning rather than producing. It may also reflect a fear on the part of smaller firms that their trained workers might be poached by larger companies – the *chaebol* – in which working conditions are more attractive.

Of those workers being trained in-service, about two-thirds receive their instruction at in-service training centers. Most of the remainder attended inter-firm training centers. These centers are jointly run by a group of firms within the same industry. In order to encourage firms' investment in general training, a system of bonding has existed; this requires trainees, once their courses are completed, to stay with their employer for a minimum period of twice the duration of the training course (Dougherty & Tan, 1991).

Over the period of rapid industrialization, the Korean government has selectively intervened in the economy to promote the development of industries in which the country has a comparative advantage (Westphal, 1990). Since the Government also controlled the provision of education, it could also over time readily match labor supply to the needs of industry (Han, 1994). The most recent phase of industrialization has occurred over the last 10 years and has followed the relaxation of the protectionist policies which were pursued earlier. During the past decade, high technology industries have been expanding, and this has involved an increase in relevant educational provision at the vocational high schools and junior colleges and also in science and technology courses at the universities.

The Ministry of Education has control of the overall system of education (including matters such as curriculum design), but the bulk of supervision and administrative duties is delegated to local offices. The Ministry of Labor is concerned with post-schooling training. Training activity is closely monitored by the authorities as part of the accreditation process, and tough standards are set at examinations.

Concern remains that the curriculum does not match well with the needs of the economy and is not flexible across regions with differing needs. In particular, there has been a chronic shortage of skilled technical workers within the manufacturing sector. This shortage is accompanied by relatively high levels of graduate unemployment – especially amongst social science and humanities graduates – thus suggesting that too many students are opting for the academic rather than the vocational route through education. This may be a manifestation of cultural factors which emphasize the importance of education; it might also reflect an inflexibility of graduate wages – though the wage gap between university/college graduates and high school graduates declined from 124% to 69% in the 5 years to 1992.

A further concern is that the Government officers charged with accrediting courses might not themselves be able to make fully informed judgements. Another source of concern is the quality of vocational education, where the vocational high schools are not sufficiently well equipped (Han, 1994). The structure of incentives offered to the teaching staff often does little to promote the maintenance of high standards. In line with these concerns, and in response to the formation of the Presidential Consultative Commission on Education Policy in 1989, the autonomy afforded to the educational authorities and individual institutions has been increased.

Malaysia

Malaysia has a predominantly rural population, with under 40% living in the urban areas. Industrialization has been rapid since independence in 1957. Rural-urban migration has responded to this but skill shortages have always been perceived as a problem. An unusual problem faced by this country is the cultural heterogeneity: in peninsular Malaysia indigenous peoples make up little over one half of the population, a further one-third are Chinese, and most of the remainder are Indian. This cultural diversity has inevitably shaped educational policy. The primary goal of educational policy has therefore been to foster national unity and personal/moral development, so that academic rather than vocational education has received most emphasis.

Since the early 1980s virtually all children in Malaysia have received full primary education, although this is not compulsory. After 6 years of primary education (with free tuition), some 83% of students enter lower secondary education (duration 3 years). Promotion throughout the first 9 years of schooling is automatic. The curriculum during the lower secondary period is comprehensive. Of those entering secondary education, two-thirds proceed to a further 2-year upper secondary period. In the upper secondary sector, the curriculum is divided into academic (arts and science), vocational, and technical streams; entry into these streams is determined by academic performance and a series of social and predominantly ethnic criteria.

Up to 1984, the vast majority (over 98%) of secondary students enrolled in the academic stream, though a vocational stream also existed. The system was reformed in 1987 by changing the curricula (Wilson, 1991); although this has resulted in a large proportional increase in students in the vocational sphere, this increase is from a very small base. Throughout the country there are about 60 vocational secondary schools and only about 10 technical secondary schools. Rapid expansion is envisaged for this sector, and a further increase in the vocational content of the curriculum of academic secondary schools is also planned. However, the emphasis of the system as a whole remains strongly on the

academic side: some 84% of upper secondary students follow academic courses, although options in vocational subjects are now available even in these schools. Flaws with the previous system were identified – notably the old system had low pass rates and the weight attached to marks obtained in vocational subjects was low relative to the time devoted to their study. There is still very limited practical experience in the form of on-the-job training or company visits.

Those graduating from secondary vocational schools may proceed to polytechnics, teacher training colleges or, if of Malay origin, to the MARA Institutes of Technology (*Majlis Amanah Rakyat Asli* – the Council of Trustees for Indigenous Peoples). For those passing through the academic secondary schools, many proceed to a 2-year sixth form; this attracts 43% of those in the academic upper secondary schools. An alternative route to higher education, pursued by one in 10 graduates of the upper secondary school system is to attend, for 3 years, colleges and institutions of higher learning which include teacher training institutes. Of those following the sixth form route, some 16% proceed to a university.

Secondary vocational schools account for just over a half of the annual output of all public training institutes. Other important sources of trained labor include secondary technical schools (11%), MARA vocational institutes (13%), the Ministry of Education's industrial training institutes (6%) and the polytechnics (10%). There are, in addition, two advanced training institutes, and a small number of youth training centers run by the Ministry of Youth and Sports. Between 1985 and 1990, the annual output of skilled and semi-skilled labor from public training institutions rose by 64% to nearly 30,000. This impressive increase in output was due primarily to expansion in the secondary vocational schools (which more than doubled their output); increases in output were also achieved by the MARA vocational institutes and the polytechnics. Taken together, these public training institutes provide the bulk of vocational training to those entering skilled manual occupations in the labor market for the first time. The institutes are not, however, major providers of in-service training: for workers with labor market experience, firms express a strong preference for training in-house (World Bank, 1994).

Over 90% of primary and secondary school enrollment is in schools financed by the public sector. In the public sector primary and secondary schools, board and lodging is often provided for those children whose homes are distant. These pupils may be eligible for scholarships which are based mainly on ethnicity (Tzannatos, 1995). At tertiary level, a number of private colleges, many of which have exchange programs with universities in other countries, have emerged in recent years. Within the vocational area, the local market outcomes of the public training institutes are inferior to those of corresponding institutes in the private sector (World Bank, 1994).

In both public and private sectors, curriculum design, student examination and school certification are all the responsibility of the federal Ministry of Education. The ministry also appoints teachers within the public system. Within the ministry, the Technical and Vocational Division is of particular interest in the context of this paper. At a lower spatial level, state education departments operate, and district education offices exist throughout most of the country. The Ministry of Education funds all schools except the MARA Junior Science Colleges, which receive their funding from the Ministry of Rural and National Development. In 1989, the National Vocational Training Council (NVTC) was set up to improve the coordination of training provision in Malaysia. Its success in so doing has hitherto been hampered by a lack of legal authority.

Vocational training out of the formal education sector includes courses in agriculture, engineering, business and commerce arranged by various government ministries and statutory bodies, and also industrial apprenticeships. A policy that aims to alleviate skills shortages has been to encourage the development of private sector training initiatives, partly by promoting joint public-private sector schemes. Consortia of firms in the private sector (some, such as the Penang Skills Development Center, involving collaboration of more than 50 firms) have emerged in response to the needs of industry (Vatikiotis, 1994). These centers provide training in technology and engineering to shop-floor workers. In the case of the Penang Center, firms pay a one-off joining fee of M\$20,000. This often discourages smaller firms from participating.

A scheme that encourages firms to invest in the training of their workers was introduced in 1987. The Double Deduction Incentive for Training (DDIT) enables firms to deduct from their income tax returns a sum equal to two times their allowable training costs. Training may be conducted either at approved specialist institutions or by firms themselves as a part of in-house programs subject to a rigorous approval procedure by the Malaysian Industrial Development Authority (MIDA). The take-up of DDIT in its first 6 years was disappointing, with numbers of workers trained through MIDA approved training programs amounting to little over 3000 workers over the whole period. Most firms instituting MIDA approved training programs to qualify for DDIT have been multinational enterprises, with a concentration in the electronics sector (where training is in any event relatively well developed). This is suggestive of an element of dead-weight. Since 1992, eligibility for the DDIT has been restricted to small manufacturing firms (employing fewer than 50 workers) but firms have in general been reluctant to participate for administrative reasons.

Another scheme, the Human Resources Development Fund (HRDF), has also been introduced to cater for the needs of larger manufacturing firms. This is a payroll levy scheme (augmented by government subsidy of M\$49 million in the first year, increasing by M\$16 million in each of the following three years). Employers contribute 1% of their wage costs to the

fund. In return they may claim reimbursement of training expenses at the following rates: 60% for technical, craft or computer training and for quality-related and supervisory training; 50% for miscellaneous retraining; and 30% for overseas training. With the exception of overseas training, all claims by firms employing fewer than 200 workers qualify for an additional 10% reimbursement.

The reimbursements are available for a variety of approved courses. These include the Approved Training Program (ATP) in registered training institutions, the Skim Bantuan Latihan (SBL) which approves occasional in-house training provided by firms or by unregistered training institutions, and the Pelan Latihan Tahunan (PLT) scheme for more regular training programs run by firms themselves. The last two of these are proving the most popular with the companies registered with the fund; these firms have a clear perception of the private benefits accruing to the firm from the acquisition of human capital which is specific and provided in-house. Employers may claim from the fund only once they have contributed for a minimum of 6 months. Take-up of the opportunities provided by the HRDF has thus far been biased towards larger firms employing upwards of a thousand workers, since small but growing firms may not have been required to join the scheme at its inception. A difficulty which plagues any scheme of this sort is that of monitoring and accreditation. Retaining the DDIT for small firms is problematic because of bureaucracy costs and because the incentive to take advantage of the scheme is absent if income tax thresholds are not exceeded. Certainly take-up of DDIT has been very limited, and this has led to the conclusion that "the number of workers trained is small and the quality of training imparted is poor" (World Bank, 1994).

Singapore

Singapore has developed rapidly since 1965, when it gained independence. Over three-quarters of the population are ethnic Chinese, but there are significant minorities of Malays and Indians. Primary education is free at the point of delivery. Secondary school students are charged a nominal fee but often receive a substantial state subsidy. Higher fees are charged by elite independent schools, though these receive a substantial government subsidy (Felstead et al, 1994). Tertiary education is heavily subsidized, but the extent of cost recovery from students in the form of tuition fees (backed by guaranteed access to loans) has been increasing in recent years (Selvaratnam, 1994).

Education is fully bilingual, with all students being taught in English as well as their mother tongue (Mandarin, Malay, or Tamil). All students receive at least 6 years of primary education, and virtually all proceed to secondary education. Most pupils sit the GCE O (General Certificate of Education - Ordinary) level examinations after 4 years of secondary

education (if they are in the top 60% of the ability range) or after 5 years (if they are in the next 25%). The less academically gifted students take the GCE N (Normal) level examinations – which develop English, mathematics, and computer proficiency – after 4 or 5 years. Those who are successful after 4 years (N level) can proceed to a fifth year and take the O level. Those who complete N level after 5 years do so having repeated the final year of study.

Beyond secondary school, students may, if their performance at O level is satisfactory, continue their education via one of three routes. The first of these is Junior College, where they may study for the A (Advanced) level examinations which serve as entry qualifications for university. The second route is to enter one of the four polytechnics, where 2- and 3-year courses are available. Polytechnics provide a broad training with links to industry and commerce and offer courses that lead to diplomas or certificates in fields such as engineering, management, architectural technology. Finally, post-secondary education may be undertaken with the Institute of Technical Education (ITE) which was formed in 1992, replacing the former Vocational and Industrial Training Board (Wilson, 1993). This institute has legal status not only as a provider of training but also as the coordinating and regulatory body overseeing the provision of all public and private training. The ITE is advised on training needs by 12 Training Advisory Committees (TACs), each of which represents a separate industrial sector. It also works closely with the Council on Apprenticeship Training, a tripartite corporatist body. Each TAC comprises of employer representatives, skilled personnel, and professionals.

The ITE provides 2-3 year courses which are vocationally oriented and are aimed at students who have successfully completed the 5-year normal course. These lead first to Grade 3 (basic skills) and then to Grade 2 of the National Trade Certificate (NTC). Beyond this, the ITE also offers training to NTC Grade 1 (master craftsman level). The ITE is modelled along the lines of the German dual system (which offers within firm on-the-job training alongside part-time education and other training provided by outside agencies).

The budget of the ITE for the 1992 financial year was approximately S\$200 million, the vast majority of this comprising of operating grants from the Government. This constitutes approximately 4% of government recurrent spending on education (Felstead et al, 1994). Nominal fees are payable by students themselves: for example, the termly tuition fee for those studying for the Industrial Technician Certificate is currently S\$122. Bursaries are provided for those in financial need, and scholarships are available for students who perform well in the early stages of their course. About half of the total budget is spent on full-time institutional training. In 1992, the ITE employed about 2000 staff, two-thirds of whom were training staff.

The ITE provides courses at 15 institutes. Full-time institutional training leads to NTC-2 and other qualifications available through the ITE, including the Industrial Technician Certificate, the Certificate in Business Studies, and the Certificate in Office Skills. The institute's further activities include involvement in apprenticeship programs through the Adult Cooperative Training Scheme (ACTS), induction training, redeployment training, and lifelong learning (including a language program for older workers, the Training Initiative for Mature Employees - TIME). For those already in employment, general education is provided through the Basic Education for Skills Training (BEST) program. Vocation-specific training is provided (for employees sponsored by their firms) through the Modular Skills Training (MOST) program. Both of these are pitched at or below the basic NTC grade 3 level. English language and mathematics training to N-level is provided through the Worker Improvement through Secondary Education (WISE) scheme.

The ITE is also involved in the monitoring and certification of providers of training. A feature analysis model, comprising 13 performance indicators, is used in course evaluation. The indicators used are: cost of training; trainer-trainee ratio; the number of first choice applicants; subscription rate; placement rate; drop-out rate; pass rate; time taken for graduates to acquire first job; employment rate of graduates; training related placement rate; starting salaries of graduates; compatibility of output of ITE and other institutions offering comparable training; and the compatibility of projected intakes with the actual numbers admitted. Feedback on training provision is also sought in a systematic program of industrial visits by the institute's management (Seng, 1992).

The Government has also set up a number of training centers in collaboration with multinational enterprises and with foreign governments. Special support has been given to training in information technology, and in this respect the experience of Singapore may be regarded as an unusually successful example of picking winners.

Technical vocational education and training is financed through a 1% tax imposed on companies using as tax base the wages paid to low paid workers (initially, in 1979, those earning less than S\$750 per month). This sum is collected by the Skill Development Fund (Middleton et al, 1991). The training which may be financed by the fund is now entirely conducted at post-secondary level. Firms may apply for grants which reimburse up to 90% of the costs of their training programs. Under this scheme, firms have two incentives to train their least skilled workers: first, they receive funding from the Skill Development Fund, and secondly, they reduce the tax base upon which contributors to that fund are made. By 1985, some 21% of the workforce had received training on a course provided in this way; almost all large firms have benefited from the Fund, as have most medium-sized and a large minority of small firms. In addition to training activities, the Skill Development Fund provides assistance to firms

investing in new technologies which are intensive in their use of physical capital. The Fund is administered by the National Productivity Board.

Private sector specialist providers of training tend to concentrate in areas where costs of provision are relatively low and demand is high. There are firms providing training in languages, information technology and management. Courses in technology require a greater capital investment and are not therefore so commonly provided by specialist firms. In some cases employers' associations, notably those within the electronics, tourism, and the financial services sectors, have, with the encouragement of the Employment Development Board, set up educational assistance funds and have arranged training programs and examinations for recognized qualifications.

The influence of the Ministry of Education extends as far as determining the broad policy direction of schools in the private sector. Forecasts of future trends in the pattern of labor demand are used as a means of accelerating the response of the vocational education and training market to changes in industry's demand for skills. The supervision by the Government of training centers (including specialist training bodies in the private sector and training units within firms) is tight. Inevitably some firms have questioned the authority of those making decisions on whether grants should be awarded or whether programs should be approved. The standards set at examinations are high. There has, however, been a move towards greater autonomy for schools since 1982, and this has become increasingly pronounced in recent years. An extreme example concerns schools which have become independent, and which are free to pursue their own admissions policy and recruit their own staff. These receive a per student grant from the Government and charge fees (which parents may claim back from the Government on a means tested basis).

An interesting recent innovation is a further subsidy to education and training introduced in 1993. For each child between 6 and 16 years of age, the Ministry of Education makes a regular payment into an EduSave account. In the fashion of a voucher system, parents may use the resources provided by this account to buy whatever additional education they wish for their child. This may include remedial or enrichment classes or alternatively the amount may be saved to help pay for further education.

The three major reforms in the Singapore system over the last three decades reflect its development to a business center specializing in industries, such as high value added manufacturing, which are intensive in their employment of highly trained labor. Current Singaporean educational policy emphasizes tuition of basic principles to school pupils, giving them the equipment to embark on a lifetime of learning; educational policy is thus well integrated with training policy. The aim of the most recent

reform (in 1992) is to give at least 2 years of post-secondary education to 90% of all those reaching the age of 16, with 20% proceeding to university.

Taiwan, China

In Taiwan, China, primary education lasts for 6 years. Pupils then proceed to junior high school for a further 3 years. Both primary and junior secondary schools are almost all in the public sector and administered at country or municipality level. Senior high school (3 years) follows for the majority of junior high school leavers. Senior high schools are divided into vocational schools, which have increased in number over recent decades, and selective academic schools. The general (academic) schools divide students into separate streams focusing on the sciences and the social sciences respectively. These are mainly public sector institutions; although an increasing number of private sector schools are emerging in this sector, these still account for less than 2% of the total. Schooling is compulsory for 9 years, and since 1990 has been free at the point of delivery up to the end of senior high school. Beyond this level fees are payable, but support is available for needy students. Public sector institutions generally charge fees which are substantially lower than those charged in the private sector.

The vocational schools predominantly belong to the private sector. Some of these have strong links with individual companies. An example is the Ming Chi College, which is financially supported by Forma Plastics. The most popular courses offered at junior colleges are in industry/technology and in commerce. These account for about 50% and 35% respectively of student enrollment, and are taught in 32 institutes of technology, 11 business colleges, and five further colleges which offer tuition in both subject areas. Courses are also available in a further 24 colleges offering agriculture, nursing, marine products, home economics, and the arts. Of those students attending senior high school, about 70% enroll in the vocational schools. Courses in vocational schools include a substantial general academic component that ensures all students achieve a critical level in mathematics and other key subjects.

Of those completing senior high school, almost one half proceed to higher education in junior college (2-3 years) or university (4 years). These respectively serve primarily the graduates of vocational and general senior high schools, although small numbers of graduates from vocational schools can and do proceed to university. Entrance to both senior secondary and tertiary education, based upon examination results, is thus extremely competitive. However, junior colleges offer, in addition to 2-3 year courses, a 5-year course aimed at students who have not gone through senior high schools. Once students on these latter courses are included, almost four-fifths of the proportion of the relevant age cohort attends post-secondary education. Most junior colleges are private sector

organizations (although they receive financial support from the Ministry of Education), but there are 10 national junior colleges in the public sector.

Some 45 universities and other 4-year colleges come under the control of the Ministry of Education, of which about a third are private sector institutions. The latter, however, enroll about 60% of all students in this sector. The private sector institutions have higher student/staff ratios than those in the public sector. A small number of military and police colleges, run by the Ministry of Defence, also offer degrees at bachelor level.

It is possible, albeit uncommon, for graduates of the junior colleges to take transfer examinations which allow them to enter directly into the second or third year of a bachelor's degree program. Likewise junior college graduates may be admitted to a postgraduate university course if they have acquired appropriate work experience. A further exception from the norm is the range of courses offered at bachelor's degree level by the National Taiwan Institute of Technology and a small number of other institutions. These courses have two streams of entry – junior college graduates study for 2 years, while vocational high school graduates study for 4 years.

There has, in response to demand pressures, been a rapid expansion of all post-primary forms of education over the last 30 years, but the Government has ensured that the increase in provision is concentrated in the vocational areas (Liu & Armer, 1993). Thus, in 1988, there were nearly 60,000 new graduates of the junior colleges, compared with 40,000 new university graduates. There has also been a rapid increase in the number of vocationally oriented junior colleges – from just 10 in 1960 to almost 80 now. The vocational senior high schools and junior colleges are thus a significant source of skills, and the emphasis placed upon them distinguishes the Taiwanese system from that of other NICs. The persistently tight state of the labor market, combined with a degree of central planning and government industrial policies, has protected Taiwan, China, from the problems of mismatch and overeducation which have characterized some other countries which have pursued this route.

Almost half of all in-service training is provided within private sector firms for their own workers; this is especially the case for skilled manual workers. About a quarter are trained within public enterprises. The remainder are fairly evenly divided between public training institutions and civic organizations. The Employment and Vocational Training Administration (EVTA) runs four of these centers and advises others which are supervised by government departments. These centers provide training at apprenticeship or pre-employment level in some 70 distinct trades, and also provide in-service training through the medium of evening classes. This training includes supplementary training for vocational instructors, upgrading training for established workers, job transfer training, and special training courses for disabled workers. EVTA also

provides a range of technical services. Under the terms of the 1983 Vocational Training Act, financial support is given for evening classes for skilled workers, for in-service courses for technicians, and for schemes which intensify the utilization of training facilities by operating multiple shifts at training centers. EVTA is also responsible for the National Employment Information Exchange Center, which has been founded to facilitate placement of workers and to speed up the dissemination of labor market information.

The Ministry of Education is responsible for all levels of education in Taiwan, China, although some functions are delegated to the Provincial Department of Education or to the municipalities. The extent of government control is substantial. The ministry develops curricula, supervises the examinations process, determines teachers' pay and even has a hand in determining private sector institutions' fees. The Ministry conducts long-range planning exercises in consultation with the National Science Council and the Manpower Development Committee. National Training Plans are developed on a 4-year cycle by EVTA in conjunction with the Council for Economic Development (a government body). Although industry is involved in the construction of these plans, the Government's voice often dominates in practice.

Legislation, in the form of a tax and subsidy scheme similar to the Singaporean Skill Development Fund, was implemented briefly during the 1970s, but was scrapped in 1974 as a casualty of economic recession. The 1983 Vocational Training Act made firms primarily responsible for the funding of in-service training in Taiwan, China. Nevertheless, large-scale enterprises have been particularly active in the provision of training promoted in part by government subsidies. Worker training in Taiwan, China was offered by about one-in-four manufacturing firms in the mid-1980s (San, 1990). Firms undertaking approved training within the enterprise itself qualify for a 50% subsidy. A similar subsidy is offered to firms which send workers to a Public Training Center. Individuals undertaking training receive fully subsidized tuition and materials and are provided with meals for the duration of their courses (Russell et al, 1989).

The centralized coordination of training has resulted in a lack of appreciation for regional idiosyncrasies, the consequence being protracted regional mismatch between the skills of the local labor force and the needs of industry. Some lessons may be learned in this context from the development in the United Kingdom of Training and Enterprise Councils (TECs); these regional organizations serve as channels for the funding of training by central government, and allow local knowledge of industry's needs to be accommodated within the decision-making process.

Summary: common features, differences and notable lessons

Common Features

When the government mandates that a certain amount of training must be provided, there is usually an expansion in the amount of training being offered. However, it is not always clear whether this is useful in increasing skills; neither is the effect on their quality clear. When the government confines itself to the regulatory side, that is, in monitoring, evaluation and certification of training programs and in dissemination of information, the results (both in terms of quantity and quality) are more positive.

Training policies can have equitable or inequitable effects. Often larger firms and more educated workers benefit more than smaller firms and the less qualified workers. In general, employers prefer in-house training (and training has higher returns) to training being offered by outside contractors. Reforms of training have been undertaken regularly as conditions change. The NICs amend or abandon interventions frequently, often responding to signalling from changing economic conditions.

Paradoxically, the speedy *industrialization* of recent years has resulted in a greater increase in training in commercial, language, information technology, management and related courses rather than in industrial skills. This has been accompanied by more autonomy of institutions over time and greater participation of employers. Increasingly institutions develop their own admission policy and are responsible for the selection of their own staff. Cost-recovery has been increasing and systems are becoming more flexible and demand-driven. Private sector specialist providers of training tend to concentrate in areas where costs of provision are relatively low and demand is high. This is often the case in urban areas and it is not surprising that in Singapore this form of provision is most widespread.

There are some cross-country similarities in training across some industries (but differences exist between others: see later). Training is more important in transport, machinery, in metal extraction, communications and the utilities but to a lesser degree in the electronics industry. Training is unusual in the construction industry, probably because of the high labor turnover rate in this sector. Other industries in which training is relatively uncommon include food and textiles, both of which use relatively unskilled and predominantly female labor.

Often vocational schooling at secondary level contains a high general education component. In general, the opening of trade has increased the provision of/demand for a more general type education. The education system in Singapore has undergone a series of reforms in order to keep provision in line with the current state of economic development. The

rapid shift of the Taiwanese economy from agricultural to industrial has imposed demands on the system, which has had to adapt rapidly to the changing economic environment.

Labor market outcomes of vocational school graduates are in general characterized by lower earnings and less promising employment prospects than academic graduates (even after controlling for factors that affect the two groups). This is partly due to the prevalence of public training centers that impart less effective training though they often have higher costs and higher staff/student ratios.

Differences

There are some notable differences with respect to both the general policy framework within which decisions are made and also to specific training provisions.

Training institutions and the production sector are coordinated centrally in some countries (such as Korea and Singapore) but this is not so evident in others (such as training in Taiwan, China and production in Malaysia).

Foreign direct investment (FDI) and the role of large firms in general has been more important in Singapore than in the other countries. Large firms employing sophisticated technology are particularly active providers of in-service training, and this often applies to the case of multinational enterprises.

While in many countries the public sector is dominant in the provision of vocational education and training, several of the NICs, notably Korea and Singapore, provide exceptions. Many training programs are *provided* by private sector organizations even though they may be *funded* (in part or whole) by government.

Some countries operate a levy/grant system or a 'train or be taxed' policy. Firms in Korea are effectively taxed, but they can avoid this expenditure by training their workers. In light of this observation, the preference of many firms in Korea to incur tax losses is no more surprising – and represents no more a failure of the system – than would an accumulation of surpluses in Singapore's Skills Development Fund.

In some industries there is substantial cross-country variation in training. Training is deemed to be very important in the financial services and the tourism sectors in Singapore but not in Korea or Taiwan, China. This might reflect differences in the level of development, and in the size and openness of the economies in question.

Vocational secondary education has been pursued in some countries but not in others. Taiwan, China has pursued secondary vocational education vigorously, albeit with a high general academic content. Korea is on a similar pattern. On the other hand, Malaysia's poly-ethnic composition has resulted in an educational policy that attempts to foster

national unity and moral development through academic rather than vocational education.

Lessons

There is no universal prescription for training interventions. Much depends on country-specific characteristics such as simple or sophisticated production, the availability of information, size of country, the nature of labor, product and credit markets, and the kind of industrial policy the government has chosen to pursue (centralized or *laissez-faire*). The socially optimal provision of in-service training, therefore, depends on the developmental stage of the country (appendix 2).

The first lesson is that skills development systems should delay specialization as much as possible, and specialized occupation-specific aspects of training should take place in-service (Middleton et al, 1993). Too early specialization can divert significant resources from more productive uses to expensive, but often ineffective, training. The track record of vocational training within the formal education sector has been disappointing. This has led to a general move away from vocational secondary schools (Middleton, 1988) though this trend is bucked in some countries (such as Taiwan, China) where vocational secondary education appears to offer high rates of return (comparable to those obtained in the academic schools). However, vocational education in Taiwan, China has a high content of academic courses. The low social rates of return to vocational education and the high rates observed in the case of in-service training suggest that the fundamental question in skills development is not whether to vocationalize schools *but at what stage in the education process*. A country that has a 40% enrollment ratio in primary education or 3% in secondary education is unlikely to realize positive social returns from vocationalization. However, a country with universal secondary education can start introducing vocational/technical courses in the curriculum.

The second lesson is that administrative measures that increase the private provision or finance of training should not act as a tax and be simple in design. The experience with levy/grant or 'train or be taxed' schemes is mixed. Taiwan, China abandoned the scheme. Korea is constantly amending it. In Singapore disbursements for training are lower than the revenue collected for this purpose. The financial incentives schemes in Malaysia are unduly complicated and have a low take-up rate. Political considerations may also be important. The high incidence of non-training in Korea is partly because firms successfully put pressure on the Government to keep the tax rate down. Overall, levy-grant schemes require competent tax mechanisms that are not usually well developed in many developing countries and have elements of dead-weight.

The third lesson is to allow public and private providers of training to operate with autonomy that would enable them to supply skills in demand

in an effective way. Internally, this means that training providers should have freedom to select their own students, recruit staff and choose courses and, externally, their coordination should be undertaken by independent bodies (Middleton et al, 1993).

The fourth lesson is that active participation of employers enhances the performance of training. In-service training contracted freely at the workplace has low costs and high returns. The heterogeneity of in-service vocational training schemes and measurement problems have restricted the number of cases where returns to training are available (compared to those for education: Psacharopoulos, 1987; Middleton et al, 1991). When available, rates of returns of in-service training are particularly high (Cassen & Mavrotas, 1994): enterprise training has produced social rates of return of 20% in Malaysia, and in-plant training for welders in Korean shipbuilding had a rate of 28%, higher than in non-firm training institutions.

The fifth lesson is that a regulatory function of the government and continuous monitoring and analysis of the labor market are useful instruments in ensuring that adequate skills are created in a timely manner and at minimum costs.

Correspondence

Dr Geraint Johnes, Department of Economics, Lancaster University, Lancaster LA1 4YX, United Kingdom.

Notes

- [1] The findings, interpretations, and conclusions expressed in this article are entirely those of the authors and should not be attributed in any manner to the World Bank, to its affiliated organizations, or to the members of its Board of Executive Directors or the countries they represent. The authors wish to thank Jane Armitage, Indermit Gill, Haneen Sayed, Michael Walton and an anonymous referee for comments on an earlier draft. The usual disclaimer applies.
- [2] Throughout this article, Korea refers to South Korea; Taiwan, China refers to Taiwan.
- [3] Training in Indonesia is examined separately in Tzannatos & Sayed (1996).
- [4] The information on the countries is as of 1994.

References

- Cassen, R. & Mavrotas, G. (1994) Education and training for manufacturing development, Mimeo, University of Oxford.
- Choudhury, A. & Islam, I. (1993) *The Newly Industrialising Economies of East Asia*. London: Routledge.

- Dougherty, C. & Tan, J-P. (1991) Financing training: issues and options, World Bank, Population and Human Resources Department Working Paper WPS 716.
- Fairclough, G. (1994) Failing grade, *Far Eastern Economic Review*, 29 September, pp. 62-64.
- Felstead, A., Ashton, D., Green, F. & Sung, J. (1994) International study of vocational education and training in the Federal Republic of Germany, France, Japan, Singapore and the United States, Report submitted to the Employment Department, Centre for Labour Market Studies, University of Leicester, United Kingdom.
- Han, J-H. (1994) Education and industrialisation: the Korean nexus in human resource development, *Education Economic*, 2, pp. 169-184.
- Husén, T. & Postlethwaite, T. (1994) *The International Encyclopaedia of Education*. Oxford: Pergamon.
- Liu, C. & Armer, J. M. (1993) Education's effect on economic growth in Taiwan, *Comparative Education Review*, 37, pp. 304-321.
- Middleton, J. (1988) Changing patterns in vocational education, World Bank Population and Human Resources Department Working Paper WPS 26.
- Middleton, J., Ziderman, A. & Adams, A. van (1991) *Vocational and Technical Education and Training*. Washington: World Bank.
- Middleton, J., Ziderman, A. & Adams, A. van (1993) *Skills for Productivity: vocational education and training in developing countries*. New York: Oxford University Press.
- Page, J. et al (1993) *The East Asian Miracle: economic growth and public policy*. New York: Oxford University Press for the World Bank.
- Psacharopoulos, G. (1987) To vocationalize or not to vocationalize? That is the curriculum question, *International Review of Education*, 33, pp. 187-211.
- Russell, D. et al (1989) *Report of the European and Asian Mission Study Groups on Vocational Education*. Perth: Western Australia Technical and Further Education Office.
- Salomé, B. & Charmes, J. (1988) *In-service Training: five Asian experiences*. Paris: Organisation for Economic Cooperation and Development.
- San, G. (1990) Enterprise training in Taiwan: results from the vocational training needs survey, *Economics of Education Review*, 9, pp. 411-418.
- Selvaratnam, V. (1994) Innovations in higher education: Singapore at the competitive edge, World Bank Technical Paper 222.
- Seng, L. S. (1992) *Overview of Vocational Training Programmes*. Singapore: Institute of Technical Education.
- Tzannatos, Z. (1995) *Reverse Ethnic Discrimination in Education*. Washington: World Bank Poverty and Social Policy Department.
- Tzannatos, Z. & Haneen, S. (1996) *Training and the Labor Market in Indonesia: productivity gains and employment growth*. Washington: World Bank Report No. 14413-IND.
- Vatikiotis, M. (1994) Survival lessons, *Far Eastern Economic Review*, 6 January, pp. 76-78.

- Westphal, L. E. (1990) Industrial policy in an expert-propelled economy: lessons from South Korea's experience, *Journal of Economic Perspectives*, 4, pp. 41-59.
- Wilson, D. N. (1991) Reform of technical-vocational education in Indonesia and Malaysia, *Comparative Education*, 27, pp. 207-221.
- Wilson, D. N. (1993) Reforming technical and technological education, *Vocational Aspect of Education*, 45, pp. 265-284.
- World Bank (1994) *Malaysia: meeting labor needs – more workers and better skills*. Washington: World Bank Report No. 13163-MY.

Appendix 1

	Korea	Malaysia	Singapore	Taiwan, China
Population (mill. 1990)	42.8	17.9	3	19.7
GNP (1990 US\$mill.)	231,129	41,528	33,480	138,495
(Exports + imports)/GNP	0.58	1.41	3.38	0.92
Distribution of GNP across industries in 1990, % (1965 figures in brackets)				
Agriculture	9 (38)	18 (28)	0 (3)	15 (42)
Industry	45 (25)	42 (25)	37 (24)	43 (25)
Services	46 (37)	40 (47)	63 (74)	42 (33)

Note: Data are for 1990 or nearest available year. Source: World Bank Development Report for Korea, Malaysia and Singapore; various sources for Taiwan, China.

Table AI. Main economic indicators.

	Korea	Malaysia	Singapore	Taiwan, China
Primary education enrollment (% of relevant World Bank age group) [1]	108	93	110	100
Secondary education enrollment (% of relevant World Bank age group)	87	56	69	78

Secondary school pupils attending vocational secondary schools (%) [2]	33	7	-	70
Number of training centers (annual number of completers in brackets) [3]	88 (30000)	20 (17000)	15 (17000)	12 (22000)

	Korea	Malaysia	Singapore	Taiwan, China
Incentives for in-service training	Tax levied on firms failing to train required proportion of workforce	Levy-subsidy (large firms); double deduction of training expenses for tax purposes (others)	Levy-subsidy	Subsidy from general taxation
Coordinating body for vocational training	Vocational Training and Management Agency	Technical and Vocational Division of the Ministry of Education	Institute of Technical Education	Employment and Vocational Training Administration
Composition of coordinating body	Government led, limited autonomy from Ministry of Labor	Government body	Governors drawn from industry, labor organizations and Government	Government body, some informal consultation with industry

Table AII. Education and training indicators. Notes: [1] The percentage enrollment in Korea and Singapore exceeds 100 because some pupils on the roll are of ages which lie outside the World Bank age band which is deemed to apply to primary education. [2] There is considerable cross-country variation in the amount of vocational instruction at general secondary schools and in the amount of academic instruction offered in the vocational schools. Hence the definition of vocational secondary schools inevitably differs across countries. The data were obtained from the country entries in Husén & Postlethwaite (1994) and from Liu & Armer (1993). [3] Training centers are variously defined across countries: public sector vocational training centers (Korea); industrial training institutions of the Ministry of Human Resources plus MARA skills institutes (Malaysia); ITE training

institutes (Singapore); EVTA centers and other public sector training centers financially assisted by EVTA (Taiwan, China). Data are for 1990 or nearest available year.

Appendix 2. In-service Training in the NICs

The experiences of Korea, Singapore, Hong Kong and Taiwan show that the relationship between education and in-service training changes over time as a result of economic growth and diversification. Three developmental stages can be distinguished from the perspective of training.

In the first stage, literacy rates rise with the spread of primary education. As the economic structure is characterized by mainly low-value added activities (garments, textiles, food, electronics) the need for elaborate in-service training programs is small.

In the second stage, as the economic structure becomes more sophisticated and diversified with the addition of new industries (chemicals, shipbuilding, financial services), the demand for more elaborate in-service training grows. All four NICs were at this second stage in the mid-1980s but there was significant variation among them in the support given to in-service training by the government, trade unions and employers.

In the third stage, the growing emphasis on high-value added activities (computers, industrial electronics, precision tools, engineering and consultancy services) creates a need for a larger number of highly-educated workers as well as a highly developed and specialized system of in-service training. The NICs have entered this third stage with substantial differences in their in-service training programs.

Within each stage, training systems can be considerably different across countries. Hong Kong has a *laissez-faire*, privately-based system. Singapore has a heavily interventionist approach. South Korea and Taiwan have extended support for in-service training but less comprehensive than Singapore. Korea requires employers to provide specific amounts of in-service training but the usefulness of such may be less than optimal. In contrast, Singapore does not stipulate a minimum amount of training but provides incentives (through grants and specialized services) which, until the training reforms of the late 1970s, benefited the educated workers and the large firms. In Taiwan, the Government is not directly or substantially involved in training, which is undertaken by small- and medium-sized firms and government enterprises (*Source*: Tzannatos & Sayed, 1996).