II

STAGES OF ECONOMIC DEVELOPMENT AND CORRESPONDING EDUCATION AND TRAINING REQUIREMENTS

There is broad correlation between the major stages of economic growth and priorities for education and training systems, as shown in the matrix in Table 1. It should be noted that the different stages are not self-contained, but overlap. In fact, country economies are usually mixed, combining various stages of economic development. A good example is India, with subsistence agriculture, a large urban informal sector, and low-cost manufacturing, together with high value-added enterprises and even some enclaves of a knowledge-based economy.

All countries start as agrarian, low-income countries, where the economic challenge is to increase agricultural productivity, develop cash crops, and provide better marketing infrastructure—-such as transport and electrification. During this stage of development, educational priorities move to universal basic education as quickly as possible, and to provision of non-formal skills training to raise incomes and reduce poverty. Once this process is underway, countries progress through the three stages of economic growth discussed below.

A. FACTOR-DRIVEN GROWTH

In countries at this stage of economic development, such as the People's Republic of China (PRC), India, and Sri Lanka, the primary sector is often predominant, with the focus on extraction of natural resources. The main economic challenges are to get factor markets functioning properly so as to utilize land, labor, and capital properly. Full employment is a principal objective as employment in the agriculture sector declines. Manufacturing is characterized by labor-

intensive activities leading to low value-added production. Competitiveness derives from the low cost of production, of which low wages are a key factor, and the ease of access to external markets. Policy efforts aim in particular to keep labor costs in check.

Development at this stage does not require massive investment in TEVT. "High levels of education and training are not required for the production of low value-added goods and services (Ashton and Green 1996, 32)." Priorities for education and training are universal basic education, low-level vocational skills development, and inculcation of disciplined work habits. A small but strong capacity in basic training also is an important priority. Establishment of a training authority, with employer participation, would be appropriate to respond effectively to the different markets for training (Middleton et al. 1993, 266).

Even advanced industrial countries may pursue a low-skills approach. In the shorter term it is quite possible for a high-skill, high-wage sector to co-exist with low-wage, low-skill sectors.

> *There is little doubt that there are companies...where competitive strategies based on high-quality production and high value added mean that a more flexible, autonomous and highly skilled workforce is regarded as an essential prerequisite for success. There are a great many other employers pursuing market strategies based on the production of low-quality, low-cost goods and services using Taylorist methods of work organization who are more likely to want a cheap, relatively low-skilled workforce of people who do what they are told... Many employers viewed training for (plastics) process operators as a waste of time because the skill requirements of the job were so limited (Booth and Snower 1996, 310, 311—312).*

Finegold (1998) first put forward the concept of a "low skills equilibrium" in describing the British economy in the late 1980s:

> *… under certain conditions it can be perfectly rational for a company manager to pursue a low-skills strategy. Under market pressure to produce short-term results, unable to find the means to cooperate productively with other businesses or with workers, experiencing difficulty in recruiting well-educated young workers, managers are likely to opt for low levels of training. At the same time, individuals hemmed in by short-term constraints, lack of security and limited marginal returns to studying hard at school, rationally opt for low levels of participation in education and training. The outcome of the game played by the company and its actual or prospective workforce is a low-skill equilibrium (as summarized in Ashton and Green 1996, 31).*

It is unlikely, however, that advanced countries can maintain or increase their standards of living over the long term using this approach. In general, the high skills, "high-tech" route is probably the only one that advanced, high-wage economies can sustain in the long term.

B. INVESTMENT-DRIVEN GROWTH

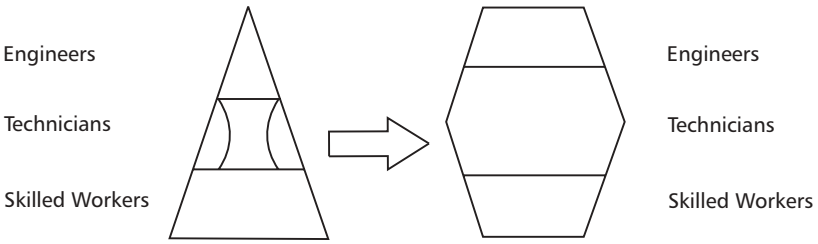
The secondary sector is predominant in countries at this stage of economic development, such as Malaysia and the Republic of Korea. The chief economic challenges are to (i) attract foreign direct investment (FDI) and imported technology to exploit land, labor, and capital resources; (ii) develop flexible labor markets (easy entry-easy exit.); and (iii) link the national economy with the global economy. The economy is characterized by export manufacturing and outsourced service exports. Production concentrates on high value-added goods and services. Competitiveness is based mainly on high-quality, technologically advanced, flexible production using imported technology. "High performing" companies burgeon.

The importance of education and training in the current era of international competition applies mainly to goods with high value-added. "To compete in these markets…the evidence for the importance of high levels of education and training is overwhelming (Ashton and

Green 1996, 32)." Economic growth at this stage witnesses an acceleration of demand for skills—-particularly at the higher levels—-and a corresponding decline in demand for unskilled or low-skilled production workers and craftsman. As stated in the project document for a recent ADB TEVT project in Nepal:[2]

> *…the present public training output ratio for technicians and crafts-level workers is 1:50. The classical ratio of engineer, technician and skilled workers for a developing economy is about 1:5:25. Presently, this is far from being met and the present skills of the available labor force are not ready to move forward to an industrializing economy without first achieving skill-based competitiveness. Figure [4] (below) illustrates the manpower structure of a developing economy like Sri Lanka, which is aiming to move to an industrializing economy to catch up with neighboring Southeast Asian countries, i.e. Singapore, Malaysia, and Thailand.*

Figure 4: Workforce Structure Model



Source: Association of Canadian Community Colleges. 2004. Sri Lanka: Proposed Human Resource Investment Project. Project Preparation Technical Assistance Report for named project, ADB, Manila, p. 39.

[2] ADB. 2004a. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to Nepal for the Skills for Employment Project*. Manila. (April 2004 draft)

Table 1: The Role of Education and Training in Different Stages of Development

Development Stage	Characteristics of Economic Production	Key Economic Challenges	Education, Training Requirements
1. Low income Factor-driven, resource-based growth	Natural resource extraction, labor-intensive assembly, and manufacturing. Primary sector is dominant. Low value-added production, e.g. commodities or relatively simple products of long-standardized technology designed elsewhere. Competitiveness mainly on price basis owing to low wages and low-cost production. Highly sensitive to world economic cycles, commodity price trends, and exchange rate fluctuations	Economic growth is determined primarily by the mobilization of primary factors of production: land, primary commodities, and unskilled labor. Government role is to get factor markets working properly by providing overall political and macro-economic stability, as well as a sufficiently free market with minimal distortions to utilize effectively primary commodities and unskilled labor.	Basic education, low-level skills, disciplined work habits, and policies to control wage increases.
2. Middle income Investment-driven growth	Concentration on manufacturing and outsourced service exports. Production of high value-added goods and services. Secondary sector is dominant. High-performing companies. Imported technology. Competition based mainly on efficiency in producing standard products. High quality technologically advanced, flexible production becomes more important, but technology and designs are still largely imported.	Attract foreign direct investment and imported technology through licensing and joint ventures. Link the national economy with international production systems and the global economy. Government priorities are to improve physical infrastructure (ports, telecommunications, roads) and regulatory arrangements to permit integration with global markets, andpolicies to facilitate flexible labor markets (easy entry-easy exit).	Universal secondary education, deepening of vocational and technical education, particularly at post-secondary technician levels—i.e. the “diamond” instead of the “pyramid” in Figure 1. Up-skill the labor force through life-long learning to retool and update skills. Broaden skills to include teamwork, communications, problem-solving, etc.
3. High Income Innovation-driven growth	Knowledge-based economy. Innovative products and services at the global technology frontier. Self-generation of technological innovation. Competitiveness is critically linked to high rates of social learning (especially science-based learning) and the ability to rapidly shift to new technologies. Tertiary sector is dominant.	Generate high rate of innovation through public and private investment in R&D, higher education, and improved capital markets and regulatory systems that support start-up of high technology enterprises. Adaptation and commercialization of new technologies	Well developed higher education—especially in science and engineering specializations, high rates of social learning—especially science-based learning, and dynamic R&D sector linking higher education programs and innovating firms. Firms invest heavily in continual training and upgrading their workforces.

R&D = research and development, TEVT = technical education and vocational training.
Source: Adapted from Schwab, Porter and Sachs (2002).

Priorities for education and training at this stage are universal secondary education,[1] deepening of vocational and technical education—particularly at post-secondary technician levels, and enhancing labor force skills through life-long learning to retool and update skills. Abilities in language, mathematics, and science become increasingly important prerequisites for the preparation of skilled workers. With advancing technology, workers are increasingly required to read and understand blueprints and operational manuals for complex and expensive machines and instruments. Workers must have basic literacy and numeracy skills in order to master the complex and sophisticated skills of modern trade and technical occupations. Consequently, universal secondary education becomes important. Technician training, particularly at post-secondary levels, also becomes a priority to supply the burgeoning requirements for middle category skilled workers (in the middle of the "diamond" of Figure 1). In terms of content, skills development would be broadened to include such topics as teamwork, communications, and problem solving. Substantial enterprise-based learning would be a requirement (Ashton and Green 1996, 24). As distortions ease, efforts should be made to enhance enterprise-based training (EBT)—especially for small and medium enterprises—and private training provision. The central training authority should be strengthened and given control of allocation of funds. A payroll levy may be both feasible and capable of providing stable funding for skills development. Finally, management capacity should be developed at institutional levels with a view to devolution of responsibilities and stronger links to accountability (Middleton et al. 1993, 257).

This stage a country's development also can be characterized as a "high skills approach," and is the opposite of the low-skills equilibrium at the previous level.

[1] One of the reasons that Thailand ran into economic difficulties in the mid-to-late-1990s, apart from the financial crisis, was the failure to move quickly enough to universal secondary education. This limited its ability to move up the economic value chain (ILO 1998a, 125).

> *An alternative, high skill equilibrium can be found where it is in the interests of the company to make use of productive techniques that require high skills to provide the necessary training and rewards for workers with the right attitudes and education, and it is in the interests of workers to undertake the necessary investments in themselves... Finegold suggests three main conditions for a high skills equilibrium. First there should be an environment in which long term planning is facilitated and short-term attitudes discouraged. Second, there needs to be an atmosphere conducive to elements of cooperation and consensus among employers and between employers and workers even in the context of overall competition. Such an atmosphere could be fostered by corporatist institutions with reasonably centralized bargaining arrangements. Third, industry must have an export orientation so that exposure to very low wage competition from other countries rules out low-wage forms of competition at home (Ashton and Green 1996, 31).*

C. INNOVATION-DRIVEN GROWTH

The tertiary sector is dominant in countries at this stage of development, such as Singapore. The main economic challenge at this stage is to generate a high rate of innovation, adaptation, and commercialization of new technologies, thus producing innovative products and services at the global technology frontier. At the upper end, this is the knowledge-based economy that generates technological innovation.

Priorities for education and training at this stage are highly developed education—especially in sciences and technical education in engineering specializations, high rates of science-based learning in general education, and a dynamic research and development (R&D) sector linking higher education programs and innovative firms. In view of the strong employment demand for skills, the largest share of occupation-specific training at this stage can be provided privately, either within enterprises or through trainee-financed private training providers.

D. TRANSITION ECONOMIES

Countries moving from command to market economies, such as the Central Asian Republics of the former Soviet Union, Viet Nam, and PRC, constitute a special case in the above typology. The transition to a market economy, and its implications for education and training, are summarized in Table 2.

Table 2: Transition Economies and Education and Training

Development Stage	Characteristics of Economic Production	Key Economic Challenges	Education, Training Requirements
Special case: Transition economies (from command to market economy)	Shift away from highly specialized manufacturing. Development of small and medium service- oriented enterprises. Development of new markets, including exports. Establishment of a labor market.	Price liberalization and reduction in subsidies. Fiscal and tax reforms, including broadening the tax base. Financial sector and banking reforms. Establishing favorable legal and regulatory framework for enterprise growth and development.	Reorientation and inclusion of market-oriented subjects. De-specialization of course offerings and consolidation of skills training. Adult retraining for those displaced by structural adjustments. Active labor market policies to facilitate labor mobility across sectors. Development of private training markets; "semi-privatization" of public training.

Source: Adapted from Schwab, Porter and Sachs (2002).

The main economic priorities in the transition from a command to market economy are price liberalization and reduction in subsidies; fiscal and tax reforms, including broadening the tax base; financial sector and banking reforms; and establishment of a favorable legal and regulatory framework for enterprise growth and development. Restructuring the economy typically requires a major shift away from

highly specialized manufacturing, and the development of small and medium service-oriented enterprises. New markets need to be developed, particularly for exports. Establishment of a labor market also has to be a priority to, among other things, address the massive shedding of labor that industrial restructuring entails. This would involve the introduction of active labor market policies to facilitate labor mobility across sectors.

Typically TEVT in command economies was overly specialized, with training institutions linked almost exclusively to one large enterprise, and trainees prepared for highly specific jobs in that enterprise. TEVT also enrolled the vast majority of youth at the intermediate level. In view of these characteristics, priorities for TEVT reform include (i) consolidation of institutions and reduction in enrollments, (ii) de-specialization of previously narrow program offerings, and (iii) reorientation of content to include market-oriented subjects. Enrollment rates in TEVT generally have plummeted throughout the transition world reflecting an extreme mismatch between the skills taught and the needs of the labor market. Adult retraining would be a priority for those displaced by structural adjustment. Other priorities would be to develop private training markets and to make public training institutions accountable for costs and output performance (See also ILO 1998a, 78—80).

E. TECHNOLOGY AND HUMAN RESOURCE REQUIREMENTS

The stages of technological development, like those of economic development, are linked with changes in human resource requirements.

> *Human resources driven economies obtain their stimulus for growth from advances in technology. The process requires receiving, assimilating, and adapting technology that already exists... This compels central attention to be given to education, which is the critical variable in determining the environment for technology (Behrman 1990, 3).*

The environment for technology should facilitate its passage through four stages of absorption:

(i) **Learning-by doing** – requiring only basic education, with technology not easily transferable.
(ii) **Learning-by-adapting** – requiring technical and vocational training, at least by shop floor technicians, and possibly by managers and engineers, with the skills transferable.
(iii) **Learning-by-design** – requiring much more technical skill, and therefore academic disciplines and advanced study to translate specific requirements into operative systems.
(iv) **Learning by innovation** – requiring creativity, education in basic science, and advanced degrees in engineering and science.

F. CASE STUDIES: THE REPUBLIC OF KOREA AND SINGAPORE

The Republic of Korea and Singapore case studies summarized below in Table 3 illustrate the main elements shown in the Table 1 matrix—how these countries went through the various stages of development, and the types of education and training assigned priority overtime.

Several common threads can be seen in the approaches of both countries. Both countries first emphasized the establishment of a wide base of educated people through universal basic education and adult education. University expansion was carefully managed, controlled and deferred until the later stages (1980s and beyond). Vocational education and training were relatively unimportant in the first phases of industrialization, when light industry that was highly labor intensive had only a limited need for skilled workers; but the bases for strong systems of vocational training were established at this stage (Caillods 1994, 247). TEVT became a top priority in the advanced industrialization phase. Both countries paid considerable attention to

upgrading workers on the job. Singapore introduced multiple programs and generally succeeded, such that the programs were phased down as the target groups were covered. Both introduced training levies to stimulate enterprise interest in worker training. The early objective of skill training was to produce flexible and multi-skilled workers. At a more advanced stage of industrialization, the focus of on-the-job training—-at least in Singapore—-shifted from quantitative objectives (upgrading more workers) to building capacities within enterprises. The objective was to make enterprises learning organizations and to deepen worker skills (e.g. skills to address and solve unforeseen problems). Higher technical education became important only in later industrial stages, particularly as the countries moved to higher value-added products and services. Science and engineering fields were then emphasized (see ILO 1998a, 122—126).

G. CONCLUSIONS

The above typology suggests that levels of economic development roughly corresponded to certain levels of development of education and training. In the first stages, (subsistence and factor-driven growth) basic education and adult education are priorities, with the gradual development of a basic skills formation system for skilled blue-collar workers. Higher education is limited. At the investment stage, universal secondary education, worker upgrading, and technician training became priorities as the importance of skilled workers declines. In the final stage, characterized by innovation-driven growth, higher education becomes the priority, along with research and development. The typology also suggests that during each stage, the base for the next stage must be prepared.

Table 3: Stages of Development of Education and Training in Singapore and the Republic of Korea

Stage	Singapore	Republic of Korea
1 **Import Substitution**	1960—1965 Integrated basic education for nation-building	1945—1960 Universal primary education and adult literacy
2 **Export-Oriented** Industrialization (low-cost assembly and light industrial manufacturing)	1965—1975 • Basic education through middle school • Establishment of single national training authority (VITB) • Initiation of Technical Education	1960s • Expansion of basic education up to middle school • Initial establishment of public vocational high schools • Creation of 2-year junior colleges • Creation of vocational training institutes for non-formal skills development under MOL
3	Mid-1970s to mid-1980s—2nd Industrial Revolution (move to higher value-added) • Vocational stream added to secondary • Establishment of Joint bi-lateral Technical Institutes • Establishment of Singapore Technical Institute • Major push to enhance workers' skills (BEST, WISE, MOST, COSEC) • Establishment of Skills Development Fund—initially to upgrade workers	1970s—Heavy Industrialization • Major push to increase proportion of secondary students in vocational high schools • Emphasis on engineering and science in junior colleges; excess demand for higher education channeled through open and correspondence universities • Law enacted stipulating quotas for EBT, later converted to training levy

4	1990s—Present ("The Next Lap") • Reworking curricula of general education to ensure basic skills needed for advanced industrial society (patterned after Japan and Germany) • Emphasis on production of intermediate level technical skills • JITCs become multinational in outlook • OJT-BEST, MOST phased down. Emphasis placed on building work-based learning and skills deepening. Training grants introduced, with German-style apprenticeship training • Higher education emphasized, especially science and engineering (polytechnics) • Attempts to expand university-based R&D	1980s (Liberalization—move into higher value added production and increasingly sophisticated technology) • Continued pressure by government to increase proportion of secondary students in vocational high schools, but enrollments declined • Emphasis placed on post-secondary technical courses and advanced training, especially in science and technology (Calloids, 248). • Levy system expanded to encourage OJT • Attempt (failed) to introduce German-style apprentice-ship system • Rapid expansion of higher education (18%/year in 1st half of 1980s) • Future strategies: ↓ Diversify higher education ↓ Allow vocational high school graduates access to higher education ↓ Decentralize to stimulate innovation and responsive-ness to niche markets ↓ Expand R&D

BEST = Basic Education for Skill Training, COSEC = Core Skills for Effectiveness and Change, EBT = enterprise-based training, JITC = joint industrial training centers, MOL = Ministry of Labor, MOST = Modular Skills Training, OJT = on-the-job training, R&D = research and development, VITB = Vocational and Industrial Training Board, WISE = Worker Improvement through Secondary Education.