

Asia's skills crisis

Introduction

Developing Asia has a serious skills gap, as well illustrated by the topic's growing frequency in news headlines. The *Financial Times* in early 2008 suggested that Asia's growing skills shortages may compel multinational companies operating in the region to pay Western-level salaries within 5 years to skilled scientists, information and communications technology (ICT) specialists, and engineers—a staggering claim once one considers the enormous income gap between the two regions. A few days later *The Economist* highlighted an unfolding crisis in the Indian army of a shortage of 11,000 officers, almost a quarter of requirements—at first glance, a puzzling situation in a country with a billion-plus population and a large pool of unemployed youth. But a closer inspection reveals that there is no puzzle: India has only a small pool of well-educated young workers, and salary offers from the country's booming private sector are often higher than those from the armed forces.

Ironically, developing Asia, home to over two fifths of the global population, is—in a relatively new phenomenon—suffering from a shortage of qualified workers. This is not limited to a few hot spots, but is prevalent enough to present a genuine risk to the region's long-run growth. Asia lacks a wide class of occupational skills relevant to a modern economy, and areas that are critical to growth are seeing large and growing mismatches between the skills that employers need and the skills that employees have. Such imbalances are particularly evident among professional groups, including accountants, airline pilots, business managers, engineers, lawyers, medical doctors, scientists, and software specialists.

The dearth of skills is manifesting itself in a variety of ways: productivity losses and idle capital; rising wage costs; increased turnover of sought-after workers; and higher placement and training costs for new workers. Business efficiency suffers as a result, and if problems are sufficiently widespread, whole industries and even entire economies may suffer.

Asia's skills gap has been widened by increasingly fierce global competition for skills, stimulated both by technological change and by a steady reduction in barriers to immigration. (See the chapter *Asian workers on the move*, also in Part 2.) Highly qualified professionals

in particular have benefited from these trends as industrial countries welcome them with open arms. Although this “brain drain” is hardly new to the region, the skills shortage confronting it has added a new, more urgent dimension to this trend.

This chapter is organized as follows. The next section, *Anatomy of a crisis*, looks at the causes, consequences, and likely future trends in developing Asia’s scarcity of skills. The shortfall stems from Asia’s economic success, which has fueled the demand for new skills-intensive goods and services. If not resolved, it may turn into an economywide bottleneck, seriously holding back growth. The largely structural nature of the problem precludes any “quick fix.”

Shortages at the sharp end sifts through survey data of employer perceptions of skills shortages in the region. It is, after all, corporate Asia that suffers the most—and so is most knowledgeable. These perceptions confirm that lack of qualified workers is indeed a large and growing business constraint across Asia and all industries. They also show that the scarcity is more pronounced for higher-skills levels, emphasizing that it is the skills that are in short supply, not workers.

Next, *Skills shortages in four Asian countries* looks at the experiences of the People’s Republic of China (PRC), India, Malaysia, and Thailand—two giants and two middle-income economies. With its combination of explosive economic growth and an education system that can fail to provide the types of workers that the economy now needs, the PRC epitomizes Asia’s talent crisis. In India, a looming shortage of talent is being fueled by the remarkable export success of the country’s ICT sector. In both Malaysia and Thailand, the failure of the education system to produce enough skilled people is seriously hampering the countries’ progression to higher value-added industries and activities.

The final section, *Easing the bottleneck*, looks at policy options, including short-term measures, such as greater openness to skilled foreign workers. More fundamentally though, stronger education systems need to be constructed, which is inevitably a long-term process. Allowing a greater role for the private sector must be an integral part of any changes to the education system, but governments will continue to play a key role. This section also contains some real-world examples of policies that help mitigate skills shortages.

Anatomy of a crisis

“Skill” is a nebulous concept and difficult to define tightly. Shah and Burke (2005) propose that “a skill is an ability to perform a productive task at a certain level of competence.” Skills are akin to the stock of knowledge and experience necessary to perform a productive task. Persons who lack them may be unable to carry out specific tasks, or will be less productive at them. By definition, skills shortages occur when supply fails to keep pace with demand.

Causes

Developing Asia’s rapid income growth has spawned demand for totally new goods and services. As incomes rise, consumers typically seek what they could not afford before—financial and legal services, for example,

and better health care. And Asia's deepening integration in the global economy has gone hand in hand with growing sophistication in the goods it produces and then sells abroad (ADB 2007a), which requires a larger pool of skills.

The emerging skills gap is largely a symptom of Asia's economic success. The acute shortage of airline pilots in the PRC, for example, is a direct consequence of the explosive growth in the demand for air travel in that country, itself a function of fast-climbing incomes. Other factors are at play, too, including a steady convergence toward international norms and practices for environmental standards, corporate governance, and financial regulation. This "upgrading" raises the demand for professional managers and specialists.

Supply-side factors are also operative. Above all, most education systems have not geared themselves to emerging needs and are exacerbating mismatches. The region's universities have to do more than produce high numbers of graduates—they have to turn out graduates who can perform the functions and tasks required by rapidly modernizing economies.

Consequences

The immediate symptoms of the skills gap include hard-to-fill vacancies, high staff turnover, and wage inflation, and reflect a natural response when demand for particular skills lags their supply. Take the example of the ICT industry. Firms will compete vigorously to attract and retain scarce systems analysts and software developers. This bids up wages, and ICT professionals can increasingly "hop" between firms for a higher salary. Furthermore, firms may find it increasingly difficult to fill vacant positions, settling for fewer and less-experienced professionals than they need. If this process goes on too long, it may crimp business and investment plans, leading to a fall in productivity, efficiency, and competitiveness at the firm level.

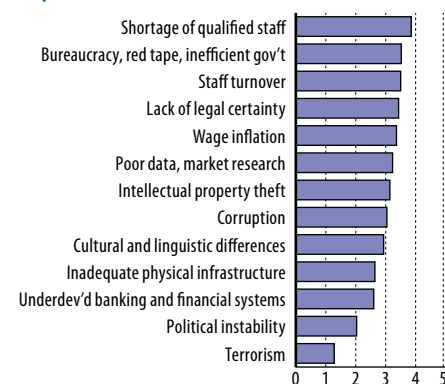
Firms can sometimes get around any shortfall in skills by investing more in local workers and developing skills themselves. For example, when Microsoft outsourced part of its web-based technical support to one of its joint ventures in the PRC, it hired 10 native-English speakers from the US to teach local workers about US e-mail protocol and writing style (McKinsey Global Institute 2005). However, many skills require long periods of more formal education. Nor is it likely that firms in tight markets for skills have any incentive to invest in job-hopping workers.

Although firms are in the front line of the skills shortage, the effects can extend to the economy as a whole. Skills constrictions can retard economic growth in just the same way as weak infrastructure. This is particularly true when they surface in the most dynamic sectors that might, for example, be important sources of foreign exchange (such as ICT in India), or that have important forward linkages to other sectors (such as accountancy, legal services, or airline transportation).

Future trends

Shortages of workers and skills are typical when growth accelerates. In order to meet the strong demand for goods and services at those times, firms may wish to have some workers in reserve, including skilled

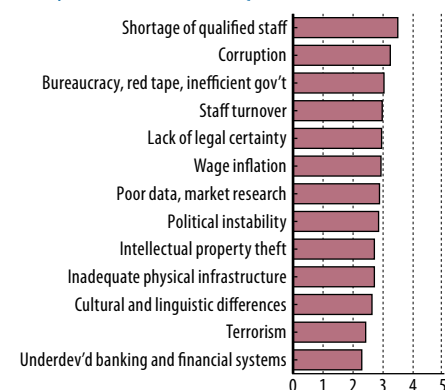
2.2.1 Top business concerns, People's Republic of China, Dec 2006–Jan 2007



1 = not an issue; 5 = serious issue.

Source: Staff estimates based on EIU (2007).

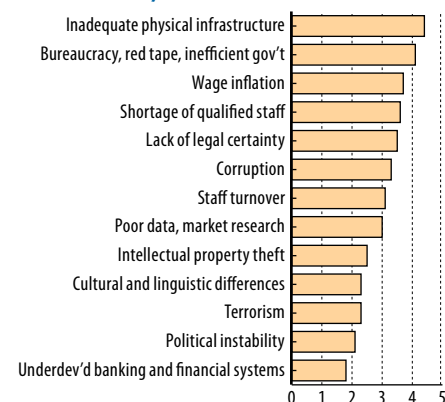
2.2.2 Top business concerns, Southeast Asia, Dec 2006–Jan 2007



1 = not an issue; 5 = serious issue.

Source: Staff estimates based on EIU (2007).

2.2.3 Top business concerns, India, Dec 2006–Jan 2007



1 = not an issue; 5 = serious issue.

Source: Staff estimates based on EIU (2007).

workers, accentuating the demand. It seems likely that exceptionally robust growth both in developing Asia and in the broader global economy in 2002–2007 exacerbated the situation. Yet there is a significant long-term component to the skills shortages that reflects the fast economic catch-up of the region and its rapid, ongoing structural transformation. In addition, most of Asia's education systems are ill-equipped to meet modern labor force requirements and many of them have for long been identified as possible bottlenecks on growth and economic modernization (ADB 2007b).

Looking ahead, the prospect of a transition toward older populations, which will begin in the PRC within the next few years and which is already well under way in the rest of East Asia, as well as of growing premiums on skills- and knowledge-based activities, suggest that the skills gap could become wider and more costly. Given the long lead times involved, policy makers would do well to consider solutions now.

Shortages at the sharp end

The previous sections have given a bird's-eye view of the skills gap in developing Asia. But how is the effect felt “on the ground,” where shortages above all represent a practical problem plaguing the everyday operations and investment plans of Asian companies? It is helpful to listen to the voice of corporate Asia to get a feel for the dimensions and depth of the impact. That voice suggests that it is the highly specialized, professional occupations that lie at the heart of Asia's skills shortage.

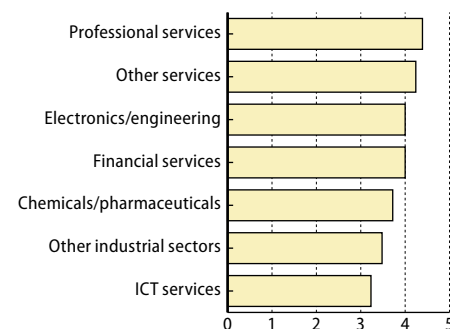
Three firm-level surveys that pick up this voice have been carried out in the last couple of years, two by the Economist Intelligence Unit (EIU) and one by the World Bank. The surveys had the broad aim of identifying the major obstacles to doing business in the region, and provide a partial—but revealing—profile.

Asia Business Outlook Survey 2007

The EIU carried out its first Asia Business Outlook Survey in December 2006 and January 2007. The survey aimed to identify companies' performance, business prospects, and key challenges. The respondents were senior executives of 241 member companies of the EIU's Corporate Network in Asia, in seven different industries: about 20% of respondents were in chemicals/pharmaceuticals; 20% in other services; 18% in other industrial sectors; 12% in financial services; 12% in professional services; 10% in ICT services; and 8% in electronics/engineering.

The respondents were asked to identify and rank their business concerns in three “regions” from a list of 13 major issues, ranging from terrorism to inadequate physical infrastructure to shortage of qualified staff. The regions were PRC, India, and Southeast Asia (Indonesia, Malaysia, Philippines, Singapore, Thailand, and Viet Nam). The survey results indicated that the last issue was the top business concern among the responding firms in the PRC and Southeast Asia, and the fourth-greatest concern in India (Figures 2.2.1, 2.2.2, and 2.2.3 above). Two issues relating to staff shortages, namely wage inflation and staff turnover, also ranked high in all three regions. These results are consistent with the view that finding and keeping qualified workers is a daunting challenge for corporate Asia.

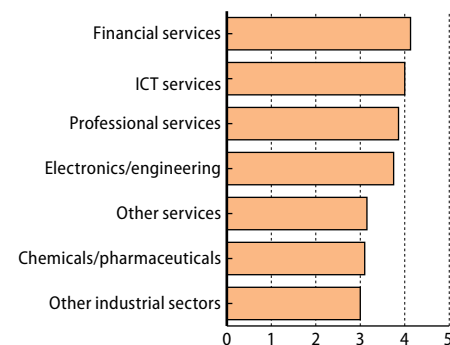
2.2.4 Shortage of qualified staff as an issue, People's Republic of China, Dec 2006–Jan 2007



1 = not an issue; 5 = serious issue.

Source: Staff estimates based on EIU (2007).

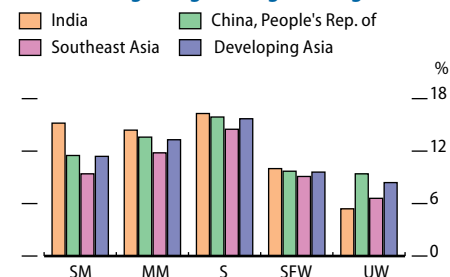
2.2.5 Shortage of qualified staff as an issue, Southeast Asia, Dec 2006–Jan 2007



1 = not an issue; 5 = serious issue.

Source: Staff estimates based on EIU (2007).

2.2.6 Average wage change during 2007



MM = middle managers; S = specialists (finance, ICT); SFW = skilled factory workers; SM = senior managers; UW = unskilled workers.

Source: EIU (2008).

Firms in the same seven industries in the PRC and Southeast Asia were asked whether shortages of qualified staff represented a serious business issue. The survey results showed that no industry was immune from these problems (Figures 2.2.4 and 2.2.5), suggesting that constraints cut across sectors as well as countries.

Asia Business Outlook Survey 2008

The EIU's second Asia Business Outlook Survey was conducted in December 2007. In addition to many of the earlier questions, this survey asked firms how much wages had risen during 2007 for different types of workers. A clear pattern emerged across all three regions: specialist workers experienced the biggest pay increase and unskilled workers the lowest (Figure 2.2.6). Overall, these data lend further support to the notion that Asia's labor gap is more pronounced in high-skill occupations. In addition to suggesting possible shortages, these findings are consistent with technological change that favors productivity gains by skilled workers.

Firms were also asked whether shortages of particular types of workers constituted a serious business constraint. Again, a clear pattern emerged (Figures 2.2.7, 2.2.8, and 2.2.9): staff shortages were a much bigger problem among senior managers, middle managers, and specialist professionals than among skilled factory workers and unskilled workers. The point bears repeating: Asia is suffering from a shortage of skills, not a shortage of workers.

World Bank Enterprise Surveys

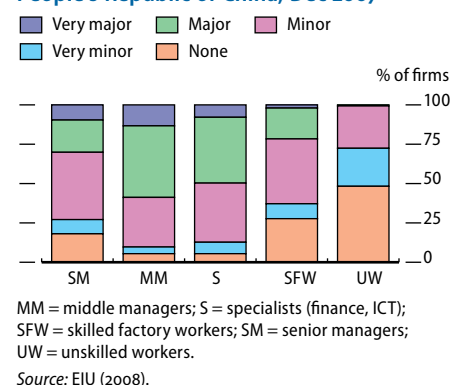
World Bank Enterprise Surveys (WBESs) collect firm-level data on the business environment, on various business obstacles as perceived by firms, and on some productivity measures. They are an integral component of the World Bank's Investment Climate Survey research program, which seeks to assess the investment climate and identify significant firm-level constraints to investment. The WBESs cover manufacturing firms mainly and certain services subsectors such as ICT and tourism. Sample sizes for recent WBESs range from 250 to 1,500 firms. First conducted in 2002, the surveys now cover slightly more than 100 countries, including PRC, India, Malaysia, and Thailand.

In the case of the PRC, separate WBESs were carried out for manufacturing and services, both in 2002. Manufacturing firms perceive inadequate skills and education of workers to be the fourth most serious obstacle to doing business, and services, third, out of 17 potential obstacles (Figures 2.2.10 and 2.2.11).

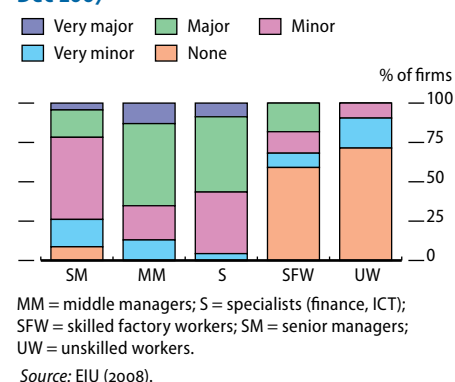
WBESs of Indian manufacturing firms were carried out in 2002 and 2005. The results suggest that, although skills shortages are a significant business constraint for manufacturing in India, it is a less pressing issue than in the PRC (Figures 2.2.12 and 2.2.13). The results of the 2006 WBES for India's ICT sector confirm that skills shortages are less severe in India than in the PRC, not only in manufacturing but also in services (Figure 2.2.14). These findings broadly corroborate those in the EIU surveys.

The 2006 WBES of India's ICT sector also provides some other information relevant to skills diagnostics. Over the period 2003–2006,

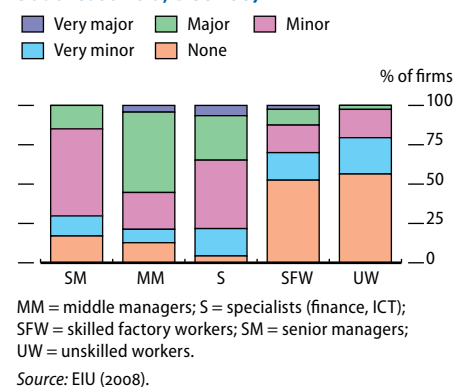
2.2.7 Staff shortage as a constraint, People's Republic of China, Dec 2007



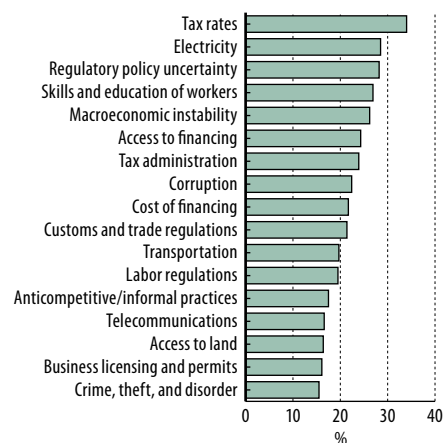
2.2.8 Staff shortage as a constraint, India, Dec 2007



2.2.9 Staff shortage as a constraint, Southeast Asia, Dec 2007



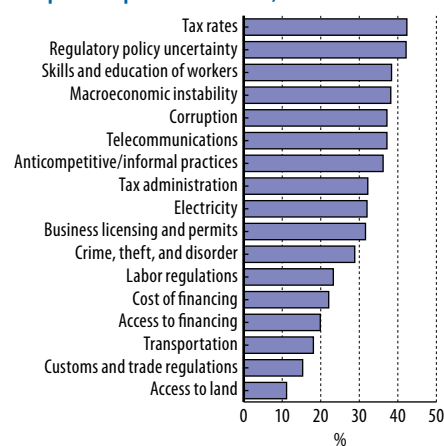
2.2.10 Share of firms perceiving an issue as a major or very severe obstacle in manufacturing, People's Republic of China, 2002



Source: Staff estimates based on World Bank (2002).

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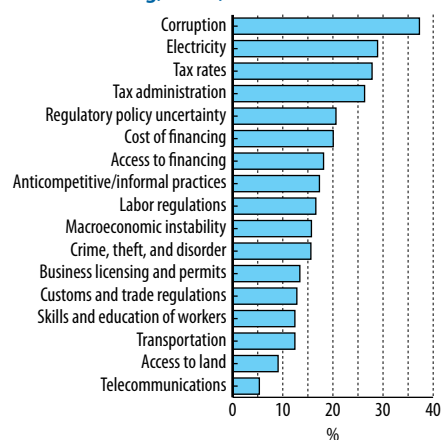
2.2.11 Share of firms perceiving an issue as a major or very severe obstacle in services, People's Republic of China, 2002



Source: Staff estimates based on World Bank (2002).

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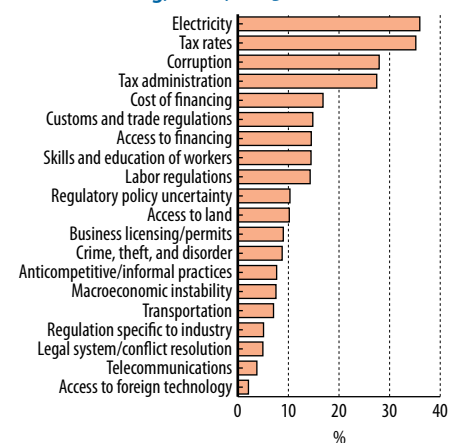
2.2.12 Share of firms perceiving an issue as a major or very severe obstacle in manufacturing, India, 2002



Source: Staff estimates based on World Bank (2002).

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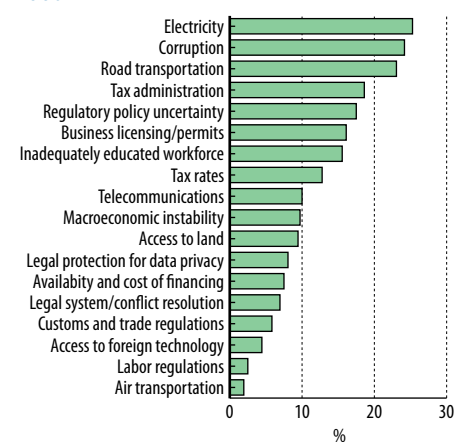
2.2.13 Share of firms perceiving an issue as a major or very severe obstacle in manufacturing, India, 2005



Source: Staff estimates based on World Bank (2005a).

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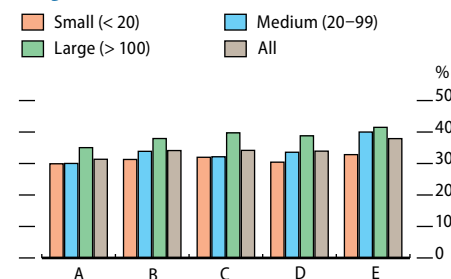
2.2.14 Share of firms perceiving an issue as a major or very severe obstacle in ICT, India, 2006



Source: Staff estimates based on World Bank (2006).

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2.2.15 Average wage change in ICT, India, 2003–2006



A = basic computer skills; B = standard office software; C = industry specific software; D = hardware and maintenance; E = programming and application or system architecture.

Note: Number in parentheses indicates the number of workers in a firm.

Source: Staff estimates based on World Bank (2006).

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nominal wages rose by 30% or more for all types of ICT workers, providing indirect evidence of a skills shortage in ICT (Figure 2.2.15). Survey results also indicate that Indian ICT firms are experiencing a widespread shortage of workers with the required skills (Figure 2.2.16). Yet as filling vacancies does not pose a major challenge for Indian ICT firms (Figure 2.2.17), the evidence of a skills shortage in this sector is mixed.

WBESs were carried out for manufacturing in Malaysia and Thailand in 2003 and 2004, respectively. Manufacturers in Malaysia pointed to inadequate skills and education of workers as the top business obstacle, while those in Thailand put it second. The results support the view that in both these middle-income developing countries a lack of skills is impeding the migration of industry into more technologically sophisticated industries (Figures 2.2.18 and 2.2.19).

WBES data also provide some information about whether skills shortages are limited to a few specific types of firms—e.g., large, foreign multinationals—or are of a more general nature. Survey respondents are classified in terms of foreign versus domestic ownership, size (as measured by number of employees), and whether they are exporters or not. The results of the 2002 WBES of PRC manufacturing suggest that skills constraints affect all types of firms (Figure 2.2.20).

Skills shortages in four Asian countries

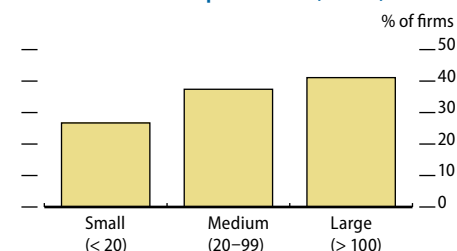
Skills shortages appear across developing Asia, and feature certain common drivers, such as globalization and technological progress. Nevertheless, there are also important differences. To see a more accurate picture of the challenges facing each country, it is helpful to look at experiences at this level. This section explores those of four regional countries—PRC, India, Malaysia, and Thailand. The PRC and India have been selected for closer scrutiny on the basis of their global and regional economic importance as well as their phenomenal growth and rapid integration into the world economy. Malaysia and Thailand offer examples of middle-income economies that are endeavoring to move further up the value chain.

People's Republic of China

Perhaps more than any other country, the PRC epitomizes developing Asia's skills crisis. Explosive economic growth, accompanied by rapid structural transformation and industrial technological upgrading, has fueled an unrelenting demand for skills. Demand for new services has added to this pressure. For example, income growth has led to surging demand for medical services, creating an acute shortage of doctors. According to *The Economist* (2007), the PRC had only around 4,000 general practitioners in 2007, but the Government's urban health care plan requires no less than 160,000. A burgeoning demand for legal services, financial services, and leisure is driving the demand for skilled professionals in those areas.

Blistering expansion of the corporate sector has been behind soaring investment, seen in factories, machines, and equipment, and in the professionals and specialists required to run them. The ability to compete successfully in markets abroad and to provide shareholder value requires

2.2.16 Share of ICT firms reporting shortage of workers with required skills, India, 2006

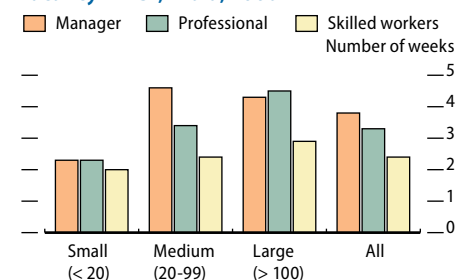


Note: Number in parentheses indicates the number of workers in a firm.

Source: Staff estimates based on World Bank (2006).

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2.2.17 Weeks needed to fill most recent vacancy in ICT, India, 2006

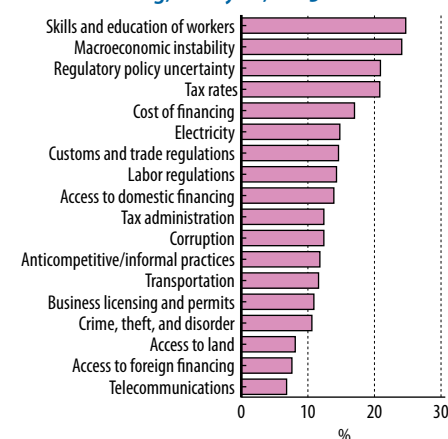


Note: Number in parentheses indicates the number of workers in a firm.

Source: Staff estimates based on World Bank (2006).

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2.2.18 Share of firms perceiving an issue as a major or very severe obstacle in manufacturing, Malaysia, 2003



Source: World Bank (2005b).

[Click here for figure data](#)

that businesses, whether domestic or foreign owned, in the PRC meet demanding production, logistical, safety, and corporate governance standards, which requires a large pool of higher- and middle-level staff.

While the root cause of the PRC's skills crisis lies in the leap in demand for skills, the education system has failed to keep pace. The system's main problem has been one of failing to produce the right kind of graduates rather than too few of them. For example, in 2005, 3.1 million students graduated from its universities, compared with only 1.3 million in the US. In the same year, the PRC produced nearly 10 times as many engineering graduates as the US—over 600,000 versus only 70,000. One would expect this flow of graduates to be adding to the large stock of young professionals (9.6 million in 2003) with significant work experience. The catch is that only a small share of this seemingly abundant “talent pool” is, indeed, talented enough.

The McKinsey Global Institute (2005) provides an in-depth look at this failure of quality. According to its study, fewer than 10% of graduates who are candidates for jobs at foreign multinational companies have the right skills and qualifications to work there. Poor English is the main shortcoming, but others, such as engineering graduates who are well versed in theory but unequipped with practical problem-solving skills, is another. This matters not only for multinationals themselves but also now for the growing number of domestic companies that are trying to emulate and compete with multinationals and that harbor ambitions to become world-class companies.

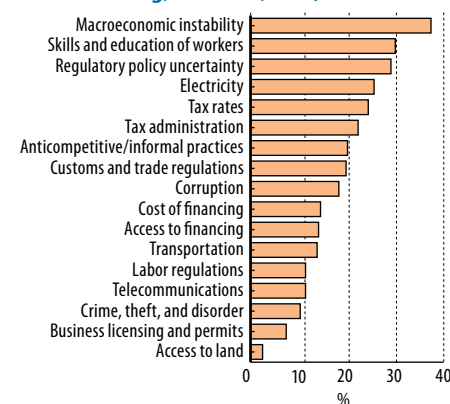
The combination of the sheer scale of the PRC's skills crisis and its largely structural nature suggests that it may constrain corporate ambitions for years to come. Skyrocketing demand for professional and managerial skills is likely to test the skills-producing capacity of even a world-class education system, and building such a system—or even a responsive one—is inevitably a long-term process for the PRC. In the meantime, the country's attempt to plug its skills gap using foreign workers is likely to have spillover effects, exacerbating skills shortages elsewhere in Asia. (Policy options for the four countries, and developing Asia generally, are given in the section *Easing the bottleneck*, below.)

India

Many of the same structural factors that are causing skills shortages in the PRC are also seen in this country: India's skills gap is a by-product of its economic success; of corporate governance changes (particularly the growing role of the private sector); and of globalization (especially foreign demand for ICT services).

But India's skills gap is also different. For one, it is expecting a demographic dividend whereas PRC is facing aging problems of rich-world proportions. In addition, some (admittedly tiny) segments of the Indian education system are better equipped to produce world-class professional workers. Networks for top establishments such as the Indian Institute of Management and the Indian Institute of Technology turn out world-class managerial and technological professionals that are in high demand both in India and abroad. Although there is a huge gulf between these two bodies and Indian universities in general, where the relevance and quality of education are still poor—and indeed, India's skills and

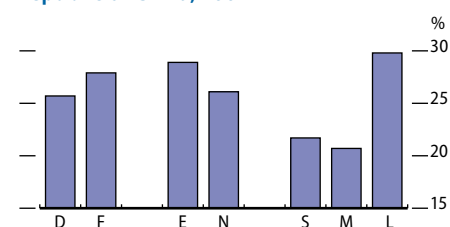
2.2.19 Share of firms perceiving an issue as a major or very severe obstacle in manufacturing, Thailand, 2004



Source: Staff estimates based on World Bank (2004).

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2.2.20 Share of firms perceiving inadequate skills and education as a major or very severe obstacle in manufacturing, People's Republic of China, 2002



D = domestic; E = exporter; F = foreign; L = large (> 100); M = medium (20–99); N = nonexporter; S = small (< 20).

Note: Number in parentheses indicates the number of workers in a firm.

Source: Staff estimates based on World Bank (2002).

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labor shortage problems can be traced back to failures in the delivery of adequate primary schooling—the country has the advantage of hands-on experience of designing institutions and curricula that meet the changing needs of the market.

India's success in training a pool of able, qualified engineers and managers with English-language skills has helped position India's ICT and business process outsourcing (BPO) industries as global leaders. The National Association of Software and Service Companies (NASSCOM) and McKinsey estimate that in 2005 the country accounted for 28% of ICT and BPO skilled workers among 28 low-cost countries with significant potential in the two industries. But to maintain its edge, India will require a 2.3 million-strong ICT and BPO workforce by 2010. Current projections suggest a likely deficit of 500,000 such workers, foreshadowing a possible contraction in global market share (NASSCOM-McKinsey 2005).

Though India has a few glittering, world-class education institutions, it also has many more higher education establishments that fail to equip students with the skills demanded by the market. Only 25% of engineering graduates and 10–15% of general graduates have the skills and qualifications for working in the ICT and BPO industries (NASSCOM-McKinsey 2005). From a microeconomic perspective, the skills gap matters because it may slow or prevent Indian ICT and BPO firms from moving into higher value-added segments and activities; from a macroeconomic perspective, it suggests that these two industries will be unable to keep up their frenetic pace of expansion. Ironically, they account for a much larger share of GDP (4.5%) than of the total labor force (0.15%) (ADB 2007a), yet it may well be constraints in the labor market that hold them back.

Malaysia and Thailand

Malaysia and Thailand are more advanced along the economic development curve than the PRC and India: they have higher income and productivity levels, and have already completed important phases of the transition to modern industrial and services economies. Equally, their pace of growth is more sedate. Yet the two Southeast Asian nations also suffer from skills shortages, partly because competition from cheaper locations (including the two giants) is compelling them to move further up the industrial technological ladder and into modern services activities. An important factor in their skills gaps is that neither country has invested adequately to ensure that education is relevant.

In Malaysia, the constraint is as much quantity as quality. Given its relatively small population and labor force, Malaysia has quite a large and complex economy. But it has been unable to supply skills to keep pace with demand because graduate numbers are low, and even among these people, few have the right blend of skills. Udomsaph and Zeufack (2006) observe that the enrollment and completion rate for higher education in Malaysia is substantially lower than in countries at similar income levels. The same study found that a university education brought about a 25% increase in hourly wages relative to a high school education, which is far higher than the wage premium in industrial countries. In another study, Thangavelu and Hu (2006) note that Malaysian graduates tend to have

weak skills in precisely those areas most needed by the type of knowledge-based economy to which Malaysia is directing its efforts to becoming.

Thailand does not suffer from this quantitative graduate shortfall. In fact, the tertiary education completion rate is slightly above the norm for countries at similar income levels. But there, too, serious quality problems mean that a large number of university graduates does not translate into an adequate supply of managerial and technical workers. According to Udomsaph and Zeufack (2006), no less than 60% of managers in Thailand rate the English language skills of their local professional workforce as poor, and 41% do so for ICT skills. Despite quality gaps, as in Malaysia university graduates can still command large wage premiums. The same study finds that university education led to a 35% increase in hourly wages relative to a high school education.

The tertiary education systems of both these middle-income countries have done a poor job at producing graduates with relevant skills. The experiences of both show that while structural change and technological progress can lead to skills shortages, causation can also be in the opposite direction. The experiences of Ireland in successfully addressing the skills gap in the context of large FDI inflows may be particularly relevant for these two countries (Box 2.2.1).

2.2.1 Aligning the tertiary education system with the needs of industry: Policy lessons from Ireland

Within a generation, rapid growth has transformed Ireland from a European laggard to a widely admired “Celtic tiger.” A critical ingredient in the economy’s remarkable success was large foreign direct investment (FDI), especially into high-tech industries. Yet by the 1990s, the economy was facing large and growing skills shortages. In particular, the number of science and engineering graduates was insufficient to meet the demands of an increasingly sophisticated economy.

The central component of Ireland’s response to the skills shortage was to expand its supply of science and engineering graduates by realigning its education system to the changing requirements of industry. Specifically, the Government adopted the northern European model of higher education, which recognizes the need for both technical and traditional university education. As a consequence, the share of tertiary students at traditional universities fell from 75% in 1965 to 54% by the late 1990s; at the same time, the share of tertiary students in vocational and technological education rose from 2% to 37%.

Ireland’s tertiary education system has thus been transformed into one that places equal emphasis on general education and on vocational and technological training. Besides this shift in tertiary education, the establishment of regional technical colleges and two national institutes of higher education has also helped build up the country’s pool of skilled workers.

The Industrial Development Agency, the main body in charge of attracting FDI, provides key inputs for education policy, reflecting the central importance of FDI in the economy. Those inputs help align the needs of foreign investors with the output of the education system. For example, concerned about a looming shortage of electronics graduates in the 1970s, the Agency lobbied the Government to expand the education capacity for technology-related courses. The result was a 40% increase in the number of engineering graduates and a 10-fold increase in the number of computer science graduates between 1978 and 1983.

The key lesson from the Irish experience is that a flexible and adaptable education policy is critical for aligning the education system to the needs of industry. Ireland has gone so far as to revamp the structure of its tertiary education system to produce graduates who have the skills required by industry. In fact, the Government explicitly incorporates industry’s requirements in formulating and implementing its education policy. The country’s successful reinvention of itself as a high-tech economy illustrates the large rewards of a demand-based education system that places a premium on the effectiveness of graduates in the workplace.

Source: Thangavelu and Hu (2006).

Easing the bottleneck

Evidence from a range of sources suggests that skills constrictions may soon limit growth potential across the region. Consequently, improving the supply and relevance of skills is a vital element in enhancing national competitiveness. As there are large private gains to be made from investment in skills, this is not a problem that calls for expansive public sector financial support. The role of government should lie more in resolving coordination failures and ensuring that the policy, regulatory, and other elements of the enabling environment create the right incentives to encourage the private sector to close the gap and reap the rewards. Of course, it will also remain government responsibility to ensure that primary and secondary school systems position the young so that they can benefit from higher education and training.

The following paragraphs outline some of the main measures for easing the skills bottleneck, in terms of steps to be taken now, and those for the long run.

Short-term policy options

While developing Asia's governments wait for their longer-term investments in higher education to bear fruit (as discussed in the next section), they can start with practical short-run measures to help ease constraints. Many of these aim to allow markets to do a better job at finding the supply–demand balance for skills.

Many frictions limit the supply of skills. Occupational associations, for example, may seek to restrict the entry of new entrants into their professions so as to limit competition and underpin members' salaries. For example, bar associations of most countries impose restrictions on lawyers that have qualified in other countries, and sometimes in other jurisdictions. Unwarranted occupational barriers—those that are not required to secure efficient and safe delivery of, say, medical services and that are intended to protect the position of “insiders”—also cut the pipeline of able university graduates who may otherwise have chosen to acquire the relevant skills. The first area of change would therefore be for governments to smooth these frictions. With political will, this can be initiated quite quickly.

Second, governments can pursue policies that make it easier for skilled foreign workers to work and live in their countries (see the chapter *Asian workers on the move*, also in Part 2). Richer economies embarked on this path some time ago, and most have immigration regimes favoring skilled, rather than unskilled, migrants. Singapore is a regional example of a country successfully overcoming scarcity of skills through policies that are targeted at foreign workers (Box 2.2.2).

Third, measures to stem or even reverse the “brain drain” would make sense. The central role of engineers and scientists from the PRC and India in the creation of Silicon Valley is well known. More recently, gifted financial professionals working in international centers of finance are now returning to Asia to help run sovereign wealth funds. Yet this is just the tip of the iceberg. There are literally millions of qualified Asian graduates who study abroad and who fail to return. Although opportunities created by economic growth will tempt some back, other incentives could be considered. The experience of Taipei, China shows what a more active approach can achieve (Box 2.2.3).

2.2.2 Importing foreign professionals: Singapore's foreign talent policy

The city-state of Singapore has become one of the richest countries in the world on the back of rapid export-oriented industrialization. A defining feature of the economy is its exceptional economic openness. Extremely low barriers to trade and investment have been key factors in the country's remarkable economic success.

However, what truly sets Singapore apart is its exceptional openness to foreign workers. Non-Singaporeans account for more than a quarter of those living in the country and around a third of the workforce. To some extent, this openness is driven by a structural gap between the workers required by the economy and the domestic workforce. This explains why Singapore welcomes not only skilled workers but also unskilled workers—the latter group in fact forming the vast majority of the foreign-born workforce.

Nevertheless, the Government makes a sharp distinction between skilled and unskilled workers from overseas, and the policy toward them is highly selective and biased toward those who can add to the country's pool of skills.

For example, it is far easier for those with higher degrees and qualifications to obtain permanent residence.

Also, the Government does much more than merely welcome foreign professionals who choose to come on their own. Rather, it has gone out of its way to recruit “foreign talent,” especially for the industries that it has targeted as promising.

There is general consensus that the contribution of skilled foreign workers has been positive and substantial. That contribution is especially evident in, for example, highly skills-intensive industries. For example, the young but thriving biotech industry would probably not even exist without foreigners, given the original lack of local biotech capability. Non-Singaporeans have also contributed substantially to another new but internationally competitive industry—private banking.

The main lesson from Singapore for other Asian countries is that competing for and welcoming foreign professionals can play a key role in resolving skills shortages. Singapore is extremely active in the increasingly global marketplace for such people, and succeeding.

These lessons are not only relevant for other high-income Asian countries with restrictive policies toward foreign workers, such as Japan and Korea, but also for middle-income countries, such as Malaysia and Thailand.

Fourth, even in the short run, it may be possible to increase the number and quality of tertiary graduates, and liberalizing the outbound higher education market can add to a larger and better pool of skills and talent. Malaysia and Singapore have pursued such policies in the past. It is of course important that graduates, especially if they receive public financial support, have incentives encouraging them to return. However, the number of students that can benefit from such programs will be limited not just by fiscal resources but also by students' language skills and the quality of their secondary school qualifications. A complementary approach is to open up the domestic tertiary education market to reputable foreign universities. This may improve access to relevant tertiary education at home.

A range of other options may also be worth considering. One would be to encourage the reentry of highly skilled women into the labor force. Others include raising the retirement age, and encouraging older professionals to remain in the workforce even after they have retired. In many Asian countries, retirement ages are probably set too low. Another option would be to provide fiscal incentives for firms to provide training and retraining for their workers. Such subsidies might be economically justified because firms will often have difficulty in capturing the benefits of such training as workers leave for new jobs.

However, for many types of skills, on-the-job training and retraining are no substitute for long periods of more formal education, as discussed in the next section.

2.2.3 From brain drain to brain gain: Lessons from Taipei, China

Taipei, China has not been immune to the developing-country problem of brain drain, or the loss of the well-educated and the highly skilled to industrial countries. What makes its experiences interesting is its substantial success in reversing the trend. Local-born emigrants who have returned home after studying and working overseas, especially in the United States, have made significant contributions to the island's economic growth. It is also true that growth itself encouraged many skilled Taipei, China emigrants to return home by creating new opportunities. This same "homecoming" trend is also now occurring in the fast-growing economies of the People's Republic of China and India.

What make the experiences of Taipei, China special are the authorities' active and systematic policies to attract the locally born currently living overseas, as well as the success of those policies. Both the authorities and the private sector began to tap emigrants' expertise and connections well before the economy had evolved to a point where many emigrants began to return home. In the 1970s, the National Youth Council was set up, to keep track of skilled emigrants and to link them with local businesses.

The Council would sometimes provide travel support and temporary jobs for those who returned home.

By far the best-known initiative is the Hsinchu Science-based Industrial Park. It was created in 1980 with the goal of replicating a Silicon Valley-like cluster of high-tech industries. The authorities provided financial incentives and infrastructure for companies to locate in the park; and to attract skilled emigrants, they provided subsidized Western-style housing and commercial services. The park has succeeded in attracting both firms and people, and has become a big commercial success. It has contributed to the strengthening of research and development capacity, to industrial restructuring from labor-intensive to technology-intensive sectors, and more generally, to economic growth.

The clear lesson is that active government policies can help reverse a brain drain, although economic growth will, for any economy, remain the biggest magnet for those intending to return for good. The combination of economic growth and a far-sighted policy of viewing emigrants as a valuable resource has enabled Taipei, China to turn a brain drain into a brain gain.

The long term: Education reform

Inevitably, the skills gap cannot be closed without the lengthy and costly process of building a strong, higher education system capable of providing the qualifications required by a modernizing economy, yet in most developing Asian countries, the university system is failing to produce enough graduates with the relevant skills. Although the dearth of skills is immediate, and the results of education reform are distant, failure to make this reform—starting now—would extend a short-run, solvable issue into a long-term, hard-to-eradicate failure.

Although the development of a tertiary education sector should serve multiple societal goals, some of which will transcend business and economic needs, addressing the skills gap will require deregulation and liberalization of the market for higher education. This approach will likely increase quantity and improve quality by fostering competition. The private sector should be allowed greater scope to meet expanding tertiary education needs, sparing public sector resources for other needs (including financial support for students who do not have the means to support their own education or who cannot access other sources of funding). It will, however, be crucial for private universities to be able to levy fees, thus allowing them an adequate return on their capital investment. Box 2.2.4 offers a good example of how private sector provision of tertiary education can produce industry-relevant graduates. Box 2.2.5 suggests that even more limited forms of private sector involvement can be useful in producing such workers.

Clear advantages arise if developing Asia opens its higher education

2.2.4 Private sector incubation of skill-intensive universities: Pohang University of Science and Technology, Korea

Korea's Pohang Iron and Steel Company (POSCO) is one of the world's leading steelmakers. Its establishment of the Pohang University of Science and Technology (POSTECH) in 1986 is a good example of the private sector taking the initiative to resolve its skills shortages. POSCO, desperately short of high-quality scientists and engineers, did something about it—and extremely well. In a short time, POSTECH became a top university in Korea, and in 1998 *AsiaWeek* magazine selected it as the top Asian university in sciences and engineering. Even though POSCO initially set up POSTECH out of self-interest, the university has now become an important source of scientific and engineering talent for the whole country.

POSTECH's basic formula for academic success has been to select a small number of top students, fully support them

(fees, living allowance, etc.), and recruit the best teaching staff possible. POSTECH initially had nine departments, and has since added four more. By 2002, it had awarded around 2,500 undergraduate degrees and 4,000 graduate degrees. It has a heavy focus on research, hosting eight research centers and more than 21 affiliated laboratories. These include the Pohang Accelerator Laboratory, the only synchrotron light accelerator in the country.

Another notable feature is POSTECH's active role in the transfer of technology between academia and industry: it helped set up the Pohang Technopark Foundation, with Pohang city council and POSCO, which provides infrastructure for such transfer. A more specific example of such transfer is the POSTECH Biotech Center, which opened in 2003 and is one of the largest in Korea.

market to foreign institutions, since there is a large quality gap between foreign and local universities: a significant foreign presence may help raise standards in the domestic sector. Besides, it is likely to take some time for local institutions to acquire the human resources that will be required to design and deliver high-quality and relevant curricula.

Government will of course still have the main role to play in building world-class tertiary education systems. It will need to lead reforms in the public sector, and set attainable performance standards. It also

2.2.5 Microsoft's partnerships with universities in the People's Republic of China

One way for companies to resolve the problem of highly educated but poorly skilled employees is to work with universities (a leading source of such workers). The objective is to better align university curricula with industry needs. In the People's Republic of China (PRC), for example, university education tends to focus on theoretical knowledge at the expense of practical application. As a result, many multinationals operating in the country find that graduates often lack the skills to perform their jobs.

Microsoft ran into these problems in its software operations in the PRC. Software projects are team efforts that require application skills, which PRC university graduates often lack, more than theoretical knowledge. To mitigate the skills shortage, it formed partnerships with four PRC universities to establish software laboratories where student interns learn practical software-development skills. More broadly, in June 2002 the company and the Ministry of Education jointly launched the Great Wall Plan to formalize and systematize the company's cooperation with universities in the country. The areas of cooperation include talent training, curriculum support,

research cooperation, and academic exchange. Around 40 universities and research organizations have taken part in the program so far.

In addition to its cooperation with PRC universities, Microsoft has trained over 10,000 software engineers and senior program managers for 11 national software parks through on-site training and e-learning. Finally, in conjunction with the local software industry, the company provides training for mid- and high-level personnel to strengthen the core competitiveness of software companies with which it works.

Microsoft's partnership with PRC universities provides a possible blueprint for public-private partnerships to resolve skills gaps. PRC universities are primarily public universities, which still dominate the higher education systems of many Asian countries. This partnership involves the provision of resources in exchange for some influence over the curriculum. The private sector gains a large supply of skills while the public sector benefits from better facilities. Producing more employable graduates is also ultimately in the interests of any university, public or private.

has an important role to play in providing an interface between the private sector and industry: early identification of industry's needs and modifications to curricula are one area where coordination is possible, and government should play a major role in setting standards and disseminating information on performance (Box 2.2.1 above). Finally, it will be government responsibility to ensure that both the private and the public streams in tertiary education are appropriately regulated, especially with respect to quality control.

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