Notes for IEAust Presentation

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Landmines

Afghanistan – use of machines, ten 2nd hand back hoes by 2001, poor untilisation.

Programmes run by military engineers, employment and wealth redistribution seen as priority, no government with economic development priorities.

Skilled (expatriate) engineers too expensive, resistance to paying local expertise high salaries ~ US$100k to return from USA.

HARC Research in Pakistan

Difficult to find competent local engineers. Research more expensive than I first thought.

Low productivity, poor knowledge of tools, materials, techniques. Engineers with some experience want to delegate all work to subordinates. No status without subordinates.

Why corruption, not built right, breaks down quickly, poor maintenance?

Skill shortages?

(skilled workers sent out by plane-load to Dubai, Abu Dhabi where work standards are amazingly high.

10 – 15% engineers unemployed in Pakistan (Pak Engr Council 04).

Salaries Au$9,000 – Au$16,000 p.a. (typical local engrs employed by ex-pat companies earn about 1/3 Aust salary).

These seem to indicate a skills surplus, not a shortage……

Electricity ($0.09 – 0.14) per unit ($0.13 – 0.17 in WA). A standby generator is essential for operating with continuous power: power outages up to 2 hours are not unusual in major cities, and longer in rural areas:

"…..the cost of energy is much higher than the cost of energy in other countries. It's a significant percentage of our total cost, around 20%. If we compare our electricity costs to India, our costs are similar but it's around twice what we would have to pay in the Middle East or in China where some of our competition comes from…"

Water – 100 Rp/year, but often have to pay for water to be carted at 400 Rp (including bribes) for about 500 litres (about $22 per 1000 litres).

Residential housing at a comparable level of construction quality costs around US$200-450 per square metre in Pakistan and US$250-450 per square metre in Australia.

Internet Access Costs – currently Rp1500 for basic broadband service in Pakistan. Public internet access in India is slightly cheaper but usable bandwidth is very low, typically 200

bytes/sec except for local (same city) sites. For higher bandwidth, a private satellite service is essential.

Survey ship construction: US$90 million (Germany), US$105 million (Karachi) – quality not comparable.

Migration:

is the brain drain a real effect?

Perhaps 8 – 15% loss of engineers from Pakistan to developed world. True figures are not available because most countries cannot provide reliable occupational statistics for migrant arrivals or departures.

Australia – permanent migrant arrivals – approx 17% of annual supply of engineers (graduates + migrants, total about 7300 per year)

(Aust receives approx 1200 engineers annually as part of the skilled migration programme and this supplements the approx 6100 engineers that graduate annually from Australian universities),

permanent departures typically 200 per year, large temporary inflow and outflow due to engineering contract work by Australian companies and temporary utilisation of overseas resident engineers in Australia.

Emigration prospects may stimulate more demand for engineering education in Pakistan, but no evidence of this yet from interviews.

Unknown number of Pakistan engineers return after a few years. (Middle East visas last 3 years typically and have to be renewed in country of residence, need to care for elderly relatives, many unable to find engineering work in USA or Canada because of skills mismatch:

Cost of producing engineers in Australia ~ Au$960,000 (total public + private investment). Saving from migration approx $1.5 billion on engineers alone, perhaps $25 billion on skilled migration program (3% of GDP). Government calculated value is $35,000 per head. However, immigrant engineers are often un- or under-employed

Australia GDP 2002 US$410 billion, population 19.6 million (http://www.worldbank.org/data/countrydata/aag/aus_aag.pdf)
Pakistan GDP 2002 US$59.1 billion US$68.8 billion in 2003, population 144 million http://www.worldbank.org/data/countrydata/aag/pak_aag.pdf)

Literature Searching (large effort so far)

Migration:

evidence on brain drain is equivocal, not easy to show a major effect. However anecdotal evidence on trades skill shortages in Pakistan suggests a different picture. Not much work on human capital treatment of migration: developed countries don't want to do research on known benefits, developing countries (eg India) are upset but cannot do anything. Research largely governed by short term govt priorities, and can be expensive (data gathering). Current

issues largely concerned with asylum seekers, refugees and illegal economic migration.

Engineering skills, engineering management

Lots of surveys of engineers, mainly to find out which (mainly technical) subjects to include in engineering degrees. Handful (maybe 5) studies looking at specific issues in engineering-related areas, like why Japan apparently did better at technology development than the USA and Europe in 1980's (but not so much in the 1990's). Studies, for example, look at highly selective aspects (and groups) of engineers in R&D and/or high-tech industries, mainly.

The literature reveals a large number of very short papers mostly representing opinions without systematic research.

Many articles report opinion that engineers need more than technical skills, but provide little detail on what this might mean.

Interviews (small effort, so far)

Qualitative surveys do not seem to have been used in the past, and not by interviewers with practical engineering experience. These techniques seem mainly to have been limited to use on sociological issues.

Qualitative surveys are expensive (two our interview, preparing transcript (four hours) and analysis). Open questions provide a rich source of data.

Preliminary observations

Some Pakistani engineers working in Pakistani and multinational companies that are competing at or near international levels are turning internationally competitive salaries (six figure salaries in Australian dollars). This confirms our original observations that internationally competitive skills are in short supply and are rewarded appropriately when available. These individuals have no interest in migration as they are well established in Pakistan with generous fringe benefits and pension entitlements. Some but not all have overseas experience, all have overseas exposure.

Apart from the most senior engineers, engineers in Pakistan have limited or nonexistent awareness of financial issues, responsibility or skills. "That's the job of the finance department, not us".

Both in Australia and Pakistan engineers spend most of their time on tasks that are not purely technical -- tasks that some engineers refer to as "non-engineering jobs" or just "admin jobs". Sifting through interviews we have found approximately 50 activities of this nature that require a mixture of technical and non-technical skills.

In Pakistan there are limited opportunities (and perhaps limited interest) in career development activities and professional development. Our sample of young Australian engineers is small at this stage (3) but all report extensive professional development activities when asked.

Many engineers described work that involves coordination of people for whom they do not have line management responsibility. These include subcontractors, peers, employees in other departments and divisions.

Most engineering work seems to require expenditure a long time before the benefits are obtained by the eventual user or investor. Many engineers emphasised the ability to predict and control costs and timescales, to produce predictable outcomes without constantly referring to their superiors. Engineers also mentioned the need to choose appropriate solutions using techniques and expertise represented by the available human resources and subcontractors.

- Australian engineers seem to learn a lot in first few years, some in Pakistan, but not all.

- Skill definitions? Are we talking about non-technical skills? Project management skills? Expediting skills? These skills seem to be a blend of technical and non-technical. Hence "Professional Engineering Skills"

- Skill use, amount of time spent using them, acquiring them. This is likely to vary systematically between individuals, companies, industries and countries.

- Are engineering skills related to costs of engineering?

Quote: Mid–career Pakistan engineer who visited Canada:

I went to Canada for six months, I took leave. I was with my two brothers and sister who are there. I wanted to see about immigration there. I could not get any response from their companies and they had no need for my skills and experience. I was shocked. I realised I would have to quit and forget all my Pakistan experience and start again in a different field. After 4-5 years of trying maybe I could get a job in my field, but probably I would have to get another degree. It was (…) shocking that I should have to forget all my hydro-electric power work. There is another thing, I could not stay there because my mother is here and I could not leave her on her own here and say goodbye. I was disappointed by this. But I noticed that maybe 10,000 engineers and qualified people go to Canada each year. The Canadian government publishes all the statistics on the internet. 15-16000 from Pakistan and India. 200,000 each year in all. But I noticed how in Toronto and Vancouver 95% of them are working in odd jobs like petrol pump attendants, car park people, security guards and drivers. So few are using their expertise. Why is this? Why waste so many qualified people doing menial jobs?