Does immigration policy help connect US and Asian firms?

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Case Study

- Outsourcing of Semiconductor Chip Design

Background

- **A** is a fabless semiconductor company founded in January 2002, with the objective of building a physics processing microprocessor (to be used in video games) to calculate the effects of motion and collision.
- By end-2002, **A** had designed the chip's logic circuitry.
- Due to the economic downturn, the company needed to save cash, & contracted with a large Indian IT services firm, **B,** to complete the design.

Scope of Work

- To convert the logic design into electric circuitry in 90nm, (a new technology at the time)
- The work to be done:
  - Register transfer level coding (converting logic into a digital circuit design)
  - Chip layout
  - Testing for power use, timing, signal integrity, physical integrity, etc.
- Close coordination with client needed at each stage

Expected Labor Cost Savings

- A team of 20 designers worked on the project at **B.**
- **A** agreed to pay $5,000 p.w.p.m. for a 12 month project, i.e., a total of $1.2 m.
- Comparable wages in SV were $12,500 a month, or 2.5x.
- For in-house work, **A** would also need to invest in a design tool costing $2 m + service fees (due to fast-moving technology, new tools could not be leased, but had to be purchased).

Outcomes

- Time: the project was completed in 18 mths.
- Since **B** was working at 90nm for the first time (unknown to **A** when signing the deal), **A** assigned a senior SV employee of Indian origin (an immigrant) to help on the digital side (see below). He spent 8 months in India training and coordinating, adding $200,000 to costs.
- **A** estimates that the lost time, due to competition from ATI and NVidia, cost $2 m in lost sales.
- Quality of documentation (for 2nd generation work) was poor, adding a further cost for redoing this.
- Due to immigration restrictions in India, **B** was unable to hire a specialist consultant directly. **A** had to do so on **B's** behalf.

Would company A work with B again?

- Yes, for the following reasons:
  - Scale & flexibility: **B** employed 500+ VLSI designers & agreed to add/reduce employees at a flat rate, unlike (typically small) SV design firms.
  - Tool costs: Design tools were changed twice (incl. from separate companies) at no extra charge (**B** already had multiple licenses), unaffordable by **A** or SV-contractor.
  - Bringing engineers from India to **A'**s premises under H-1B: Wage equivalence rule not an issue since the contract was to **B,** bringing workers for a new project.
  - However, it would have reduced time to market to 12-14 months. But higher travel & stay were estimated at $500,000, apart from tool costs.
  - **A'**s IP was protected. **A**'s managers feel IP was protected better than in SV. **B** did not have the capability to re-use the IP, as it did not have any other clients in the space.

Company B's gains

- **B** used its 90 nm experience with **A** to upgrade its capabilities, receiving new business (now employs over 2000).
- It currently offers 45 nm capabilities.
- It has expanded up- and down- stream, with micro-architecture capability and complete chip delivery (works with a Taiwanese fab for manufacture).
- However, absence of SV research office forces it to rely on a few clients for learning.

Relevance to Immigration Policy

- **A**'s immigrant engineer from India was critical for the project's success.
- H-1B rules were not a factor, but could have been had **A** chosen to directly employ a team from India and locate the team partly in SV.
- **B,** as of 2009, plans to set up a research group of about 100 persons in SV to enable interaction with potential clients and academia, and showcase capabilities. It will employ a mix of US-trained and India-trained engineers (70:30) at this site. Not clear how this will affect their ability under H-1B rules to bring lower-wage contract designers to work in SV on projects.