Intellectual Property, Technology Transfer and Global Development

Challenges in Implementing the Triple Helix in the Developing World

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Some International Teaching/Strategic Assignments

- Téthys, Egypt
- G-TEC, Japan
- Research Norway
- Department of Biotechnology, India
- UTEN, Portugal
- IC2, Colombia
- SARIMA, S. Africa
- AUTM-CORFO, Chile
- KFUPM, Saudi Arabia
- Umm Al-Qura University, Saudi Arabia
- Slovak Center for Scientific and Technical Information
- Thailand Center of Excellence in Life Sciences
- NUS (Suzhou) Research Institute, China

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Issues I've Identified in Developing Countries

- Innovation is everywhere
- Universities lack scale in many countries
- Technology transfer's awful business model
- The Triple Helix model isn't understood
- Companies don't look domestically for innovation
- Licensing experience isn't a major part of commerce
- Risk capital isn't available
- Legal structures may not be suitable
- Local expertise grows from the ground up
- Keeping the local stars local

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Innovation is Everywhere

- The current generation is highly entrepreneurial
  - Globally
- Great project ideas everywhere
  - Chile
  - Colombia
  - Egypt
  - Portugal
- Business development skills can be taught
  - IC^2
  - SRI
- Someone has to pay for this

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Universities Lack Scale in Research

- First priority for universities is undergraduate tuition
  - Graduate programs much smaller
    - Doctoral programs often even smaller
    - Best and brightest go overseas for graduate training
      - Will they come back?

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Example – Chile

- AUTM-CORFO strategic partnership
  - Phase 1 Training
  - Phase 2 Strategic planning
    - 7 AUTM Experts hired
      - 6 U.S., 1 U.K.
    - 14 universities, I National Lab
      - Benchmarking
        - AUTM Survey
        - Purchased additional survey questionnaire
      - 5 year Strategic Plan
      - I year Operating Plan
  - Phase 3 Six additional smaller universities
    - Really, really small
      - 1 had a research budget of $900k and didn't offer Ph.D.'s!

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Benchmarking

- Chile:
  - Low level of intellectual property creation in Chile
    - ~600 patents per year
      - Individuals receive more patents than companies
  - Relatively low level of academic research compared with US
    - If Chile was a single university, would rank 103rd in US (Tulane)
    - Largest, Concepcion, would rank 156th (Whitehead Institute)
  - Inventions are related to research funding
    - More research➔ more inventions

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Benchmarking

- Chile:
  - But Chile more productive than US, Canada and Europe
    - 1 invention/$1.1 million
      - US 1 invention/$2.8 million
      - Canada 1 invention/$3.0 million
      - Europe 1 invention/$3.6 million
  - 4% licensing success rate
    - Same as US pre-Bayh-Dole
      - Government owned and licensed IP
  - Expenditures on patents 3x license income

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Benchmarking

- These results expected for a country just starting to create a technology transfer ecosystem
  - Denmark 2000
  - Japan 1999-2004
- Scale issue meant the right solution for Chile was
  - 2-3 individual TTO's
  - Regional entities for the rest
- Not what government wanted
  - Prior attempt had failed
    - But it wasn't regional
      - Santiago + Valparaiso
    - Included the universities which could justify their own TTO

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Technology Transfer – a Horrible Business Model

- Hire and pay staff
  - Must be comfortable operating in the fog of uncertainty of early stage technologies
- Train them to change the culture of professors/scientists
  - Start to identify useful inventions coming from their research
- Pay for patent applications on the inventions they eventually disclose
- Market the inventions
  - Inventions typically 4 years old when licensed
- Eventually license 25% of the inventions
  - Write off the investment in the rest
- Wait while the licensees develop the inventions into products to sell
  - Some technologies don't work or aren't cost effective
- Finally start to receive royalties on the successful inventions
- Give away 75-100% of the income
- Wait for the patents to expire

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Implications

- Years till self supporting
  - In U.S. in 2006:
    - 52% of institutions spent more than they brought in
    - Only 16% of institutions kept enough money to cover operating costs
- This isn't about making money
  - It's about the economy
  - Government support will be essential
    - For many years

The Triple Helix Model Isn't Understood

- In many emerging economies, Government sees universities solely in workforce development terms
  - Not as sources of
    - Innovation
    - Entrepreneurship
    - Economic development
  - Hence low funding of research
- University leadership doesn't understand their role in an innovation ecosystem
  - Decision making is highly centralized
    - Loathe to delegate commercial decisions to TTO
      - Slows process
      - Results in "academic" decisions
      - Risk averse

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Companies Don't Look Domestically for Innovation

- Industrial leaders in developing countries frequently look overseas for innovation and new technology
  - U.S.
  - Europe
- Don't look at local technology suppliers
  - Particularly not local start-ups
  - E.g., Chile / Mining
    - Swiss and German engineering companies supply innovation
    - Universities are active in these areas
      - Maybe some testing done at universities

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Licensing Isn't a Major Part of Commerce

- Commerce in developing countries is product focused, not IP-focused
- So, not much expertise in licensing and transferring IP
  - Even in the commercial sector
  - Let alone the academic sector
- LES only has 32 national and regional societies
  - Those in emerging economies / regions often have little activity
    - Members often all lawyers
      - Few corporate members
      - No academic members
  - E.g., LES Chile
    - Established 2007
    - 30 members
    - No activities currently planned

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Risk Capital Isn't Available

- Angel investment usually limited to market-ready projects
  - Not useful for technology development
  - E.g., in incubator in Talca, Chile
    - Companies were raising $10,000 - $50,000 per round
    - Only one company raised $100,000
      - That was the only one that had taken off
- No equivalents of SBIR / STTR programs
- Limited VC funds
- Philanthropic sources scarce
  - Generally limited to basic and clinical research
    - Not risk reduction

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Risk Capital Isn't Available

- Even resource rich countries have issues
  - Early stages of innovation need very small amounts of money
    - Get's lost in the rounding
  - How funding is managed is critical
    - Skills may not be available
    - Resource-based economies don't have to deal with market risk
      - Extract it and there's a global market waiting
    - It's all about engineering risk
      - Different from technical risk of early stage technologies

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The Issue is Exits

- The only reason someone invests in a company is in the hope of selling that investment at a profit
  - Not interested in dividends
  - The higher the risk, the higher the profit they want
    - VC's won't invest unless they can see a 10x return
      - Only expect to make that much on 1-2 out of 10 investments
  - Only two routes to exit
    - M&A
    - IPO
  - M&A
    - Often companies look overseas for innovation, not domestically
  - IPO
    - Emerging companies have weak capital markets
      - Particularly for development stage companies
      - NASDAQ an option for a very, very few.

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Expertise Grows from the Ground up

- The people who run incubators are critical
  - They know where the local sources of risk finance are
  - They're the *de facto* local entrepreneurship business schools
    - They've seen what works and what doesn't work in that country
  - They know the local companies that are receptive to innovation
  - They can plug into international organizations
    - NBIA
    - IASP
    - AURP
    - AUTM

Keeping the Local Stars Local

- Best and brightest often go overseas for graduate school
  - Frequently want to stay and not return
    - Better professional opportunities
    - Entrepreneurial opportunities
  - Critical to get them to come back
    - Bring back what they've learned

Some Solutions

- Fellowships
- Joint projects
- Strategic partnerships
- Seeding Labs
- Forming a local tech transfer organization
- International training

Fellowships

- Tech transfer people come and work in a U.S. / European TTO for 3-6 months
  - Needs some sort of sponsorship for living expenses and travel
    - Typical cost ~$20,000 for a six month fellowship
  - Universities want some overhead support
    - $5,000-6,000 for a six month fellowship
- Effective
  - Forms lasting bonds and networks
  - Big exposure to best practices
- Opportunity to form ex-pat networks

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Joint Projects

- Long term research collaborations
  - Tech transfer component
  - E.g., MIT with:
    - Cambridge U.K.
    - King Fahd University of Petroleum and Minerals, Saudi Arabia
    - Skoltech Institute of Technology, Russia
  - Requires massive government support

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Strategic Partnerships

- E.g., AUTM – CORFO
  - Requires the Government to "get" the Triple Helix model
    - And be prepared to fund it
      - Programs are expensive
        - ~$500,000

Seeding Labs

Forming a Tech Transfer Association

- Brings together like-minded people
  - Should be practitioner driven and run
    - Not commercial or government
      - Government support helpful / essential
- Forms a locus for interaction with government
  - Policy gap analysis / policy development
- Point of contact for international interactions
  - ATTP
- Successful models
  - SARIMA
  - FORTEC
  - USIMP

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International Training

- Lot of experienced people available to provide training
  - Low cost
    - ~$5,000-10,000 for a week's course
- Important to develop local resources
  - Transition over a 3-5 year period
- Need to tailor to local conditions and laws
  - What works in Cambridge or Palo Alto won't work in developing countries

Thank you for listening.

Questions?

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