EH 210: Social and Sustainable Innovation Driven by the Sustainable Development Goals

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The big picture: Sustainable Development Goals
Would Innovation help in achieving SDGs?

This startup reduces pesticides’ consumption by 90% and fertilizers’ consumption by 50% while improving production yields for food production.
Would Innovation help in achieving SDGs?

This startup developed a non-invasive glucometer that measures blood sugar and other health metrics in real time, it might help in managing diabetes and cardiovascular disease effectively to prevent hundreds of thousands of premature deaths and millions of disability days worldwide.
Would Innovation help in achieving SDGs?

This startup developed a “biological” solar panel that performs better than silicon photovoltaic panels in “low irradiation” conditions which are prevalent for half of the year in Canada, Northern USA, Northern Europe, Japan, Korea and Russia.

<table>
<thead>
<tr>
<th>Weather condition</th>
<th>Crystalline Silicon Solar Panel (W/m²)</th>
<th>Proton Solar Panel (W/m²)</th>
<th>Proton Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunny</td>
<td>87</td>
<td>86</td>
<td>-1.15%</td>
</tr>
<tr>
<td>Cloudy</td>
<td>25</td>
<td>38</td>
<td>52.00%</td>
</tr>
<tr>
<td>Rainy</td>
<td>9</td>
<td>16</td>
<td>77.78%</td>
</tr>
</tbody>
</table>
All of the ideas previously shown come from great minds, do you agree with this?

However, all of these individuals live in cities with inexistent or very low support systems to scale-up innovation ideas.
Health and sustainability businesses are riskier than conventional businesses (cost of money is higher). Banks are not likely to lend...
There is a sweet spot when individuals have both high creativity and innovation: Young Adults (late teens to mid thirties)

Young Adults = Maximum creativity + high innovation levels + time available + inexperienced + no money + no credit history + student loans + desire for professional growth + drive to start a family. Therefore society recommends NO RISKY BUSINESSES
Issues that hinder innovation and sustainability

- Early gestation for innovation is paid by the government (from idea to demonstration)

<table>
<thead>
<tr>
<th>Government</th>
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<tbody>
<tr>
<td>$ in Business Gestation</td>
</tr>
<tr>
<td>Basic research in universities</td>
</tr>
<tr>
<td>Research grants</td>
</tr>
<tr>
<td>Fiscal incentives</td>
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<tr>
<td>Innovation Awards</td>
</tr>
<tr>
<td>Grants for prototypes</td>
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<tr>
<td>Demonstration Facilities</td>
</tr>
</tbody>
</table>

- Time

- Maturity
- Expansion
- Decline
- Birth
- Gestation
During the **expansion** stage of a business, the company self-finances growth.
Issues that hinder innovation and sustainability

- Between concept demonstration and profitability there is the “Valley of Death”

$ in Scaling-up a Technology or Business Idea ("The Valley of Death")
- Bank Loans at a high interest rate
- Family Loans ("Family, Friends and Fools")
- Etc.

"Demo day"/ "Day of the Picture"
Issues that hinder innovation and sustainability
Issues that hinder innovation and sustainability

- Overcoming the “Valley of Death”

Initial Stages: Go to the Government and to Local Universities

Public Basic Research
Business Incubators
Research Grants
Fiscal Incentives
Innovation Awards
Patents
Grants for First Prototype
Demonstration Facility

$ in Scaling-up a Technology or Business Idea (“The Valley of Death”)

Bank Loans at a high interest rate

“Family, Friends and Fools”

Consolidation Stage: Got to Private Equity Funds, the stock exchange, banks, etc.

Manufacturing and/or Service Sales
Worldwide Distribution
Initial Public Offering (IPO)
Loans or Private Equity
Business Expansion
Etc. etc.
Issues that hinder innovation and sustainability

- In cities with undeveloped support systems for innovation, **75% of technology, sustainable or health startups fail** (successful businesses are...)

[Images of cities and businesses]
Harvard’s goal for teaching EH 210

• Unofficial mission: Ensure that young adults with no credit history but great ideas can get funded to create startups in sustainability and health to reduce the carbon footprints and health burdens on governments, universities and society in general.
Main Topics for EH 210

- Climate Change Preparedness and Carbon Mitigation and Adaptation Technologies and Practices
  - Principles of climate change
  - Main carbon reduction technologies
  - Climate change adaptation practices
  - Assessment of community vulnerabilities and resiliency enhancement to climate change
Main Topics for EH 210

- Climate Change Preparedness and Carbon Mitigation and Adaptation Technologies and Practices
Main Topics for EH 210

• Climate Change Preparedness. Example: Bangladesh
Main Topics for EH 210

- Climate Change Preparedness. Example: Bangladesh
  - Minimum prediction (1 m sea-level rise by 2100)
  - 30 million people displaced
  - 20% of the land will banish
  - 30% of the rice crop will disappear
Main Topics for EH 210

• Vulnerability Assessment + Resiliency Enhancement = Climate Change Preparedness
Main Topics for EH 210

• Sustainable Development of New Products and Services
  – Market intelligence (what do people really want?)
  – Intellectual property (patents, trademarks, copyrights)
  – Techniques to enhance creativity and innovation
  – Principles of sustainable product/service design
  – Life cycle thinking and the circular economy
  – Assessment of health and environmental impacts (good and bad) of products and services
Main Topics for EH 210

- **Sustainable Development of New Products and Services**

VS
Main Topics for EH 210

- Sustainable Development of New Products and Services
Main Topics for EH 210

- Sustainable Development of New Products and Services
Main Topics for EH 210

• Sustainable Development of New Products and Services

  - Renewable energies are less damaging for the environment and health (effects of 1 Million KWh)

Human Health and Ecosystem Diversity Endpoint Indicators

- Coal
- Natural gas
- Biomass
- Wind
- Hydroelectric
- Solar

Graph showing years and DALYs for different energy sources.
Main Topics for EH 210

• Social and Sustainable Startup Development (to enhance your chances of getting funded)
  – Basics of the Innovation Ecosystem (startups, angel investors, venture capitalists, venture philanthropists)
  – Conventional VS Innovation Financing
  – How to prepare a sustainable business plan
  – How to do a business pitch or social impact presentation to potential investors or foundations
• **Innovation Ecosystem** is the regional scheme to create high tech startups, it requires the participation of the whole community to make it work in an effective way (it is similar to what happens in nature where interdependency of biological species creates a balance that maintains a healthy local system).
Main Topics for EH 210

• Social and Sustainable Startup Development (to enhance your chances of getting funded)

Overcoming the “Valley of Death”

Initial Stages: Go to the Government and to Local Universities

- Public Basic Research
- Business Incubators
- Research Grants
- Fiscal Incentives
- Innovation Awards
- Patents
- Grants for First Prototype
- Demonstration Facility

$ in Scaling-up a Technology or Business Idea (“The Valley of Death”)

- Bank Loans at a high interest rate
- Family Loans
- Angel Investors
- Venture Capitalists
- “Crowdsourcing”
- University Collaborations
- Business Accelerators
- Government Interventions

Consolidation Stage: Got to Private Equity Funds, the stock exchange, banks, etc.

- Manufacturing and/or Service Sales
- Worldwide Distribution
- Initial Public Offering (IPO)
- Loans or Private Equity
- Business Expansion
- Etc. etc.
Main Topics for EH 210

• Social and Sustainable Startup Development (to enhance your chances of getting funded)
Main Topics for EH 210

- Bostonian Innovation Ecosystem
Ordinal and P/F options, 2.5 credits

- Blogs and community outreach to prepare climate change preparedness plans (40%)
- Business or Social Plan for a positive startup (50%)
- Business or Social pitch for your startup (10%)
This class will be taught in the Yucatan Peninsula in Mexico from January 7th to 18th of 2019

- We will provide lodging
- We will provide assistance for traveling (up to $600)
This is for graduate students only

• To apply to EH 210, please download the application form available at https://canvas.harvard.edu/courses/33944/files/

• You will also need to select a Sustainable Development Goal and write an essay to propose a solution and a potential startup to implement it (500 words or less)

• Send the application and essay to Dr. Ramon Sanchez at rsanchez@hsph.harvard.edu before Nov 2 @ 11:59 PM
Pictures from January of 2018
Pictures from January of 2018
Questions?

Dr. Ramon Sanchez. E-mail: rsanchez@hsph.harvard.edu
You might also contact Aleyda Villavicencio:
avillavicencio@hsph.Harvard.edu