

# **Appropriate Organizational Design: A Hybrid Business Model for Technology Transfer to the Developing World**



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# Overview



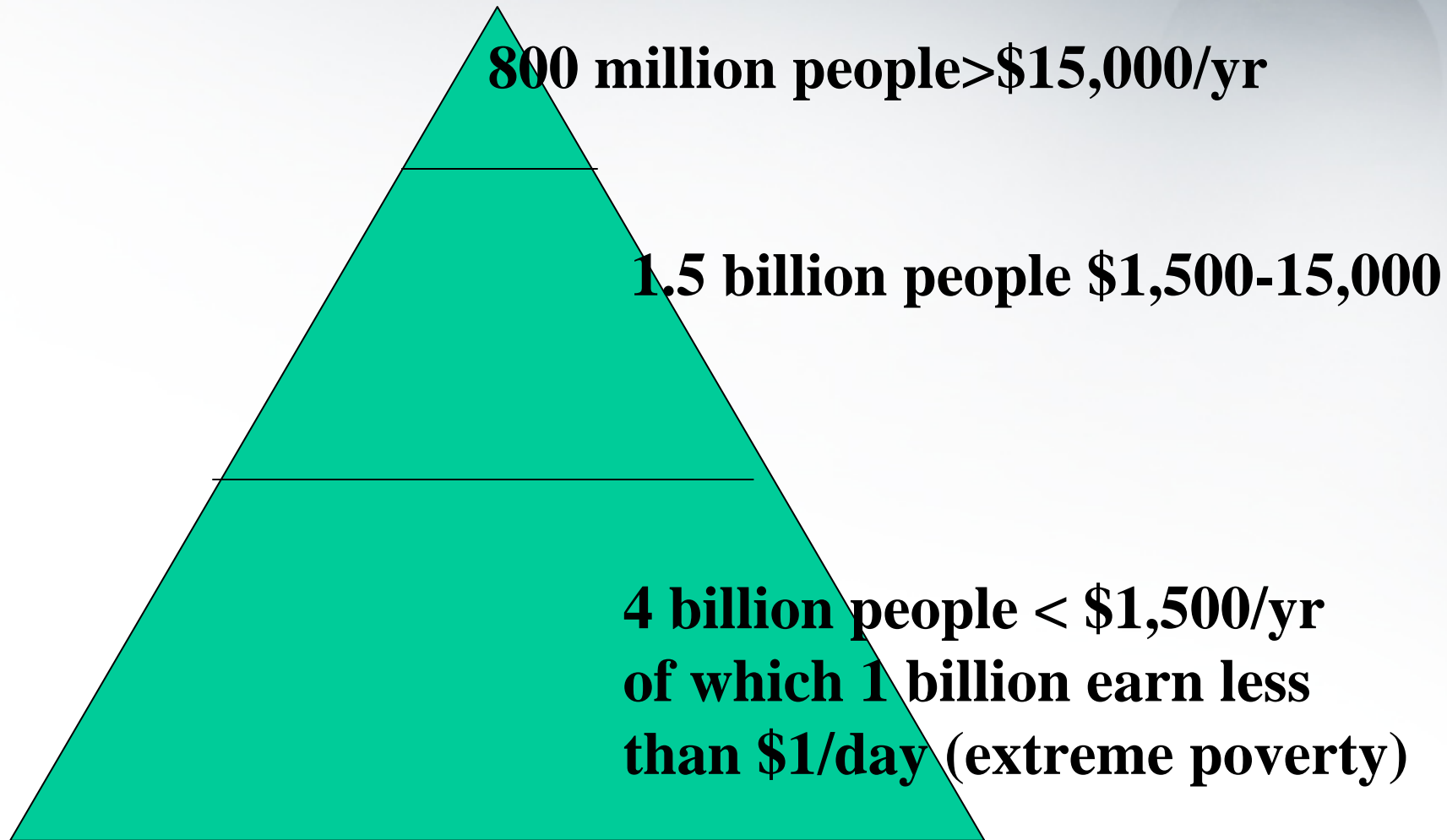
- 1) The BOPportunity
- 2) Entrepreneurial Approaches
- 3) Example: Envirofit International, Ltd.

# Conclusions (just in case)



- Many large BOPportunities in the developing world
  - Improve social and economic conditions
  - Improve environment and reduce pollution
  - Make money
- BOPreneurs are developing new strategies and new, hybrid organizational forms to build global sustainable enterprises
- Envirofit provides an example of utilizing “appropriate organizational design” for such an enterprise
  - Significant impact, sustainable business model and scaleable
  - Appropriate technology + appropriate organizational design

# The World's Wealth Pyramid



*S. Hart, Capitalism at the Crossroads (2005)*

# Entrepreneurs like really “BIG” markets



- **Something new in the developed world**
  - Very competitive; most firms have limited growth opportunities
  - Home run approach: targeting **Billion** \$ breakthroughs (iPods, Lipitor)
- **Something new in the developing world or emerging markets ( a “BOPportunity”)**
  - If a billion people make \$3 more/day, it is a **\$1.1trillion** market
  - This is what is happening in China and India (US GDP is \$12 trillion & China is \$2 trillion)

# Travel Guides for the Bottom of the Pyramid



- **Prahalad: Fortune at the Bottom of the Pyramid (2005)**
  - BOP as opportunity
  - Focus on MNC as key player/change agent
- **DeSoto: Mystery of Capital (2002)**
  - Developing world is entrepreneurial
  - Lacks rule set to transform assets into capital
- **Sachs: The End of Poverty (2005)**
  - UN Millennium Development Goals
  - Plan to eliminate extreme poverty; public finance focus



- **Hart: Capitalism at the Crossroads (2005)**
  - Adds environmental dimension to BOP opportunity
  - Need for disruptive innovation by MNCs
  - Becoming an “indigenous” organization
- **Enriquez: As the Future Catches You (2002)**
  - Current productivity difference is 360:1 ...and soon will be 1000:1
  - Not about natural resources- about human capital

# Are these travel guides accurate?



- Primary focus remains on governments and MNCs as the change agents
  - DeSoto focus on how entrepreneurial outputs are stuck as extralegal dead capital
  - Hart/Christensen focus on disruptive innovation coming from MNCs
  - Sachs (and Bono) rely on foreign aid to relieve poverty
- But...history shows that entrepreneurs are the change agents, not governments or large corporations.
  - Definition: A revolutionary a with a business model.
  - Entrepreneurs are part of the millennium challenge puzzle
- The rise of the social entrepreneur
  - How to Change the World (Bornstein)- Ashoka
  - Stanford Social Innovation Review
  - New Heroes PBS Series/Oregon Public Broadcasting (2005)

# Attributes of BOPpreneurial Enterprises



- Significant impact (triple bottom line)
  - Social, environmental, economic
- Sustainable business model
  - Novel distribution models
  - Venture philanthropy for technology development
- Scaleable (Dees 2004)
  - Replicate to other villages, regions and countries
  - Early planning considers scale
- For global approach, require appropriate technologies and appropriate business models for developing markets

# BOP Business Model principles



- BOP is not high margin
  - Volume and capital efficiency
  - Need new metrics to measure performance
- Market research and product development
  - “Engage first, design second”
  - Coinvention
  - Multiple low cost probes
- Marketing- Distributed Distribution Models
  - Fly under radar of corruption
  - Nontraditional partners
- Social Contracts (not legal)
  - Microcredit example
  - “Key to success is trust, not technology”

# Examples of Social Entrepreneurship



- **ApproTech/Kickstart- Kenya**
  - transforming rural agriculture with manual water pump
  - rural “middle class” with business acumen; impacting GDP!
- **Grameen Phone (Founded 1997)**
  - 2004: \$300 million revenue and \$74 million profits
  - Phone ladies increase income by \$300 (\$1/day)
- **SELCO India (Founded in 1995)**
  - Provide light and electricity for 150,000 people “off grid”
  - Last year, profits exceeded \$3 million
- **BOPreneurs: improving environment, improving society, and making money at the Bottom of the Pyramid**

# Traditional organizational design



- **Venture fundable business model**
  - IRR of 25+%
  - Rapidly scaleable to \$50+ million revenue at margins of 15-20%
  - Major investment required for technology development
    - Primarily IT and Biotech
  - Customer in “pain” with ability to pay
  - Investors like new idea with proven team and business model
  - Investor funds management to build business
  - Shareholder value drives business decisions

# Or...



- **“Bootstrap” model**
  - For profit, but doesn’t fit venture model
  - Useful for services, but not technology development
- **Non-profit fundable business model**
  - IRR of 0% (non-profit)
  - Customer in pain, very limited ability to pay, so “charity”
  - Donors fund programs
  - Donors want proven technology/solution
  - Mission drives organizational decisions

**Are there other options?**

# Here's a problem... or is it an BOPportunity?



- There are over 50 million two stroke motorcycles in the world
- They are powerful, reliable vehicles used for taxis and delivery throughout Asia and Africa
  - Drivers make \$1-3 day
- Each produces air pollution equivalent to 50 cars
  - Tons of pollution from each tailpipe every year
- Significant contributor to the pervasive air pollution in megacities
  - Annual impact of air pollution in Manila is \$400+ million US



# Envirofit™

New solutions to global challenges.



# Challenges for addressing Asian air pollution from tricycles



- Technology development costs are not necessarily lower for these markets
- Markets are large, but little disposable income or investment capital
- Concepts of “investment”, ROI and payback are difficult for people who are living day to day
- Baseline data shortage
- High perceived risk and low return for private capital



- Grants and donations targeted toward problem definition, not development of solutions
  - Air pollution, infectious disease, deforestation
  - Need for building systemic solutions: technology, business model, public policy
- “Frontier issues” of extralegal economy borders with older regulatory systems and globalization
  - Air pollution regulation and enforcement
  - Kyoto Protocol → Carbon credit trading
  - Ownership restrictions

# Conventional wisdom...



- Difficult to fund technology based businesses that can't promise high returns
- Difficult to build a business where customers have limited ability to pay
- Difficult to build technology based businesses that are based in developing world
- Difficult to fund a non-profit to develop technology
- In short, difficult to build and finance a sustainable, technology based company with operations in the developing world that could significantly reduce urban air pollution...

**DIFFICULT.... BUT NOT IMPOSSIBLE!**

# Envirofit International, Ltd.



- Founded in October 2003
  - Based on a CSU student business plan
  - Retrofit application of technology- Orbital Engine Co.(Australia)
- Mission
  - To develop and commercialize environmentally friendly technologies for the developing world.
- Product
  - Direct injection retrofit on 2-stroke motorcycles to improve fuel efficiency and reduce emissions
  - Each retrofit reduces CO<sub>2</sub>, HC and PM<sub>10</sub> emissions by over 1 ton per year
  - Payback is less than 12 months for cash purchase
  - Microfinance and carbon finance makes driver cash flow improve
- Milestones
  - First round funding November 2004
  - IRS exemption March 2005
  - Field test conducted May-November 2005
  - Commercial sales begin Summer 2006 in Vigan, Philippines

# Envirofit- organization design objectives



## **1. Deliver product at acceptable cost, while providing incentives for private companies in supply chain**

- Driver “payback” and cash flow target
- Envirofit is a non-profit; suppliers and distributors are not!

## **2. Scaleable and sustainable business model**

- Start up capital required to develop, test and industrialize
- Positive operating margins at scale
- Define the model for additional markets (Thailand, China, Malaysia, Indonesia, Viet Nam)
- Utilize microfinance
  - target of driver break even cash flow from installation
  - installation center expansion
- Supply chain mix of IP protected components and local manufacture



### **3. Thin margins and cash flow issues**

- Utilize networked business model
- Reduced asset footprint
- More “indigenous” model with local involvement and profit
- Monetize carbon cash flow
- Venture philanthropy for early stages

### **4. Making an Impact**

- 2 million retrofits in 10 years (out of estimated 30 million 2 stroke motorcycles in Asia);
  - Improved respiratory health in cities
  - Improved economic conditions
  - GHG emissions reduction

# Why is Envirofit a hybrid?



## Non-profit attributes

- Social mission: environment, poverty alleviation
- Organized as 501(c)(3)
- Start up financing is donations/grants
- Support from Colorado State University

## “For profit” attributes

- Milestone based funding rounds
- Operating costs covered by sales
- Performance based compensation
  - Annual and long term
- Complex supply chain

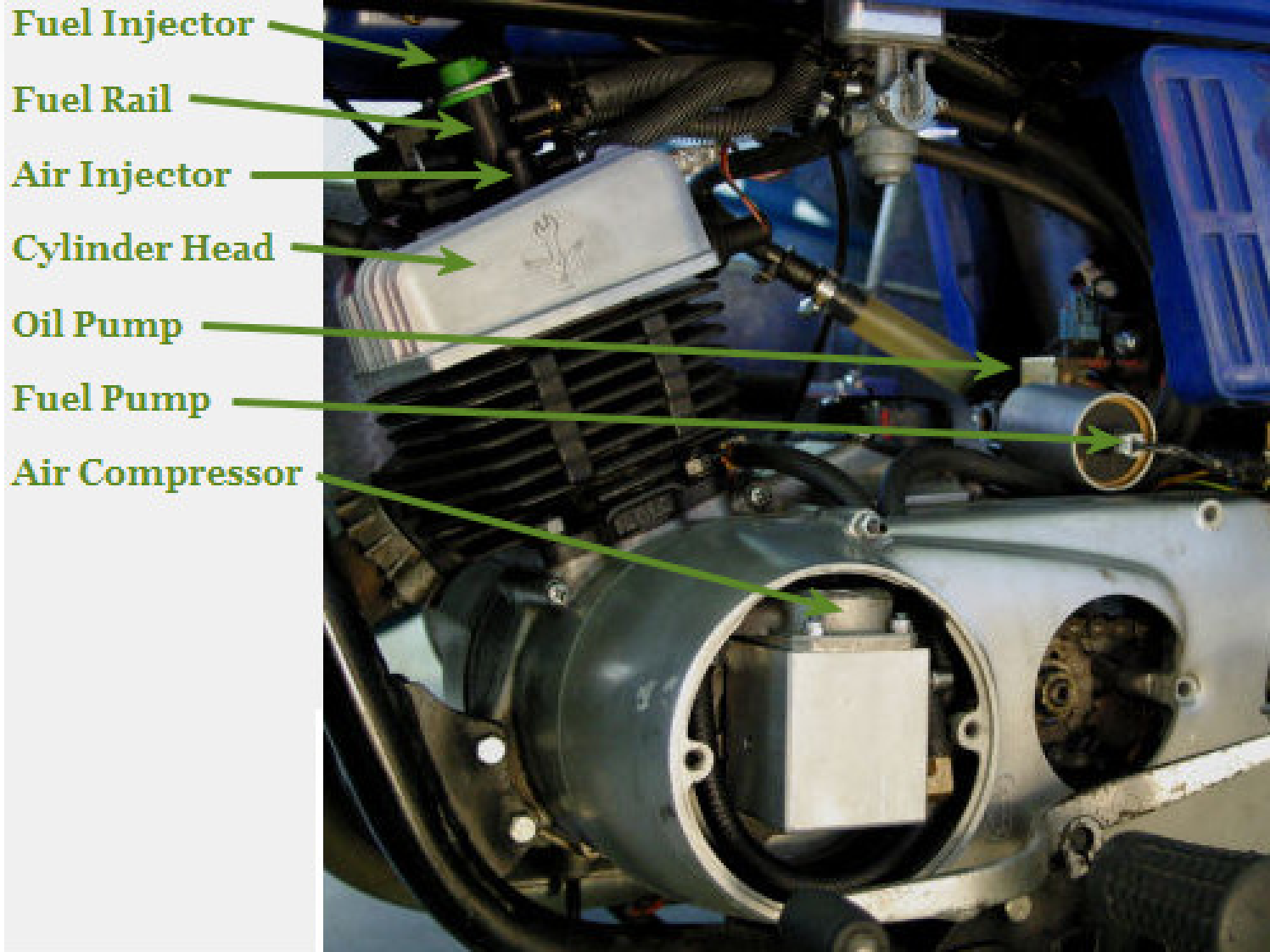
**“Hybrid Enterprise”:** Mission oriented enterprise that utilizes philanthropic investments for start up and technology development and generates operating surplus long term.

# Appropriate Design of DI Retrofit



- Direct injection (“DI”) technology is proven in terms of performance and emissions reduction
  - installed as OEM equipment on hundreds of thousands of small engines (primarily outboard motors and European scooters).
- The initial kit to retrofit 125 cc Kawasaki motorcycles
  - will subsequently be adapted for Yamaha and Suzuki models.
- The Envirofit kit utilizes a re-engineered head, compressor, brackets, and a wiring harness.
  - Manufactured in Philippines
- All other parts are off-the-shelf components.
  - Sourced through Synerject LLC in Virginia
  - Joint venture of Siemens and Orbital Engine

This figure shows the primary components of the retrofit kit installed on a Kawasaki motorcycle. Additional components, not shown, include an engine control unit (ECU), wiring harness and throttle body.



# University Technology Transfer considerations



- Universities create ideas, knowledge and technologies
- The sustainable enterprise sector in the developing world represents a potential market for these ideas and technologies
  - And a chance to make a big difference!
  - Engage and energize faculty and students
- BUT
  - Need to understand the sector
  - Consider BOPportunity early in technology research, development and commercialization strategies
  - Nascent field- need to build cross-institutional knowledge base of what works and what doesn't
- Envirofit's success helped enable the creation and grant support for CSU Global Innovation Center for Energy, Health and Environment in 2005
  - Creating joint learning opportunities for Engineering and Business students
  - Focused on appropriate technology and business model design for developing world
  - Several start up company ideas in development

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# Contact info



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