Innovating For Emerging Markets

Novel business models to supply energy to the rural poor

Parth Vaishnav

UNIVERSITY OF CAMBRIDGE
Judge Business School

Globally, 1.5 billion people do not have access to electricity

- Investments of $30-40 billion per year are needed to provide universal grid access by 2030 (The Economist 2010)
- Traditional alternatives are expensive, hazardous and polluting (Adkins et al. 2010; Mills 2005; Schultz et al. 2008; Peck et al. 2007)
- More sustainable alternatives can be economically viable
  - e.g., cheaper than kerosene, diesel or grid extension (Chakrabarti & Chakrabarti 2002; Miller 2010)

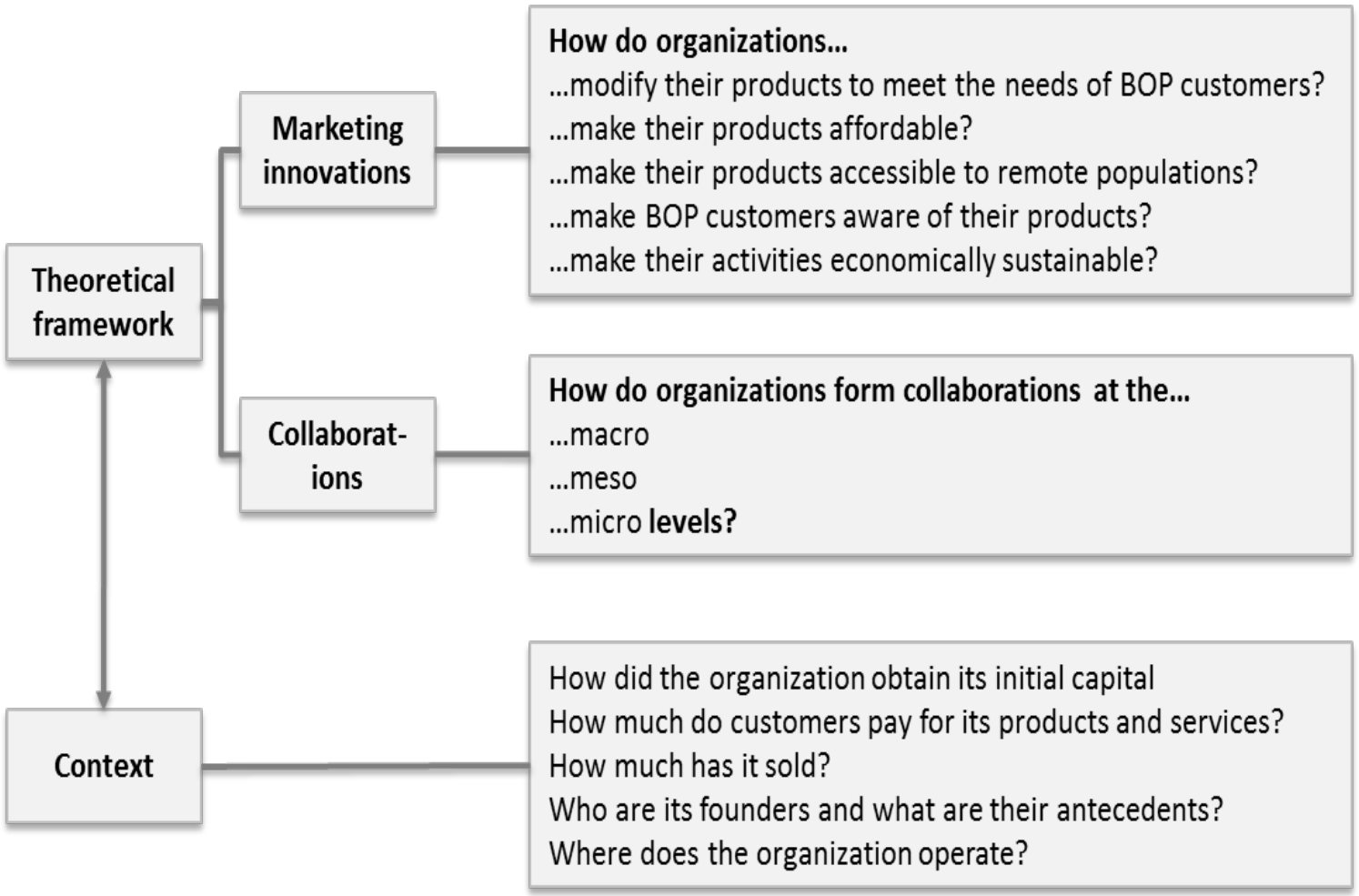
Can entrepreneurs implement such alternative solutions? How?

How do organizations seek to deliver - in an environmentally and economically sustainable way - energy services to the poor, rural populations that do not have access to the electric grid?

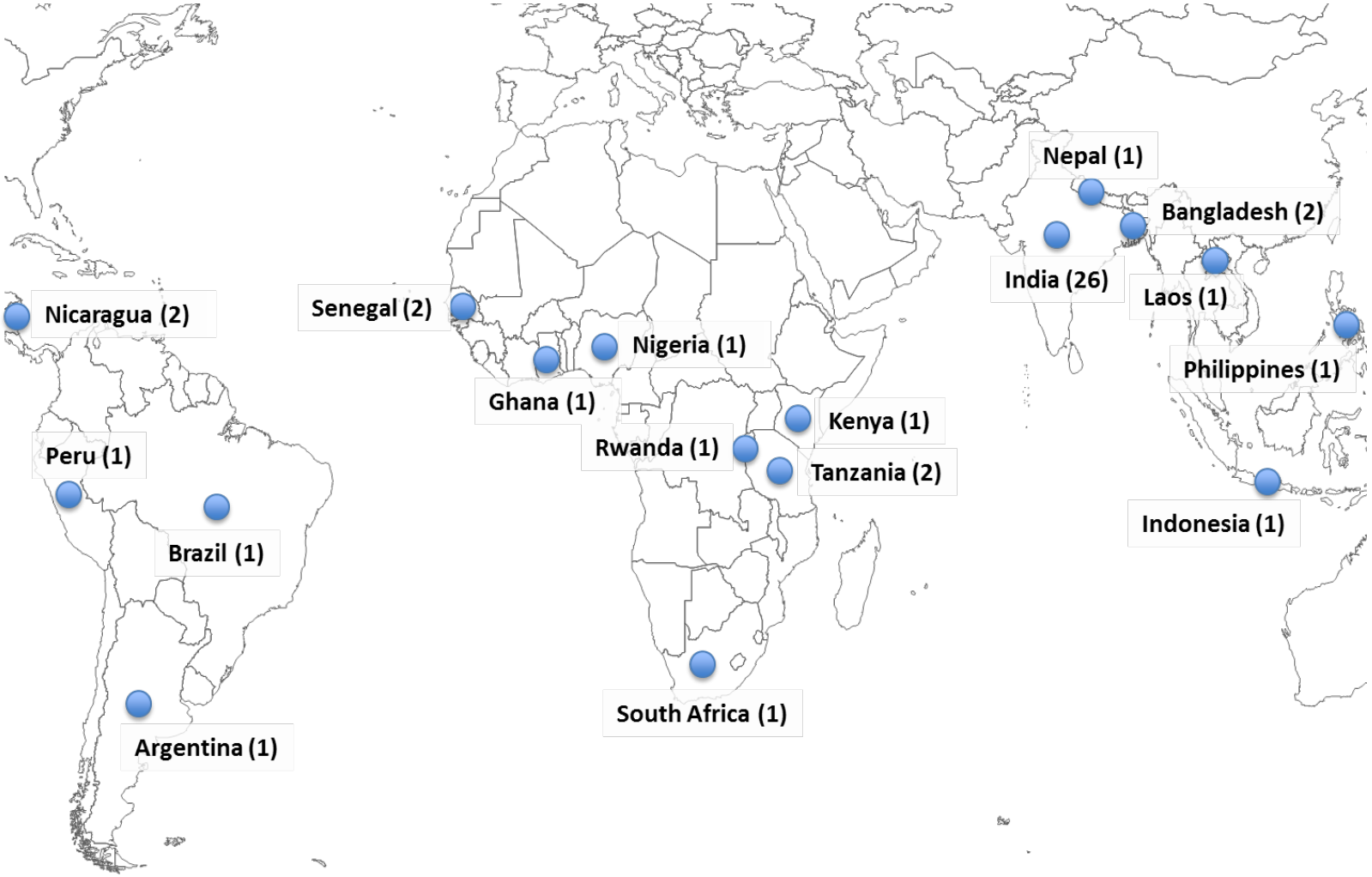
Methods and Theory

- Case studies (Yin 1981; Yin 2003)
  - When boundary between phenomenon and context is blurred
  - Multiple case studies: analytical generalization
  - Central questions of the research identified beforehand
- Marketing and management strategy literature (Prahalad 2009)
  - Marketing to the BoP: Product, Place, Price, Promotion → Product, Accessibility, Affordability and Awareness
- Social and institutional entrepreneurship
  - Creation of social and economic value: Sustainability (Dacin et al. 2011)
  - Collaboration (Spear 2006; Sánchez and Ricart 2010; Seelos and Mair 2007)
  - Multi-level institutional work: Macro, Meso, Micro (Tracey et al. 2011)

The central questions



Forty seven organizations were studied…



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…and their business models analysed

Organization	Product	Collaborations at		
		Macro	Meso	Micro
Husk Power Systems	Biogas-fired power plants supply 30W of power to 300-500 families from sundown to midnight	Collects Government subsidies and is preparing to qualify for CDM credits. Ministry of New and Renewable Energy is keen to help propagate the model.	Partnering with a supplier of energy efficient bulbs to supply customers; acting as a distributor for consumer goods firms.	Has organized 500 women into groups who supplement their incomes by manufacturing incense sticks from the char produced by the biogas plant.

Innovations in				
Product	Awareness	Accessibility	Affordability	Sustainability
A husk-based, single-fuel anearobic digester that is modified to make it cheap and simple to operate. Fixed monthly fee for a fixed, relaible supply of power.	Ministry of New and Renewable Energy has co-opted the project and is presenting it as a Government initiative in some places.	The Husk Power University will clone the model and ensure rapid expansion.	Provides lighting at half the cost of kerosene: fixed price for a fixed and relaible supply of power.	The model is 'open source'. The raw material (husk) is ubiquitous: Bihar produces 1.8 billion kg a year. The business model ensures that theft is low - losses are 5%. Profits are healthy.

Founders and Antecendents	Funding	Sales	Price	Markets
Gyanesh Pandey (IIT Varanasi and Rensselaer) Manoj Sinha (IIT Varanasi and U.Mass, Darden) Chip Ransler (Darden) Ratnesh Yadav (Delhi University; founded a non-profit organization)	$50,000 in the Social Innovation Competition at the University of Texas Total $100,000 in prize money (e.g. MIT Ignite Clean Energy competition, University of Virginia) $165,000 from the Shell Foundation $250,000 from Draper Fisher Jurvetson	As of Jan 2011: 65 units serving 30,000 households	Rs. 80 per month for 30W of power; 6 hours a day; Rs 40 for each incremental 15W	India: Bihar, then Uttar Pradesh, Arunachal Pradesh, Tamil Nadu

Over 500 news articles, 25 previous case studies, 4 interviews with founders

Marketing innovations

Product	Affordability	Accessibility	Awareness	Sustainability
Enable the use of multiple energy sources (12 of 47)	Reduce upfront cost: through product modularity and CDM (29 of 47)	Create network of local entrepreneur-franchisees (16 of 47)	Engage, and demonstrate product to, communities and customers (4 of 47)	Ensure payments (by peer pressure or pre-payment) (9 of 13)
Ruggedize (8 of 47)	Enable access to finance though MFI or other loans or by channelling subsidies (whether loans make products affordable or merely *accessible* can be debated) (32 of 47)		Use celebrities, sport and entertainment (4 of 47)	Teach locals to manage technical & commercial aspects of enterprise (7 of 47)
Tailor product to specific tasks (4 of 47)	Promote income generation (7 of 47)	Piggyback on existing networks (MFIs, post office, NGOs) (7 of 47)	Engage consultants (3 of 47)	Facilitate replication of the model (2 of 47)

Collaborations

Macro	Meso	Micro
Channel to customers, or collect, subsidies and funding from governments and international organizations (14 of 47)	Partner with organizations to finance (through loans or subsidies) customer purchases (24 of 47)	Engage microentrepreneurs to produce, promote, distribute or maintain products. (10 of 47)
Earn credits under the CDM mechanism (11 of 47)	Partner with organizations to promote or distribute products (10 of 47)	Organize customers to generate income from, or operate product. (7 of 47)
Lobby for, identify, and exploit beneficial government regulations or international programmes (8 of 47)	Partner with firms or universities to gain access to key technologies (10 of 47)	Buy biomass fuel, labour or produce from customers. (5 of 47)

How much do customers pay?

Product		Watts	Hours per Day	Life in Years	Total output (kWh)	Price ($)	$/kWh
TERI's Light Up a Billion Lives, India	Solar lantern	3	6		0.02	0.1	3.69
Sun King solar lantern	Solar lantern	1.4	4	3	6.1	17	2.71
Noble Energy, Andhra Pradesh and Maharashtra, India	Solar lanterns	3	6	5	26	35	1.18
Prokaushali Sangsad, Bangladesh	Solar home system	20	6	10	438	280	0.75
Sunlabob monthly rental, Laos	Solar home system	20	6		3.7	2.8	0.76
Unmetered tariff for rural areas for supply up to 1kW, Bihar, India	Grid power to villages	30	7		6.5	2	0.31
Husk Power Systems monthly charge, Bihar, India	Power from biomass	30	7		6.5	1.8	0.27
Saran Renewable Energy, Bihar, India							0.18 - 0.27
Kutir Jyoti Scheme, Bihar, India	Grid power to villages	30	7		6.5	0.8	0.13
Metered tariff in urban areas, Bihar, India	Grid power in cities						0.08

- All alternatives cheaper than kerosene
  - The SunKing solar lantern costs $17, and has a life of 3 years: families spend $2-4 on kerosene per month
- Previous research in other markets has shown that the poor pay more
  - Caplovitz 1965
  - Chung and Meyers 1999
  - Prahalad & Hammond 2002

Contribution

- Intense debate about doing business at the base of the pyramid (BoP)
  - Fortune (Prahalad 2004; Christensen et al 2001) vs. mirage (Karnani 2007; Warnholz 2007)
  - Munir et al. 2010
- Data support the 'mirage' hypothesis
  - Note additionality requirement for CDM

    Without the contribution of carbon credits, d.Light won't be able to substantially penetrate the very large market opportunity for providing lighting to families earning less than $2 per day because the cost of making and delivering lighting to those markets is just too high otherwise. Without access to that market, we could not project a return that would meet our threshold. (d.Light Design 2006)
  - Note also that these investors would be "comfortable with…returns of 6-8%" (Karunakaran 2009).

Further research

- What do the lowest rungs of the energy ladder look like? How is energy consumed?

  *"In our Blueprints scenario, the most optimistic scenario we published in 2007, we saw China's carbon intensity falling by over **14%** between 2005 and 2020. A more recent assessment suggests that China is on track to reach a **32%** reduction for that period, despite stronger GDP growth and higher overall energy-use than we had assumed."* (Voser 2010)

- Impact on income generation and development
  - People can work longer → they should earn more (?)
  - Replicate ethnographic work done in microfinance

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