Business Models for Off-Grid Energy Access at the Bottom of the Pyramid

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Abstract: A large proportion of the world's population has no access to electricity and so relies on noxious kerosene for their lighting needs. Solar-based solutions require a large upfront investment and are often unaffordable in this market owing to consumers' tight liquidity constraints. As an alternative, there are business models relying on rechargeable light bulbs that are sold at a subsidized price (which renders them affordable) and require regular micropayments for recharges (which eases liquidity constraints). These bulbs provide a cheaper and healthier light source than kerosene, yet their adoption is lower than expected and some consumers continue to use kerosene. The authors propose a stylized consumer behavior model to explain these observations. In addition to monetary cost incurred while using a particular light source, our model accounts for the inconvenience cost (due to repeated travel to the purchase center) and blackout cost (due to liquidity constraints) associated with that source. Although kerosene lighting is more expensive than bulbs, consumers who face either high inconvenience costs or high blackout costs prefer kerosene to bulbs because the former's flexibility, with regard to quantity, helps reduce whichever cost is dominating. At the firm level, there is an optimal bulb capacity that trades off demand for rechargeable bulbs against recharge revenue from consumers; furthermore, firm can reverse the preferences of kerosene consumers by increasing its product's flexibility (e.g., by allowing partial recharges). Although strategies - such as price discounts and mobile micropayments - based on alleviating liquidity constraints are not in themselves sufficient to ensure higher adoption rates, increased bulb use becomes more likely when they are combined with strategies to reduce consumers' inconvenience.

Bio: Serguei Netessine is the Timken Chaired Professor of Global Technology and Innovation at INSEAD and the Research Director of the INSEAD-Wharton alliance. Before joining INSEAD in 2010, he was a faculty member at the Wharton School, University of Pennsylvania. He worked on the topic of business model innovation and digital disruption with numerous organizations around the world including Lockheed Martin, Deloitte, Procter & Gamble, McDonald’s, Rolls Royce, Comcast, Expedia, ABB, Keppel, Genting, SPRING Singapore and US Air Force, among others. Prof. Netessine is currently serving on the Future of the Economy committee for the Singapore government. He also serves on the boards of several startup companies and he is an active angel investor. Professor Netessine is a frequent speaker on innovation/entrepreneurship at major global events including World Knowledge Forum (Seoul) and World Economic Forum (Davos). Prolific academic writer, professor Netessine publishes and holds senior editorial positions in leading academic journals. His work has received extensive media coverage in CIO Magazine, the Economist, Forbes, New York Times, US News and other media. Recently, he co-authored “The Risk-Driven Business Model: Four Questions that Will Define Your Company” (Harvard Business Press, 2014).