

GLOBAL HEALTH

Innovation Insight Series

Market research and prototyping helped d.light understand the specific and sometimes unarticulated requirements of its users



Photo: d.light design

D.LIGHT II: Market Research and Prototyping in Remote Regions

SAN FRANCISCO, CALIFORNIA

ESTABLISHED 2006

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THE PROBLEM/SOLUTION SPACE

Worldwide, 1.3 billion people still do not have access to electricity. This includes 550 million living in Africa and 400 million in India.¹ Many of these individuals live in total darkness at night. Those able to afford light spend between 5 and 30 percent of their income on kerosene oil for lamps.² However, kerosene is dangerous and can negatively impact health. Burning kerosene creates indoor air pollution, which kills an estimated 1.5 million individuals annually from respiratory diseases including chronic obstructive pulmonary disease (COPD) and respiratory tract infections. Over half of these deaths involve victims under the age of five.³ Evidence also links indoor air pollution to lung,

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laryngeal, and nasopharyngeal malignancies, heart disease, and low birth weight. Moreover, kerosene lamps can cause deaths from burns, fires, and suffocation.⁴ The poor quality of light and toxic fumes from burning kerosene also reduce the productivity of families and businesses and limit the hours children are able to study.



Photo: d.light design

Founders Sam Goldman and Ned Tozun in India with d.light's early products

ABOUT D.LIGHT

d.light was founded by a group of four students attending Stanford University. Two MBA candidates, Ned Tozun and Sam Goldman, teamed up with two engineering students, Erica Estrada and Xianyi Wu, in a course called Entrepreneurial Design for Extreme Affordability, to address the need for safe, affordable lighting designed to fulfill the specific requirements of users in the developing world. Over the span of the two-quarter course, they developed prototypes of portable, solar-powered LED lights fit for use in low-resource settings. Within a couple of months, they started field testing their designs in Myanmar and found that the potential demand was not only strong, but

overwhelming. “People would actually weep as they talked about how the lights had transformed their lives,” Tozun remembered.⁵ In one village, the police even confiscated the prototypes for their own use—they needed light too.⁶ After taking the summer off to complete their respective internships, the team members reunited at Stanford in the Fall and decided to form a company to develop their ideas into a real product.

ONE CHALLENGE: MARKET RESEARCH AND PROTOTYPING IN REMOTE REGIONS

When Tozun, Goldman, Estrada, and Wu were working on their lighting solution as part of the course, they collaborated closely with a partner—International Development Enterprises Myanmar (IDE|M)—that had been engaged by the teaching team. The role of the partner was to suggest project ideas, host the students when they visited to learn about the needs of potential users in Myanmar, and actively participate in the preliminary design and testing of solutions. Once the course concluded, IDE|M was willing to continue the collaboration but d.light determined that Myanmar was not an ideal first market. Instead, the team decided to focus on India. “It’s larger and the need is much bigger,” noted Tozun. In addition, the market infrastructure in India was better established and distribution networks reached deeper into rural areas than most other developing regions. After additional consideration, d.light narrowed its preliminary focus to North India because residents there had less access to electricity than people in the southern regions.

No longer able to rely on IDE|M for access to target users, the team needed to establish alternative channels for gathering detailed user feedback to inform product development. d.light also required first-hand information about competing lighting solutions. Both

types of data would be best gathered on the ground in India. However, the team had few contacts to help gain access to users in the field and, during its early stages, limited funding for travel. “We didn’t have a ton of cash, so we had to be very careful about how often we would visit to do testing. But at the same time, we had been trained to constantly be testing prototypes with users through a rapid, iterative development process. So it was difficult,” explained Estrada, who took on the responsibility of coordinating d.light’s initial research and prototyping efforts. The team needed a strategy to overcome these limitations.

THE SOLUTION: BALANCING FIELDWORK SUPERVISED REMOTELY WITH ON-THE-GROUND PRIMARY RESEARCH

d.light developed a strategy for market research and prototype testing that balanced fieldwork supervised remotely with primary research personally conducted by team members on the ground. This model enabled the team to save money and remain productive in market research and product development even while based in the U.S.

To manage field research remotely, d.light needed to establish formal partnerships with local organizations in its target geographies. Without an established network in India, the team relied on Internet research to generate preliminary contacts. “We also started talking to people who we know and asking people at Stanford for connections,” Estrada said.

Through those leads, they identified organizations specializing in rural community development, such as the Drishtee Foundation and the Self Employed Women’s Association (SEWA), which were willing to conduct research and testing activities on behalf of d.light.

Estrada negotiated contracts with these entities and then provided them with intensive training. d.light favored individual home interviews over focus groups. “The research that we were trying to do was very different from any research they were used to doing,” Estrada recalled. She overcame this challenge, in part, by developing structured “field guides” with detailed instructions for how to interview end users and what specific data to collect. As Estrada described, “The guides literally spelled out what the interviewers should tell the families on each visit,

the questions they should ask, the pictures they should take.... I provided very explicit instructions knowing that I couldn’t be on the ground the whole time.” This approach helped to ensure high-quality results and meaningful progress when d.light staff members were working in the U.S.

Another benefit from partnering with these local organizations was that they were highly familiar with their communities. With their breadth and depth of local contacts, they were able to connect d.light with users meeting highly specific profiles such as families of specific sizes and income ranges. “I could tell them I’d like to speak with a family in a particular area that’s really destitute, only relies on kerosene, and has certain other char-



Photo: d.light design

Members of the d.light team interviewing end users in rural India

acteristics, and they could find that family for me. Then I would give them another set of characteristics and they would take me to that family,” Estrada said. As d.light’s research and testing activities became more focused, this targeted access to potential customers was invaluable.

In addition to establishing formal agreements with local partners, Estrada also utilized an informal approach to research and testing, tapping into personal contacts to generate additional insights each time she visited the country. For instance, she had a close friend whose father owned hotels in India. Many of his employees resided in villages without electricity. Estrada was able to introduce herself to these hotel staff members and communicate d.light’s mission. Excited by the product, many employees became willing to serve as personal tour guides and walked Estrada through their communities to help her understand the needs and socioeconomic conditions of residents. “It really helped me understand how the dynamics of the neighborhoods worked,” Estrada commented. Whereas d.light provided compensation to the Drishtee Foundation and similar organizations, Estrada’s informal collaborations were more personal. She provided reimbursement for gas and other travel expenses but formal compensation was generally not necessary. “A lot of people were so excited just to be a part of it,” she explained.

We were more focused on just talking to people and understanding their needs and circumstances...it was a lot more like a deep dive into a few villages...than massive surveys and doing research on the ‘total market.’

As Estrada visited different villages and neighborhoods, she actively benchmarked competing products. In each location, she would explore the local market and meet with the storeowners selling electrical products. “I would just buy every single lighting product that I had never seen before. After a while I knew all the types of lights that you might be able to buy in a given region,” she stated. At the time, LED lights were just beginning to become popular. According to Estrada, “I would buy a ton of those and I would also take those around with me because they provided great comparisons.” Estrada would ask the users she interviewed to evaluate d.light prototypes alongside other LED lights and listen carefully to their feedback. Mindful that kerosene remained the company’s “real competitor,”

Estrada also made a habit of buying all the different kerosene containers she encountered during her travels. When she discovered that many individuals routinely made their own kerosene containers, she responded by “taking pictures everywhere of everything” and then studying the designs.

d.light acknowledged that this particular research and testing strategy did not yield large volumes of quantitative data. “We were more focused on just talking to people and understanding their needs and circumstances,” Estrada said. “And it wasn’t like we did this in a ton of villages. It was a lot more like a deep dive into a few villages and a few families within them rather than massive surveys and doing research on the ‘total market.’”

However, as the d.light core team analyzed and synthesized the information gathered in the field, they were able to use it to make important refinements to the company’s product development efforts. As Estrada described, “From gathering all of that data, from interviewing different types of families, we started to lay out what they needed and how to tailor product to them. Up until that point, we didn’t really understand that there were roughly eight different levels of poverty. It’s not just like one poor person equals another



A woman in India with her d.light solar LED lantern

poor person. There are so many different market segments and attitudes and beliefs and things like that that we had to understand.”

The data gathered by Estrada and d.light team members provided an important foundation for their initial product development efforts. Using this information, d.light created archetypes—or composite characters—that it would use to guide its design process and ultimately expand its product line. As d.light experienced substantial growth and success, it continued tailoring the design of its products to the unique circumstances and needs of end users. Dorcas Cheng-Tozun, d.light’s communications manager, emphasized this human-centered approach: “Our design team

spends hundreds of hours in the field, interviewing, observing and sometimes even living the lifestyles of our customers.” She added that d.light still engages in extensive prototype testing that “engages the end users at every step, getting their feedback on every single aspect of the product. Our customers have the final say in how our products are designed.”⁷ ♦

NOTES

- 1 “Energy—The Facts,” The World Bank, <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTENERGY2/0,,contentMDK:22855502~pagePK:210058~piPK:210062~theSitePK:4114200,00.html> (October 22, 2012).
- 2 Peggy Gibbs, “d.light Provides Business Case for BizSmart Global Students to Solve,” Bizsmart News, April 22, 2012, <http://www.bizsmartglobal.com/india/2012/04/22/d-light-provides-business-case-for-bizsmart-global-students-to-solve-2/> (October 22, 2012).
- 3 “Indoor Air Pollution and the Millennium Development Goals,” World Health Organization, <http://www.who.int/indoorair/mdg/en/> (October 22, 2012).
- 4 “Indoor Air pollution and Health,” World Health Organization, September 2011, <http://www.who.int/mediacentre/factsheets/fs292/en/index.html> (October 22, 2012).
- 5 All quotations are from interviews conducted by the authors, unless otherwise cited.
- 6 Jocelyn Wiener, “D.light’s Lofty Goals Meet Practical Challenges in India,” 2010, <http://www.gsb.stanford.edu/news/bmag/sbsm1005/feature-dlight.html> (October 29, 2012).
- 7 Simon Keane-Cowell, “This Product Can Change Your Life: the d.light story,” <http://www.architonic.com/ntsht/this-product-can-change-your-life-the-d-light-story/7000556> (November 19, 2012)