

**IDRC's
Innovation, Technology and Society (ITS)
Internship Award**

**RESEARCH PROPOSAL:
"Facilitating Individual Access to
High-Value LED based Lighting Markets
for Reducing Poverty"**

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MBA / Industrial Engineer

Santiago, Chile
September 2007

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Background

The Energy crisis is affecting worldwide and particularly in Latin America. Industries and individuals are looking for ways to reduce their energy bills. Lighting is one of the most common saving source where only a small investment is required. New developments in energy-saving lighting products based in new technologies are usually non-accessible to the poors because their higher price compared to conventional products. This enlarge the gap between rich and poors as wealthy people and business have the means to invest in energy-saving products but poor people do not.

A particular new technology, namely the LED technology is starting to flood the market with several lighting and signaling products. LED-based lighting solutions requires only 10% of energy to produce similar or more light than a traditional incandescent bulb within a 60 degree light cone. Construction of a LED-based lighting solution can be made either manually or with automation. Corporations had chosen automation to reduce costs, which in term has translated in increasing unemployment and reducing the availability of customized lighting solutions. As a result of rising in energy cost, poor people's neighborhoods are getting darker. This translates into increased criminality. On the other hand individuals can fill the gap left by mass-production building customized lighting solutions according to customer's specific needs. Therefore, there is a market opportunity for incorporating the micro-segmentation approach to serve the high-value market of LED-based customized lighting solutions, which is a huge market composed by industries and wealthy people who require unique solutions.

Therefore, small entrepreneurs and individuals can make a living while building LED-based lighting or signaling solutions for the huge demand originated from the energetic crisis. In doing so they will reduce the burden of poverty making their own income. At the same time they would be taken away from criminality and would be busy using their intelligence in designing innovative new products. At last but not at least, they would improve lighting conditions within their living surroundings due to the access to scrap lighting materials when manufacturing their products.

This project suggest to research different entrepreneurial experiences in the hand-made LED-based lighting industry, as well as different production and association models from the perspective of two different economies that have shown success. Author's experience in Chile is presented as starting ground research (Se APPENDIX.) Some promising results after a couple months of applying the model are available to share: great interest from formal market players (i.e., corporate customers and lighting specialized firms), as well as from the prospect people that wants to be trained and benefit from this proposal, as well as from schools and private sector who act as sponsors. Not to mention the interrest perceived at the Municipality Government level as well as social organizations which mission is to help the poors. All these players are currently part or sponsoring this experimental project. Only in the following moths enough data would be available to draw recommendations and suggestions in establishing working models for reducing poverty. The author believes from its own experience that this project will emerge as feaseble possibility to reduce poverty using innovation and emerging LED technology in any community, at al local, regional an national level. If right it would become a mean for giving back to people the dignity they deserve thru self sufficiency and industriosity.

The Project

Major changes in the lighting sector - such as the increasing Energy deficit world-wide make LED-based lighting solutions very attractive to consumers and are rapidly taking hold in developing countries due to their extended service life and reduced energy consumption. In fact, savings in consumption reach in average 90-95% when compared to traditional incandescent technology, and 50-60% compared to energy saving fluorescent bulb lamps. These changes create an opportunity to individuals and small enterprises for building a business around these huge demand for energy-efficient products because there is no significant investment required to set up a mom and pop's shop where these products can be manufactured on a customized basis. This opportunity becomes a source of income to the poor and needed who live in urban or rural neighborhoods, because potential customers are everywhere.

In other words, LED-based lighting solutions could provide individuals and small-scale enterprises - who make up a large proportion of the poor in developing countries-- with an income source and an opportunity for improving their life quality via increasing the amount of light in their neighborhoods. However, they must first overcome a wide range of constraints for accessing the high-value lighting market, including financing capital for tools and materials, training, limited access to production inputs, transportation links, and market information. Nevertheless, little knowledge about what makes such market access initiatives successful is available for guidance. While there is evidence that high value markets can be of great potential benefit to small-scale manufacturers, not enough is known about how market access can be facilitated. This project proposes to address these gaps in knowledge, by undertaking comparative research on alternative strategies and mechanisms to facilitate the market participation of individuals and small-scale manufacturers. Using a consistent and rigorous framework that builds on established analytical approaches, it undertakes a series of case studies across a range of contexts in Latin America and eventually in Asia. The purpose is to define a set of guiding principles to facilitate the participation of individuals and small-scale producers in high-value markets for LED-based lighting products at the national and regional level, as well as in industrialized countries.

Objective

The general objective of the project is to compare and contrast alternative mechanisms for facilitating the participation of small-scale producers in supply chains to high-value markets for LED-based lighting and signaling products, identifying government innovation programs. Put more simply, it aims to identify 'what works and what doesn't' in terms of facilitating smallholder access to markets in different geographical, economic, political and social contexts, with the intention of improving relevant initiatives, especially within Latin America.

Approach

The project will identify the managerial, organisational and operational aspects of alternative mechanisms through which constraints to smallholder participation can be alleviated. A thorough review of the relevant literature will inform the development of an analytical framework, which will in turn be applied to case studies in Chile, Argentina, and two more case studies from Latin American or Asian countries that utilizes extensively labor and remote work as production model. The research will focus on a few lighting products so as to enable comparative analysis, and will consider supply chains to national and regional developing country markets, as well those linked to industrialized country markets, in order to address the diverse needs of producers across Latin America.

Market access mechanisms to be studied include individual and collective level actions in production and marketing, initiatives that are NGO or donor-initiated or sponsored, and those that are led by domestic and/or international private business. Variables such as the nature of

payment vehicles, technical assistance and contracts will be explored. The project will consider the degree to which strategies for facilitating market participation can act to reduce social inequalities and support livelihoods, and will pay particular attention to differences in impacts by gender, promoting homemakers participation. A special emphasis will be given to identify government innovation programs available.

Expected Outcomes

Based on the research results and working papers that will be produced on each element of the project, a set of operational guidelines will be developed that are oriented to help relevant initiatives to better assist small-scale producers to attain and benefit from access to high-value lighting LED-based markets. The guidelines, which will be published as a manual will be oriented to be of use to development agencies, bilateral and multilateral donors, NGOs and private sector organisations and enterprises, among others. These guidelines will be developed through analysis of the research results and based on consultations with a range of development actors. The purpose of the consultations is to identify the ways in which the research results can be translated into 'best practice' operational guidelines to improve assistance strategies. The research outputs and working papers will be widely disseminated via a project website and distribution list, as well as through a workshop in Ottawa and dissemination seminars in Chile and other countries. Also a WEB site with information tailored to the general public will be set-up.

The Project Team

The author hopes to integrate a multidisciplinary research team, hopefully with researchers from the IDRC, or other schools from Canada, with the intent of enrolling in a Doctoral program in Canada. Contacts with Dalhousie University has already been made.

Project Coordinator

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Relevant Experience or Achievements

- 1. Recipient of and Industrial Intellectual Property Patent.** Sector: Oil Field Industry
Invention: "Crude Oil Sampler for Large Accumulation Tanks", Patent Number: 968-95.
Chilean Ministry of Economy, 1995.
- 2. Founder of the LED-Based Lighting Innovation Center in Chile**, namely "Energy Market", 2006.
Purpose: To create a network of individuals trained in the manufacturing of LED-based lighting products. Sponsors: InterfaceFLOR (US-based firm); Electrónica Casa Keim (Chilean Electronic Reseller); University UCINF. See details at www.e-market.cl/productos/solar/index.htm
- 3. Organizer of two International Seminars at Universidad Mayor:** "Battery Recycling Process" in 2006, sponsored by NOKIA; and "Sustainable Economy and Environment with Dr. David Suzuki" in 2007, sponsored by InterfaceFLOR and Canadian Government, among other selected sponsors.
- 4. Guiding Professor in Thesis Projects:**
"e-Vote: Creating Environment Awareness among People and Market Players", University UCINF 2005, and "Territorial Information System for the Valparaiso Region", University Mayor, 2007.
- 5. Member of the following Associations:** Chilean Professional Engineering Association; Environmental Committee in the Chilean-American Chamber of Commerce; and also collaborator within the Chilean-Canadian Chamber of Commerce.

APENDIX:
**Experience in implementing a
 Self-sufficiency and Industriousness Model among Pooors of Santiago
 for Building LED-Based lamps from their homes**

During June 2007 to date, the author has been busy designing and building LED-based lighting solutions according to the needs of several Chilean lighting companies and contractors. Among these ELECTRÓNICA CASA KEIM has worked closely in developing with the author more than ten new products. Also the author has been training people at urban and rural communities in how to build LED-based lamps.

In fact, about twenty people has been trained in the assembly of these products, preparing them to become selfsufficient producers. This opportunity has awoken the interest fo many people at different levels: community, low paid employees, high school students and pre-graduated students. Prospect customers has shown high interest in expand this concept to other applications, specially because products tailored to their specific lighting needs can be designed and delivered on a micro-segmented basis.

Some of the products designed and built, as well as some of the people trained are depicted in the following images:



Some of the LED-based Lamps produced manually, 2007



Fourth group of rural people being trained in how to build a LED-based Lamp, 2007

An important milestone for the project is the fact that the Municipality of Curacavi (a 40,000 rural resident community close to Santiago - Chile) has shown interest in the project expecting several benefits from it, namely: Reducing energy bill in public illumination; training students from technical high schools; and exploring the possibilities of Photovoltaic solar panels. For this particular project, already InterfaceFLOR and CASA KEIM has committed their sponsorship. This project is conceived as the anchor in a rural community from where learning lessons can be obtained when rolling out the model.



Picture of the Touristic Project Site, Municipalidad de Curacavi, 2007

Official Sponsors for the Curacavi LED-based lighting Project

The following is a list of the organizations that in one way or another endorse this project. Some of the organizations had worked previously with the author in other Environment-based related projects.

Organization	Relationship	Comments
Municipality of Curacavi	Coordination with the Technical High School students to be trained; financed civil works required to install 72 LED-based lamps in a Tourism Project.	Main recipient of the benefits during first stage of the project.
InterfaceFLOR	Extended a grant of US\$500 for financing training materials. Also would donate carpet for the Event Center at the Tourism Project.	Interest in sponsoring on a long range basis the project. Interest in joining efforts with "Un Techo para Chile" program via donating used carpet. Previously sponsored pro-environment activities organized by the author.
Electrónica CASA KEIM	Extended a sponsorship consisting in 3,000 leds required to build 72 lamps of the Tourism Project.	Technological long run Partner who is acting as a marketing distributor at the level of institutional customers.
Energetic Platform ESPERANT	Endorses the project and will help in fund raising sponsorships.	Non-for-Profit organization that will act as a partner in getting exposure to the Market and Government.
Chilean Regional Wholesale Tourism Association (ACHMART)	Endorses the project in those service to the community activities aimed to improve touristic sites.	Previously worked with the author in cleaning three miles of a touristic site, in the Region of Rancagua.
University UCINF	Discussing their level of sponsorship with the project.	Showed interest in offering facilities as a training center for the project.
University Las Americas	Discussing their level of sponsorship with the project.	Showed interest in offering facilities as a training center for the project.

SOME REFERENCES

- Patricio Cañete, Trade Commissioner, Chilean Canadian Embassy, patricio.canete@international.gc.ca
- René Salame, Academic Rector, UNIVERSIDAD MAYOR, rsalame@umayor.cl
- Verónica Cuevas, Country Sales Manager, InterfaceFLOR, veronica.cuevas@interfaceflor.com
- Nena Mora, General Manager, Electrónica CASA KEIM, jcr@casakeim.cl
- Andrés Varela, President, Energetic Platform ESPERANT, avarela@varela.cl

EXECUTIVE SUMMARY

The candidate has a strong research interest in policy implications associated with new technologies such as photovoltaic solar cells, thermo solar cells, wind generators, and LED-based lighting solutions. The candidate wants to gain international development exposure and contribute to state-of-the-art in LED-based lighting technologies, as well as in innovating processes and systems for reducing poverty in developing countries. An ongoing project is described.

The candidate has strong research, analytical and writing skills, as well as familiarity with communications and dissemination tools (i.e., expert in Folio Views and publishing to the WEB.) The candidate expects to focus on the following issues of the ITS mission:

- Innovation Systems Research in the South;
- Science, Technology and Innovation policy issues in developing countries (example themes: science & technology indicators, science & technology infrastructure, science & technology human resources development, or government innovation programs);
- Focus on one developing region of the world, a comparative of 2 developing regions, and/or a comparison between a developing region and Canada.

The candidate expects to integrate with the ITS team in its current activities and ongoing projects, and learning from them how to better contribute to the developing countries.

LEARNING OBJECTIVES

The candidate expects to learn:

1. How to better conduct Research on the Innovation and Technology initiatives that contribute to alleviate the gap between rich and poor in developing countries. This objective is key to the candidate due his expectation to enroll in a Doctorate program on this area in Canada during or after his Internship at IDRC.
2. How grants are managed, specially learning how to select and evaluate proposals and results of initiatives for implementing in developing countries.
3. How Government structures and officials can be better reached in connection with information gathering for research proposals and Policy making.

CONTRIBUTION TO THE INNOVATION, TECHNOLOGY AND SOCIETY PROGRAM

The candidate brings expertise in projects using new LED-lighting technologies along with innovation in design and building LED-based lamps as an income source for eliminating poverty in urban or rural communities. It also brings a feasible model for getting participation of private sector, universities and local Government agencies. Candidate expects to contrast this project with similar initiatives from other developing countries in Latin America or Asia. Candidate is proficient publishing information on the WEB (i.e., he maintains his website: www.e-market.cl.)

BENEFITS THAT THE CANDIDATE EXPECTS FROM THE INTERNSHIP

1. Receiving exposure to IDRC in order to be considered for employment. The candidate and his family plan to migrate to Canada as permanent residents by January 2008.
2. Getting training in world-class research techniques applied to the Development arena, in order to enroll during/after the Internship in a Doctorate program in a Canadian school.
3. Learn how grants are administered (i.e., selection of projects, monitoring, evaluation.) so can later become a link between Chilean initiatives and international organizations.