

2012-07-12

# International development partnerships and diffusion of renewable energy technologies in developing countries: cases in Latin America

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Platonova, I. (2012). International development partnerships and diffusion of renewable energy technologies in developing countries: cases in Latin America (Doctoral thesis, University of Calgary, Calgary, Canada). Retrieved from <https://prism.ucalgary.ca>. doi:10.11575/PRISM/26616  
<http://hdl.handle.net/11023/112>

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UNIVERSITY OF CALGARY

International Development Partnerships and Diffusion of Renewable Energy  
Technologies in Developing Countries: Cases in Latin America

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE

DEGREE OF DOCTOR OF PHILOSOPHY

FACULTY OF ENVIRONMENTAL DESIGN

CALGARY, ALBERTA

July, 2012

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## **Abstract**

Access to energy is vital for sustainable development and poverty alleviation, yet billions of people in developing countries continue to suffer from constant exposure to open fires and dangerous fuels, such as kerosene. Renewable energy technologies are being acknowledged as suitable solutions for remote rural communities in much of the developing world and international development non-governmental organizations (NGOs) increasingly play important roles in the diffusion of these technologies via development partnerships. While these partnerships are widely promoted, many questions related to their functioning and effectiveness remain open. To advance the theory and practice, this interdisciplinary exploratory research provides in-depth insights into the nature of international NGO-driven development partnerships in rural renewable energy and their effectiveness based on the case studies in Talamanca, Costa Rica and Cajamarca, Peru.

The analysis of the nature of development partnerships shows that partnerships in the case studies differ in structure, size and diversity of actors due to differentiation in the implementation strategies, technological complexities, institutional and contextual factors. A multi-theoretical approach is presented to explain the multiple drivers of the studied development partnerships. The research highlights partnership constraints related to the provision of rural renewable energy, the organizational type and institutional environments.

Based on the case studies this research puts forward theoretical propositions regarding the factors that affect the effectiveness of the partnerships. In terms of the partnership dynamics dimension, several key factors of success are confirmed from the existing literature, namely shared values and goals, complementary expertise and

capacities, confidence and trust, clear roles and responsibilities, effective communication. Additional factors identified are personality match and continuity of staff. In terms of the partnership outcomes dimension, a previously under-researched aspect of partnerships, this study found that success was associated with a local champion who is trusted by the community, has the resources and skills to educate and engage the community and build capacities for sustainable provision of energy services, and institutionalizes its learning processes. Providing affordable technological solutions that meet people's needs and are developed in a participatory way are other important factors found to be positively associated with the effectiveness of the studied partnerships.

## **Acknowledgements**

This has been a challenging at times, yet wonderful journey and I am forever grateful to the people who guided, encouraged me and supported my work along the way. First, I want to acknowledge my Supervisory Committee for their tireless and endless support and encouragement. I am especially grateful to my supervisor, Dr. Larissa Muller, who always believed in me and my research from the day we started our fruitful collaboration. She provided key intellectual support during my PhD and helped me advance as a researcher and critical thinker. Her deep insight, academic rigour, and kind guidance were invaluable. Dr. Dave Irvine-Halliday was an inspiration to me with his professional and personal commitment to and expertise in solid state lighting and renewable energy for development. Meeting him at Light Up The World sparked my initial interest in the topic and I am forever grateful for his kind support, motivation and generosity. Dr. Lorne Jaques with his wealth of experience in international development provided invaluable guidance, feedback and continuous support during my research. Both Dr. Dave Irvine-Halliday and Dr. Lorne Jaques were on my Committee since the beginning of my PhD journey and stood by me during transitions.

I want to acknowledge late Dr. Dixon Thompson who was my first supervisor. He played key role in enabling my entrance into the PhD program at the Faculty and his enthusiasm, kind guidance and support were crucial during the first years of my PhD. I also want to thank Dr. Michal Moore, who was initially on my Supervisory Committee, for his useful feedback and support.

This research would not have been possible without my research participants. I am forever indebted to a number of organizations and individuals from Canada, Costa

Rica, Peru and the United Kingdom, who participated in my research, for generously giving me their time and sharing their insights, for facilitating my field work and providing invaluable input into my work. I am most grateful to people from the communities in Talamanca, Costa Rica and Cajamarca, Peru for sharing their experiences with me.

I am deeply thankful to the Faculty of Environmental Design, the Faculty of Graduate Studies, and the University of Calgary for their continuous support and generous funding throughout the years. I also want to acknowledge the Conjoint Faculties Research Ethics Board of the University of Calgary for their guidance.

I am very grateful to the International Development Research Centre for supporting my research and generously funding my fieldwork in both Costa Rica and Peru through the Research Internship 2010 and the Professional Development Award 2011. I am especially grateful to the Innovation for Inclusive Development program, which hosted me, and my mentors, Dr. Veena Ravichandran and Dr. Fernando Santiago, and other colleagues for their continuous support and encouragement.

I am also grateful to scholars, both young and established ones, whom I met on this journey. So many kindly offered their thoughtful feedback and kind support and helped me advance my research.

Many thanks go to all my peers and friends at my Faculty and beyond, in Canada and from around the world, for their kind encouragement, friendship and support.

I am forever grateful to my mother and father, Galyna Platonova and Ivan Platonov, for always believing in me and tirelessly supporting me in this journey, including coming several times all the way from Ukraine to help me and my family. I am also grateful to all my Ukrainian and Canadian relatives for their kindness and support.

I am particularly indebted to my husband, Thomas Scott. My husband was always there to help, nurture, and support my work. He read every single page I have written and tirelessly checked my “a” and “the”. Thanks to him I was able to successfully balance my PhD work and family life. My son, Maxwell Scott, who was born mid-way through my PhD, is the inspiration and delight of my life. He is always so loving and patient with his mommy’s work commitments and travels. I am also grateful we were fortunate to go on some of my PhD travels together as a family. I am thankful for a healthy pregnancy now with my second child and an ability to complete my PhD research project.

Thank you all, who cared, supported, encouraged, inspired, and helped.

*To My Parents and My Family for  
their unconditional love and support during the course of this thesis and always*



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## **List of Acronyms**

ACEM	Association for Science and Moral Education
BoP	Base of Pyramid
CEDECAP	Center for Training and Demonstration of Appropriate Technologies
ICE	Costa Rican Electricity Institute
ICT	Information and Communication Technologies
ICT4D	Information and Communication Technologies for Development
IDRC	International Development Research Centre
IEA	International Energy Agency
IID	Innovation for Inclusive Development
IS	Innovation System
ITDG	Intermediate Technology Development Group
LED	Light Emitting Diode
LUTW	Light Up The World
MDG	Millennium Development Goal
NGO	Non-Governmental Organization
NIS	National Innovation System
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PSA	Preparation for Social Action
PV	Photovoltaic
R&D	Research and Development
SHS	Solar Home System
UN	United Nations
UNEP	United Nations Environment Programme

## CHAPTER ONE: INTRODUCTION

### Background

Sustainable energy services are central to sustainable development<sup>1</sup> and poverty alleviation (Kaygusuz, 2012; Modi, McDade, Lallement & Saghir, 2006). Yet, 2.7 billion of the world population still rely on traditional biomass energy sources and over 1.3 billion do not have access to electricity (IEA, 2011). Using inefficient biomass fuels poses harmful impact on human health, in particular, among women and children, and on the environment. Lack of electricity undermines the provision of basic social services, including education and health, and impedes development of income generating opportunities. It is clear that without access to affordable and sustainable energy services, the attainment of economic and social development goals in developing countries<sup>2</sup> is doubtful (Modi et al., 2006).

Renewable energy<sup>3</sup> is increasingly recognized for its contribution to rural development, improved health conditions, energy security and climate change mitigation. Decentralized<sup>4</sup> renewable energy technologies can be particularly suitable for remote off-grid communities in developing countries given the prohibitive costs of expanding the grid into remote and rural areas, growing environmental concerns over

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<sup>1</sup> The World Commission on Environment and Development in its Brundtland report in 1987 defines sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs,” (WCED, 1987, p. 43).

<sup>2</sup> Developing countries include low-income and middle-income economies as classified by the World Bank. The World Bank indicates that “the use of the term is convenient; it is not intended to imply that all economies in the group are experiencing similar development or that other economies have reached a preferred or final stage of development. Classification by income does not necessarily reflect development status,” (World Bank, n.d.).

<sup>3</sup> Renewable energy refers to modern technologies based on solar, wind, biomass, geothermal, and small hydropower. This definition excludes traditional biomass and large hydropower (Martinot et al., 2002).

<sup>4</sup> According to an information gateway on renewable energy and energy efficiency created by the Renewable Energy and Energy Efficiency Partnership, a public-private partnership launched at the Johannesburg World Summit in 2002, and the Renewable Energy Policy Network for the 21st Century, a global policy network in renewable energy, “decentralized signifies that the energy is being generated close to where it is used [...]. Decentralized energy can be fed into the grid to support it or remain off-grid and become an alternative to it,” (reegle, n.d.).



conventional energy, the abundance of renewable energy resources in most of developing countries, reduced costs of renewable energy technologies and their improved efficiency and reliability (IEA, 2010a; World Bank, 2008).

Since the 1970s, renewable energy technologies have been actively promoted in developing countries (Martinot, Chaurey, Lew, Moreira & Wamukonya, 2002). Despite noted success stories, e.g., small hydro power in Nepal, ethanol use for transport in Brazil, and solar home systems in Kenya, many renewable energy projects continue to fail (Brent & Kruger, 2009; UNEP, 2003). Reported reasons for failures relate to the absence or lack of factors for sustainability and replication, such as low institutional and commercial viability, poor technical performance, lack of mechanisms for equipment maintenance, lack of sustainable sources of credit and expertise, and poor incentives for sustained operating performance (Martinot et al., 2002; UNEP, 2003).

International development non-governmental organizations (NGOs)<sup>5</sup> have been playing an increasingly important role in the diffusion of these technologies in developing countries (Biagini & Sagar, 2004). These NGOs facilitate the provision of technologies that address basic energy needs, provide funding, build necessary capacities, apply innovative delivery mechanisms, and commonly operate via partnerships with other actors. In fact, partnerships are increasingly promoted as vehicles to deliver development goals (Caplan, Gomme, Mugabi & Stott, 2007). Working in partnerships has become a common practice for organizations in addressing

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<sup>5</sup>In the international development domain, non-governmental organizations (NGOs) are defined as the non-profit organizations and community-based organizations that are (i) entirely or largely independent of government; (ii) not operated for profit; and (iii) exist to serve humanitarian, social or cultural interests, either of their memberships or of society as a whole (World Bank, 1996). According to the World Bank, international NGOs are typically headquartered in developed countries and carry out operations in more than one developing country. However, we see a rise of the international NGOs based in developing countries.

various development challenges and it is a common mode for international development NGOs working in developing countries (Horton, Prain & Thiele, 2009).

I had the privilege to work for six years in the non-profit sector in the pertinent area and bring my professional experience into this research. In 2003, I came to Canada on a Canadian International Development Agency internship and worked as a Projects Coordinator at the EnerGreen Foundation, a Calgary-based charity that funded renewable energy projects in developing countries. I worked, among other things, on developing the partnership between EnerGreen and other international NGOs, including Light Up The World (LUTW) whose work will be featured in this thesis. Later, I joined LUTW as a Special Projects Coordinator and coordinated a number of community-based renewable energy projects primarily in Latin America and Asia and initiated and facilitated a number of project and strategic partnerships. I experienced first-hand the realities that development NGOs face on a daily basis as well as the importance and the challenge of building effective partnerships that promote development goals. This experience strongly influenced this PhD research, which consequently aimed to not only contribute to the body of knowledge and be academically sound, but also advance the practice and be relevant to the organizations and individuals working in development.

### **Research Rationale**

Since the late 1980s, NGOs involved in development have grown in numbers, and have expanded their profiles at local, national and international levels (Lewis & Kanji, 2009). Over 15% of bilateral official development assistance (ODA) in 2005-2006 for various OECD countries was channeled to or through NGOs, e.g., the Netherlands (19.5%), Switzerland (17.2%), and Spain (15.9%) (Koch, Dreher, Nunnenkamp & Thiele, 2009). The number of internationally operating NGOs is

estimated to be 40,000 (Anheier, Glasius & Kaldor, 2001). The national numbers are much higher, for example, in India there were close to 3.2 million NGOs in 2009 (Government of India, 2009).

As a result of this trend, NGOs have attracted much attention in development literature. The voluminous NGO literature focuses on NGOs as important new actors in development and involves both supporters and critics of NGOs (Mitlin, Hikey & Bebbington, 2007). While important NGO studies have been conducted (e.g., Igoe & Kelsall, 2005; Salamon & Anheier, 1997), compared to other development issues, NGOs receive far less systematic research attention and available literature is often too normative in nature. Lewis and Kanji (2009) also point that NGO research is conducted primarily in the form of a single study of specific organizations making generalizations difficult. This research adds to this literature by providing a more pragmatic view of international NGOs involved in the diffusion of renewable energy technologies and their partnerships in developing countries. It explores in-depth the role of these NGOs and their partners in delivering renewable energy services in remote rural communities in the studied countries and effectiveness of their partnerships. Furthermore, as explained further in Chapter 3, this research is applying a multiple study design versus a single case study to strengthen the validity of the findings.

In contrast to the NGO literature, the partnership research is very saturated. The notion of partnership has received wide attention from academics and practitioners in various disciplines and professional domains, such as management and organizational development, public policy and public management, international development, social policy, science, technology and innovation, to name a few. However, available studies are often rooted in particular disciplines that influence their perspectives and lack cross-

referencing and cross-fertilization that are needed to enrich our understanding of the phenomenon of partnerships (Selsky & Parker, 2005). As explained further, important knowledge gaps remain in the analysis of partnerships (Horton et al., 2009). Addressing these knowledge gaps in the partnership literature is a primary focus of this research.

Among others, development and management scholars focused their attention on development partnerships involving NGOs, for example North-South partnerships literature (e.g., Fowler, 1998), Base of the Pyramid partnerships research (e.g., Rivera-Santos & Ruffin, 2010), and social issues cross-sector partnerships studies (e.g., Selsky & Parker, 2005). The existing development partnerships approaches are useful in expanding our understanding of development partnerships, their rationale, dynamics, and success factors; however, they often focus on the process of partnering rather than explaining and evaluating how a partnership leads to specific development outcomes (Geldof, Grimshaw, Kleine & Unwin, 2011). These approaches also ignore the complexity of interactions within the partnerships and their broader settings, goals and interactions (Selsky & Parker, 2005). The researchers acknowledge that traditional analytical frameworks are not adequate for the analysis of the partnerships for development and call for further investigation with emphasis on theory, agency, method and context (Kolk, van Tulder & Kostwinder, 2008; Lewis & Opoku-Mensah, 2006). This research addresses these key knowledge gaps in the partnership literature by taking a holistic view of partnership effectiveness in rural renewable energy, which incorporates both the process of partnering and the development outcomes – as explained further it is rarely done in the partnership scholarship.

Another key component of this research relates to the diffusion of renewable energy technologies in developing countries. Recent studies and some earlier work on

the subject examined the pre-conditions for the diffusion of renewable energy technologies in a developing country context highlighting the importance of the socio-political and institutional factors in addition to generally accepted economic and technical aspects (Brent & Kruger, 2009; Cherni et al., 2007; Cohen, 2004; Jacobson, 2007; Mabuza, Brent & Mapako, 2007; Martinot et al., 2002; Miller & Hope, 2000; van der Gaast, Begg & Flamos, 2009). However, the NGO dominated pathways for technology diffusion (IPCC, 2000) and the role of development partnerships in the process are not well explored or understood. In particular, there is a lack of research on the interface between development partnerships and the diffusion of renewable energy technologies in remote rural communities in developing countries. This research contributes to this literature by exploring the nature of the development partnerships driven by international NGOs involved in the diffusion of renewable energy technologies in off-grid communities in developing countries, determining when and how such partnerships can be effective and also discussing how the known factors of the technology diffusion may impact partnership effectiveness.

Energy poverty is a pressing development challenge and it is widely recognized that access to energy is vital for sustainable development and poverty alleviation. It is also acknowledged that the provision of modern affordable energy services in developing countries is important in achieving the Millennium Development Goals (MDGs) (Sanchez, 2010). Over the last few years, energy access for the poor has become one of the top items on the development agenda in the international arena. In December 2010, the UN General Assembly declared 2012 the International Year of Sustainable Energy for All to raise awareness and promote action around increasing access to energy, energy efficiency, and renewable energy with a global goal of

achieving universal access to energy by 2030. Furthermore, a growing number of international, regional, national and local organizations are engaging with this issue via research activities, policy and advocacy and development activities on ground.

Decentralized renewable energy technologies are increasingly acknowledged to be the most affordable and most sustainable solution for rural communities in much of the developing world (REN21, 2011). A growing number of solar home systems, wind turbines, micro-hydro, biomass systems and other renewable energy solutions are powering homes, schools, community centres, health clinics and health posts, agriculture and small business in off-grid areas in developing countries (REN21, 2011). It is estimated that hundreds of millions of rural households enjoy the benefits of renewable energy, with a few million households relying on solar photovoltaic (PV) technology, over 44 million using biogas for lighting and/or cooking, and more than 166 million using more-efficient biomass cook stoves (REN21, 2011).

However, billions of people still continue to suffer from constant exposure to open fires and using dangerous fuels, such as kerosene. They rely on energy sources that are inefficient, provide poor quality and are costly. For example, among the poorest of the poor, lighting is frequently the most expensive energy item they have to acquire, amounting to up to 30% of their disposable income (Lighting Africa, n.d.; Schultz, Platonova, Doluweera & Irvine-Halliday, 2008). Toppled kerosene lamps are responsible for countless fires that result in injuries, death or property destruction in developing countries (Schultz et al., 2008). Furthermore, unsustainable use of biomass puts pressure on the environment by causing deforestation, soil degradation and erosion. Inefficient and dirty fuel-based sources are partly responsible for greenhouse-gas emissions and global warming (Peon, Doluweera, Platonova, Irvine-Halliday & Irvine-

Halliday, 2005). Fuel-based lighting alone is responsible for about 190 million metric tons of carbon dioxide per year, equivalent to one-third of the total emissions from the UK (Mills, 2005).

It is predicted that without a change of course, by 2030, 900 million people will continue to live without access to electricity, three billion will cook on traditional fuels, and 30 million people will have died of smoke-related diseases (Practical Action, 2012). Therefore, action to change the course is needed at all levels: international community, policy makers, private sector, civil society, researchers, communities and individuals.

This research aims to contribute to this debate and action by providing theoretical propositions and practice-relevant recommendations on effectiveness of the development partnerships in rural renewable energy in remote developing country communities and by virtue of this to help advance the practice of provision of modern energy services to the world's poor. I bring to the research both academic and professional experience in rural energy and my passion and commitment to international development and energy for all.

## **Research Questions**

The research poses two key research questions:

- 1) What is the nature of international NGO-driven development partnerships involved in the diffusion of renewable energy technologies in remote rural communities in developing countries?*
- 2) What factors make these partnerships effective?*

## **Research Objectives**

The research aims to:

**1. Describe the nature of the international NGO-driven development partnerships involved in the diffusion of renewable energy technologies in remote rural communities in developing countries.**

- Examine the partnership models in the diffusion of renewable energy technologies in remote rural communities in developing countries;
- Identify key actors in partnerships and their roles;
- Determine linkages and interactions among actors in partnerships;
- Examine the driving forces behind the partnerships;
- Identify challenges to these partnerships.

**2. Identify effectiveness factors of the international NGO-driven development partnerships involved in the diffusion of renewable energy technologies in remote rural communities in developing countries.**

- Improve the conceptualization of partnership effectiveness;
- Select partnership effectiveness measures;
- Identify effectiveness factors from the case studies and develop theoretical propositions on partnership effectiveness;
- Provide recommendations for actors pursuing development partnerships in rural renewable energy.

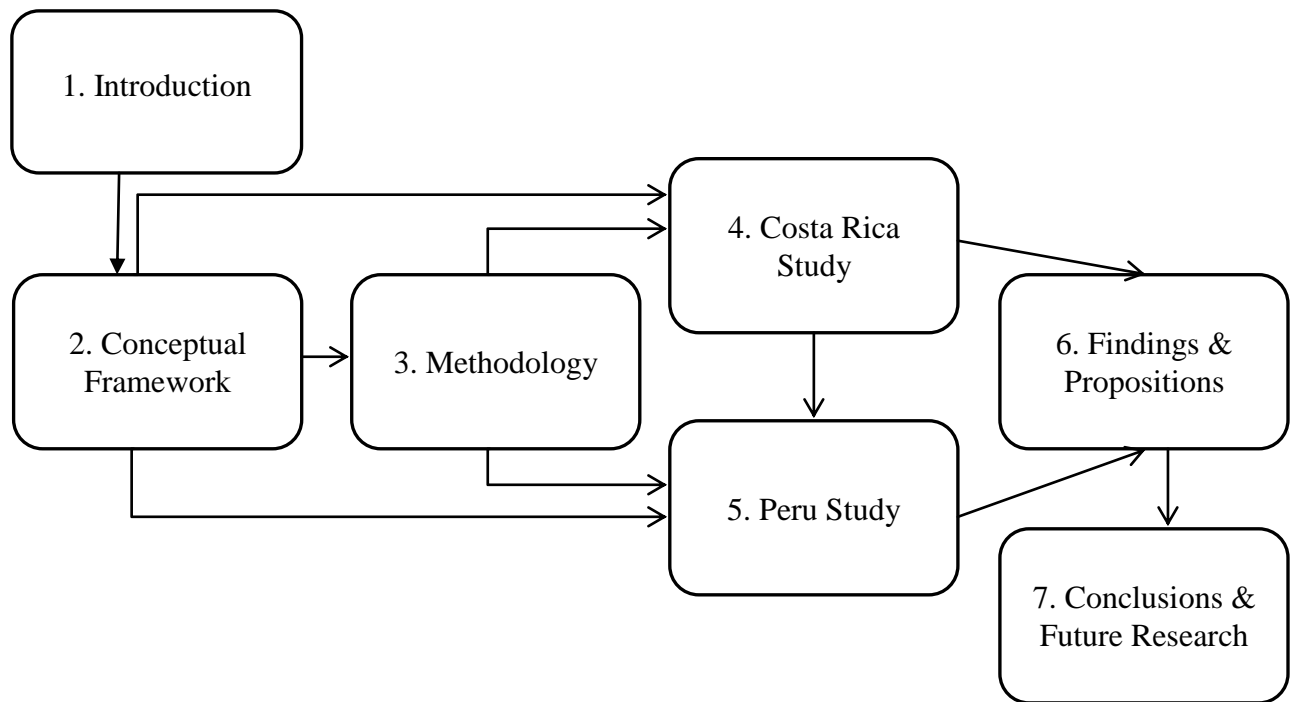
## **Thesis Structure**

Figure 1 depicts the structure of this PhD thesis. Chapter 1 provides an introduction to the thesis, which presents the background of the research topic and explains the rationale behind this research. It outlines key research questions and



objectives of the research and explains the structure of the thesis. Chapter 2 provides the conceptual and theoretical underpinnings of this research. It explains the theoretical approach applied and builds a preliminary conceptual framework to guide the study. Relevant literature is discussed and key knowledge gaps that the research aims to address are identified. Chapter 3 presents the research methodology, which explains the overall research strategy, explains the choice of methods to collect and analyze data, and describes their application. It also discusses research limitations and how these are being addressed. Chapter 4 features the multiple comparative case study in Costa Rica, which focuses on the nature and effectiveness of partnerships and formulates preliminary propositions with regard to the effectiveness factors, which feed into the case study in Peru. The Peru study follows in Chapter 5. The findings from both studies are further analysed and synthesized in Chapter 6. The findings are contrasted with the pertinent literature and a set of theoretical propositions is formulated. Finally, Chapter 7 discusses the research contributions of this study and future research directions. It also highlights implications for practice in relevant fields.

Figure 1. PhD Thesis Structure



This introductory Chapter presented the background of this research and provided the rationale behind it. Key research questions and objectives of the research were highlighted and the structure of the thesis was presented. The next Chapter outlines the conceptual framework for this research, discusses the relevant literature, and identifies key knowledge gaps addressed by the research.

## **CHAPTER TWO: CONCEPTUAL AND THEORETICAL UNDERPINNINGS**

The conceptual framework is an anchor for the study and explains the key factors, concepts, or variables and the presumed relationships among them (Baxter & Jack, 2008; Miles & Huberman, 1994). The emergent conceptual framework presented in this section is based on the literature, communication with experts and my professional experiences. As my research progressed and data were analyzed the framework was further developed and the constructs were refined (Baxter & Jack, 2008).

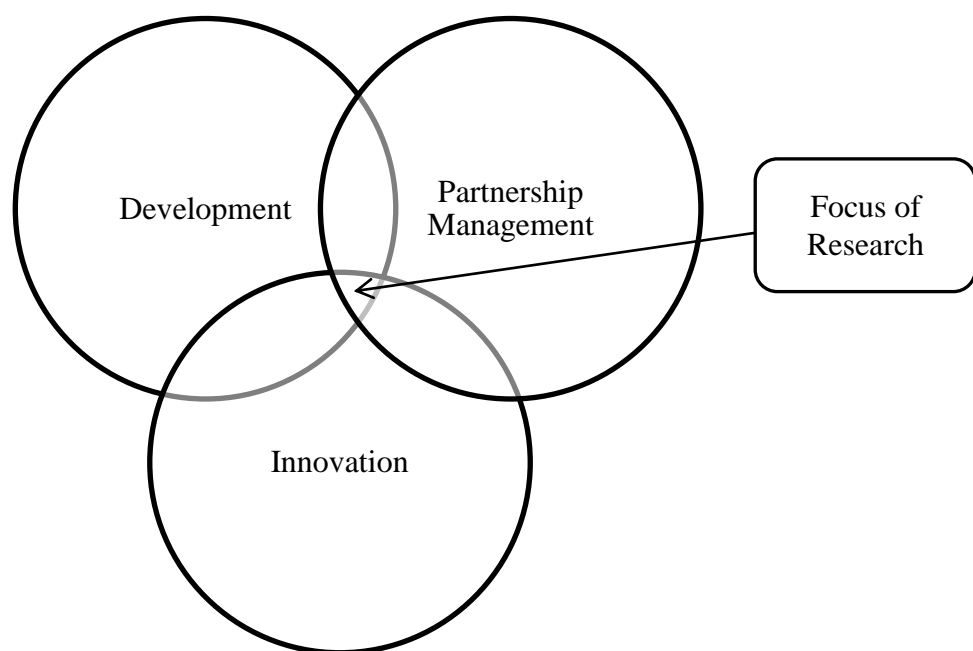
The research utilizes an interdisciplinary approach, in that the conceptual framework is built upon three fields of knowledge: development studies, partnership management, and innovation (Figure 2). As the discussion below will show, interdisciplinary research is most appropriate to address the complexity and multi-dimensional character of the researched topic, which spans across various knowledge areas. It also aims to address the shortcomings of the partnership literature, which lacks cross-referencing and cross-fertilization among different knowledge domains that often deal with the topic of partnership in isolation.

Interdisciplinary research is integrative in nature and “is based on active interaction across fields” versus multidisciplinary research, which is cumulative or additive and connotes transfer of knowledge from different areas without its adaptation (Huutoniemi, Klein, Bruun & Hukkinen, 2010, p. 83). Such interaction and integration is in a way a collaboration of different fields in an effort to bring a more holistic understanding of the research topic.

The fields used in this research are chosen based on certain considerations. First, the development literature is perhaps best positioned in terms of research on

international development in general and more specifically on the development NGOs, their activities and partnerships. Partnership management literature provides rich insights into the world of partnerships and also, to an extent, includes research on partnerships involving NGOs. Since the topic deals with the diffusion of technologies, innovation literature becomes most useful in terms of understanding the process of diffusion, the factors influencing the uptake of technologies, the roles of actors in this process, the technological aspects of development interventions, and the innovation system approach.

Figure 2. Interdisciplinary Approach



To address the question on the nature of partnerships, the innovation system approach is applied to map out actors within these partnerships, and highlight their linkages and interactions. This framework also helps position these partnerships within a larger system of actors and interactions that are part of the technological diffusion process. To deal with the question on effectiveness, two dimensions of partnership

effectiveness are introduced: partnership dynamics and partnership outcomes. The partnership dynamics dimension focuses on the process of partnering and the relationship dimension of a partnership. The partnership outcomes dimension deals with the issues related to the achievement of development outcomes identified by these partnerships.

### **Development Partnership Approaches<sup>6</sup>**

Development partnerships are commonplace in the context of international development policy and practice (Lewis & Kanji, 2009). While the notion of partnership is widely utilized by scholars and practitioners in a variety of ways and meanings, development partnerships can be generally understood as

an agreed relationship based on a set of linkages between two or more agencies within a development project, involving a division of roles and responsibilities, a sharing of risks, and the pursuit of joint objectives [...]. (Lewis, 2007, p. 96)

These partnerships are widely promoted by international donors and development agencies and are espoused by the state, private sector and civil society. There are a number of reasons why such partnerships are desired. First and foremost, the partners are driven by the desire to improve the results of development interventions (Morse & McNamara, 2006). The nature of the development challenges is often very complex making it impossible to address them in isolation (Brinkerhoff, 2002a). From an international NGO perspective, partnerships can help leverage donor funding, increase organizational accountability, gain credibility and legitimacy, build capacity and capabilities, reduce information and transaction costs, and access scarce resources

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<sup>6</sup> This section appears in Platonova (2012). Copyright 2012, IGI Global, [www.igi-global.com](http://www.igi-global.com). Posted by permission of the publisher.

(Fowler, 1998; Morse & McNamara, 2006; Selsky & Parker, 2005). Partnerships depend on and foster trust among stakeholders, which enhances the ownership of the development processes, which in turn improves their effectiveness and sustainability (Fowler, 1998).

Without being exhaustive, several approaches can be distinguished in the development partnerships literature with specific reference to development NGOs. One such approach is the normative perspective on North-South partnerships (Fowler, 1998). Power dimensions, accountability, trust and mutuality are at the core of this understanding of the development partnerships (Fowler, 1998; Lister, 2000). One of the key themes is the criticism of North-based NGOs for failing to form equitable or “authentic” partnerships with their counterparts in the South (Ahmad, 2006; Fowler, 1998). Some of the most common factors for failure relate to matters of power imbalance, lack of accountability and inequality (Fowler, 1998). This approach focuses on partnership as an end in itself and is criticized for being difficult to operationalize, having little practical value and being subjective and values-based (Brinkerhoff, 2002b).

The social issues cross-sector partnership literature presents a more pragmatic approach towards development partnerships and views them as means to achieving specific objectives (Brinkerhoff, 2002b). It examines partnerships between NGOs and government, government and business (public-private partnerships), NGOs and business, and tri-sector partnerships that address social issues, such as poverty alleviation, education, health, and other (Selsky & Parker, 2005). Selsky and Parker (2005) consolidate the vast multidisciplinary literature that addresses this type of partnership through the lens of resource dependence, social issues and societal sector conceptual “platforms”, which have a strong instrumental focus. While these platforms

help identify “functionally useful dimensions” and success factors affecting partnerships outcomes, the authors conclude that the partnerships are often approached in a linear way through the input-output systems models, which

neglect the embeddedness of social processes within the larger institutional structures studied in institutional theory, as well as processes of nonlinear emergence as studied in complexity theory. (Selsky & Parker, 2005, p. 865)

Another approach is the Base of the Pyramid (BoP)<sup>7</sup> and subsistence markets partnerships (Rivera-Santos & Ruffin, 2010)<sup>8</sup>. This literature, which focuses on development partnerships driven by businesses that target pro-poor markets, suggests that serving the BoP requires cooperation between large corporations and small firms, civil society organizations, development agencies, governments and the poor themselves (Prahalad, 2005). Such partnerships are largely to be affected by the institutional environment of the pro-poor markets (Rivera-Santos & Ruffin, 2010). For example, lack of formal market institutions in these markets is likely to be compensated by greater involvement of government and civil society. We are likely to observe a greater diversity of organizations, in particular, non-market agencies (such as NGOs), involved to fill the gaps in the governance structures of pro-poor markets. The partnerships typically rely on informal trust-based governance mechanisms (Rivera-Santos & Ruffin, 2010).

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<sup>7</sup> C.K. Prahalad (2005) introduced the notion of the bottom (base) of the (economic) pyramid (BoP), which consists of 4 billion people living on less than \$2 USD per day. He argued that multinational enterprises can help these people out of poverty by making profits from the poor, and that the BoP can be an engine of the next round of global trade, alleviation of poverty, prosperity and a source of innovations.

<sup>8</sup> This type of partnership may be viewed by some as the variation of cross-sector partnerships. However, for the purpose of this research, it is important to distinguish this type of partnership as it specifically targets partnerships in the context of poverty and discusses the impact of the BoP markets’ specificities on partnership functioning.

The existing development partnerships approaches (Table 1) are useful in expanding our understanding of the development partnerships, their rationale, dynamics, and success factors, however they often focus on process of partnering rather than explaining and evaluating how the partnership leads to specific development outcomes. Often, the partnerships are approached through input-output models, which ignore the complexity of the interactions within the partnerships and their broader settings and goals. To address these concerns, the question on the nature of partnerships is addressed through the lens of an innovation system approach and the question of effectiveness brings together the process and outcome views.

Table 1. Development Partnerships Approaches

<i><b>Partnership Category</b></i>	<i><b>Development partnerships approaches</b></i>			
<b>Type</b>	North-South partnerships (e.g., Fowler, 1998)	Base of Pyramid partnerships (e.g., Rivera-Santos & Ruffin, 2010)	Social issues cross-sector partnerships (e.g., Selsky & Parker, 2005)	NGO development partnerships in diffusion of technologies (Author)
<b>Common Initiator</b>	North agency: either donor or operational NGO	Business firms, often multinational enterprises	Government, business, NGOs	International NGOs or local actors
<b>Common conceptual constructs</b>	Power and equality, authenticity	Impact of distinct BoP institutional environment, need for intermediaries	Functional dimensions, success factors	Partnership dynamics and partnership outcomes
<b>Main disciplinary focus</b>	Development studies	Business and management	Multidisciplinary	Interdisciplinary

Source: Platonova (2012).



## **Innovation System Approach<sup>9</sup>**

The innovation system approach is incorporated into this research because it focuses on the innovation and learning process associated with new technologies and is useful in explaining the role of institutions in the technology development and diffusion. In fact, technology diffusion is broadly viewed as a complex process involving a broad range of private and public actors, which constitute national innovation systems (OECD, 1997).

National innovation system (NIS) can be defined as

[...] a set of interrelated institutions; its core is made up of those institutions that produce, diffuse and adapt new technical knowledge, be they industrial firms, universities, or government agencies. The links between these institutions consist of flows: knowledge, financial, human (people being the bearers of tacit knowledge and know-how), regulatory, and commercial. (Niosi, 2002, p. 291)

The relationships between the NIS agents are viewed as carriers of knowledge and through the interaction among them new knowledge is produced and learnt (Johnson & Lundvall, 2003). Regulatory, policy, international, infrastructure and market conditions have major impacts on innovation and therefore are an integral part of the NIS (Gu & Lundvall, 2006).

The notion of NIS was developed within the evolutionary economics framework in response to limitations of neoclassical economic theory to explain complexities of technology development and diffusion processes (Dosi, 1982; Edquist, 1997; Freeman, 1987; Nelson, 1993). Since its beginnings in the late 1980s, the NIS approach has become influential in academic, international and policy arenas (Groenewegen & Van

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der Steen, 2006; Sharif, 2006). Initially, the idea of an innovation system was developed at the national level. The NIS concept has expanded to include industrial, local, regional and even international systems of innovations (Gu & Lundvall, 2006; Niosi, 2002).

Though the notion of NIS originated in developed countries, it has been expanding to include developing countries (Lundvall, Vang, Joseph & Chaminade, 2009; Muchie, Gammeltoft & Lundvall, 2003). The NIS approach challenges the limitations of the traditional approach, which views developing countries as ‘technology users’ and focuses on North-South technology transfer with learning being imitative (Mytelka, 2003). NIS emphasizes the importance of building capabilities in developing countries to absorb technology, adapt them to local conditions and innovate (Dolun, 2005). Building upon indigenous knowledge and local governance strengths is essential (Johnson & Lundvall, 2003).

Aubert (2005) notes that, often, NISs in developing countries are poorly constructed and are very fragmented. He explains that this is due to weaknesses in the overall innovation environment characterized by low levels of education, business environment and infrastructure. Furthermore, low education levels pose a serious barrier to the generation and diffusion of technologies in developing countries. He points out that poor business environment and governance conditions hinder the innovation climate. A lack of infrastructure, including telecommunications, roads and other transport infrastructure, water, sanitation, energy and other systems is of primary concern (Aubert, 2005).

On the firm level, often a large number of small enterprises perform in informal sector (Kraemer-Mbula & Wamae, 2010). Foreign-based companies tend to be disconnected from the rest of the economy (Aubert, 2005). Public sector agencies are

numerous, rarely appropriate, and lack flexibility (Aubert, 2005). The research community is limited and universities suffer from unclear mandates and a lack of resources. The university system is disconnected from the labor market needs and opportunities (UN Millennium Project, 2005). Levels of R&D in the business sector are low and national R&D is often irrelevant to the economy (Aubert, 2005). Thus, differences in development levels among developing countries, their institutional capabilities, business and political environments, and education levels influence the policy response and environment, in which technology diffusion takes place.

The innovation system (IS) framework can prove useful in understanding the diffusion process involving international NGOs and their partnerships and positioning these partnerships within a larger system of actors and interactions and how these, in turn, impact the process and outcomes of the partnerships. It is used in this study as an analytical tool rather than approached as a subject in itself, which looks at a partnership in terms of its actors, the roles they play, linkages and interactions taking place, capacities and learning. These IS categories are applied to map the partnerships and discuss interactions and linkages between the partners. The research also identifies drivers or factors that explain the formation of partnerships and the choice of partners and challenges facing partnerships.

The idea of using the IS framework for the analysis of partnerships in developing countries is not new, for example, Thorsteinsdottir et al. (2010) examined the South-South research partnerships in health biotechnology and Hall (2006) worked on public-private partnerships in agricultural innovation in developing countries. However, they look at partnerships within the innovation systems rather than apply IS as an analytical tool to partnerships themselves. While separate elements of the IS framework are

discussed to some extent in partnership literature, to my best knowledge, the IS framework has not been applied to the analysis of development partnerships in rural renewable energy in developing countries.

### **Technology Diffusion Perspective**

While the processes of invention and innovation are necessary preconditions for development of a new technology, it is through the process of technology adoption and acquisition that the benefits of new technologies can be realized. The study of the spread of use and/or ownership of new technologies through an economic structure is called the study of technology diffusion (Karshenas & Stoneman, 1995).

The theoretical and empirical literature on technology diffusion is vast and diverse. The starting point in diffusion literature goes back to the pioneering work of Joseph Schumpeter (1959), which introduced a linear model from invention to innovation to imitation/diffusion. In subsequent years, the analysis of technological diffusion received less attention relative to the processes of invention and innovation. It is after the 1950s that diffusion research began to develop into a prominent field. Formal theoretical and empirical research on diffusion started with the development of epidemic models of diffusion (Mansfield, 1968).

A common feature of the epidemic model is the analogy with the spread of diseases. The number of users of an innovation increases over time as non-users come in contact with users and gain knowledge about the innovation. Thus, the diffusion results from the spread of the information among potential users (Karshenas & Stoneman, 1995). Despite its popularity in marketing and sociological literature of diffusion (Strang & Soule, 1998), the epidemic model has been widely criticized by economists for its weak theoretical foundations (Karshenas & Stoneman, 1995). Since

the model deals with the aggregate behaviour of firms, it is unable to explain why some firms adopt certain technologies more quickly than other firms. Furthermore, this model assumes that firms are homogeneous and that the profitability and cost of the technology remains constant over time and must be the same for all firms within the industry (Davies, 1979). The model also ignores any changes in the technology over time and disregards any external information sources. Potential adopters are viewed as passive recipients of information, rather than active seekers of information (Karshenas & Stoneman, 1995).

Since the 1970s, two distinct diffusion approaches have been developed in the economics literature: neoclassical equilibrium model (e.g., Davies, 1979; Fudenberg & Tirole, 1985; Ireland & Stoneman 1986; Reinganum, 1981, 1983) and evolutionary disequilibrium model (e.g., Arthur, 1989, 1996; David, 1985; Metcalfe, 1988; Nelson & Winter, 1982; Rogers, 1962, 2003).<sup>10</sup>

The neoclassical equilibrium approach is based on at least two of the three basic tenets of the neoclassical theory: equilibrium, infinite rationality, and full information. Similarly to neoclassical analysis, the diffusion process is viewed as a sequence of shifting static equilibria, in which agents are fully adjusted at each point of time. The models also assume that decision makers are infinitely rational. The third principle, – full information, is less regular (Sarkar, 1998).

While neoclassical equilibrium models provide important insights into the diffusion process, these models have their shortcomings. Aiming to achieve logical elegance and mathematical formalisation, the neoclassical approach has abstracted from the complexity of the economic environment, history, culture, social structure and so on

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<sup>10</sup> A detailed overview of the diffusion models can be found in Sarkar (1998).

(Sarkar, 1998). The infinite rationality, which is an underlying tenet of the neoclassical approach, ignores the multitude of institutional and contextual factors (cultural values, moral norms, folkways, power relationships, vested interests, etc.), which can affect rational decision making by adopters (Sarkar, 1998). In the neoclassical models, even those that incorporate aspects of imperfect information, such as risk and uncertainty, the result can be predicted at each period of time. The history of adjustment process and initial conditions do not matter once the system is in equilibrium.

Given the shortcomings of the neoclassical model, the evolutionary disequilibrium approach can be viewed as a more robust alternative to analysis of the diffusion process because it takes into account behavioural differences, contexts, environments, initial conditions, learning processes, technology characteristics, and influence of market and non-market institutions in the diffusion process. It reveals important characteristics of the diffusion process such as multiple equilibria, bounded rationality, path-dependency, unpredictability, and potential inefficiency. The evolutionary disequilibrium approach suggests that individuals, instead of being infinitely rational, are boundedly rational because of the cognitive limitations. The factors, such as cultural values, moral attitudes, power relationships, and vested interests, affect the rational decision making by adopters. Furthermore, it is unlikely that potential adopters would have perfect information about the availability and nature of new technologies. The process of diffusion is about creative forces, which evolve over time and instead of equilibrating they are disequilibrating. Furthermore, evolutionary economists highlight the discontinuity in the process of technological change (Sarkar, 1998).

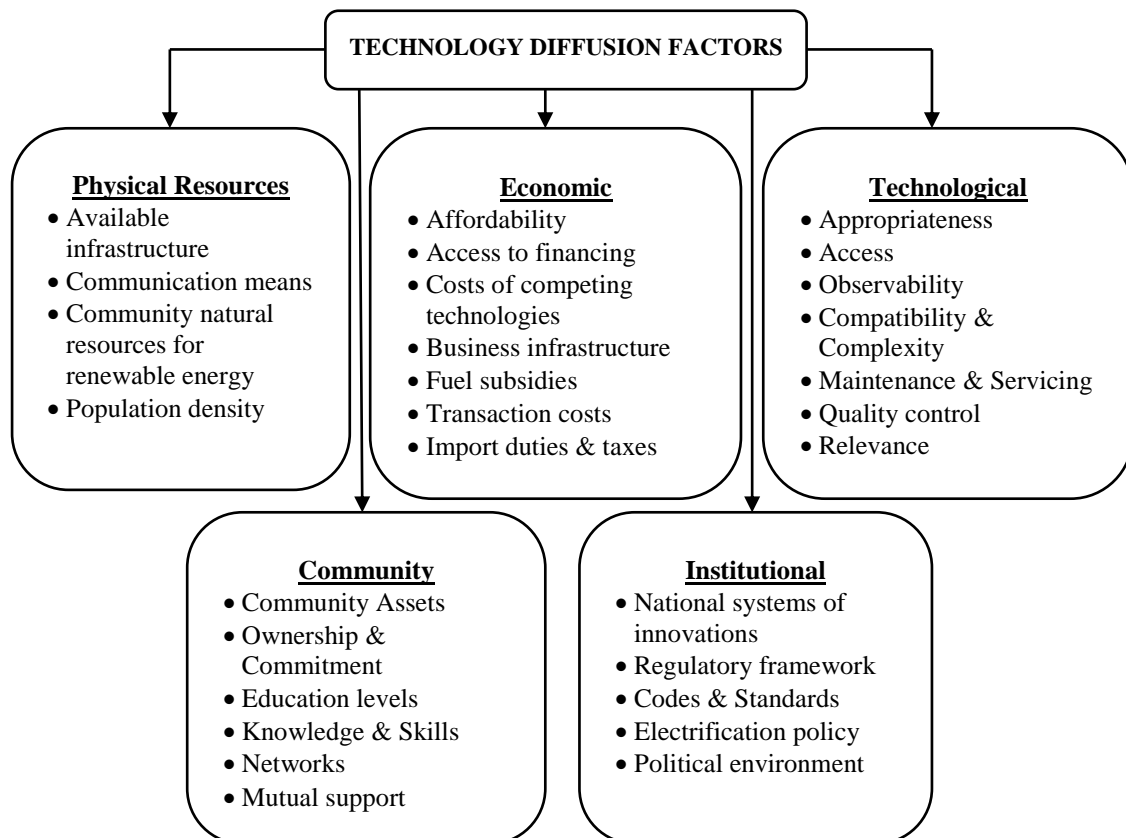
This research takes place within the evolutionary tradition in technology diffusion research and in its analysis considers the plethora of behavioural, contextual and institutional factors that may influence the process of diffusion and can impact the dynamics and outcomes of the development partnerships. This research pays attention to the contexts, environments, and the initial conditions.

In addition to a general technology diffusion literature, the research also consults studies that focus on diffusion of renewable energy technologies in developing countries. These studies widely recognize that socio-political and institutional factors are as important as economic and technical aspects when it comes to the success of the renewable energy projects aimed at the diffusion of renewable energy technologies (Brent & Kruger, 2009; Cherni et al., 2007; Cohen, 2004; Mabuza et al., 2007; Martinot et al., 2002; Miller & Hope, 2000; Oyedepo, 2012; van der Gaast et al., 2009). More specifically, these factors include among others project sustainability and replication factors, community involvement and ownership, appropriateness and affordability of technology, business infrastructure, maintenance and servicing, rural electrification policies, and political stability. These factors may influence the partnerships involved in diffusion processes. Given the lack of research on the interface between development partnerships and diffusion in renewable energy technologies in remote rural communities in developing countries, it will be useful to discuss how and which of these factors can impact partnership effectiveness, which will be done in the case studies.

Based on the literature review and my professional experiences, I suggest that physical resources, economic, technological, community and institutional factors,

highlighted in Figure 3, are likely to play a role in outcomes of partnerships, which aim at the diffusion of renewable energy technologies in remote rural communities.

Figure 3. Factors of Technology Diffusion in Renewable Energy in Rural Communities in Developing Countries



Some factors may also impact the very formation of the partnership and its structure. For example, consider economic factors, in particular, affordability of technology. The main target group for renewable energy is the rural population with low income and limited saving potential. The acquisition and operation of renewable energy systems involves a high initial investment and some operating and maintenance cost. The lack of financial resources to the target group is considered as one of the main barriers hindering the diffusion of renewable energy technologies in rural areas (IEA, 2002; Karekezi & Kithyoma, 2002). However, several models have been applied to deal



with the financial barriers. The choice of the model can lead to a specific partnership configuration and outcomes.

Thus, many of the early solar projects were based on donations of the systems. Major advantages of this model included low initial costs to the users (often zero), which held a promise for rapid diffusion of renewables. However, experience showed that many of these projects failed because of lack of user commitment, involvement and responsibility for maintenance, repair and replacements. Some success stories, such as the solar home systems (SHSs) program by the Mexican government, suggest that donations can still be an option, especially when the target group cannot be reached by commercial SHSs and cannot afford even subsidized systems. However, projects should have provisions to encourage user commitment and create awareness about maintenance and replacement needs (Nieuwenhout et al., 2001).

Negative experience with donations and the need for finance has resulted in a quest for alternative delivery modes. Consumer credit has become important for making renewable energy technologies affordable to rural households. Consumer credit is generally provided through three primary channels: dealer-extended credit, credit through a microfinance organization, and credit through a local development finance institution (Martinot, Cabraal & Mathur, 2001).

Credit through commercial firms has been tried in India, but proven unsuccessful because dealers were reluctant to lend to rural users due to credit-risk and collection concerns. In Indonesia, a similar model was tried; however, continued growth was hindered by the financial crisis in 1997. This example shows the vulnerability of credit schemes to external financial shocks. In Bangladesh, a successful application of dealer credit was realized through a non-profit dealer, Grameen Shakti, who was

supported by an international donor. In Sri Lanka, a country with a long history in rural microfinance, the microfinance model proved to be viable in financing SHSs (Martinot et al., 2001). The overall experience is that the provision of credit does not guarantee rapid diffusion of renewable energy systems. Credit schemes have been successful when external parties (e.g., World Bank) have provided seed finance or financial guarantees to credit facilities. The repayment discipline was strongly related to the technical performance of the systems (Nieuwenhout et al., 2001).

In the fee-for-service model, an energy service company is set up. It owns the system, charges monthly fees and is responsible for service. Such a company may operate as a monopoly concession regulated by the government (e.g., Argentina, Benin, and Togo), or it may operate competitively without monopoly status (e.g., Dominican Republic) (Martinot et al., 2001). In the Dominican Republic, Soluz-Dominicana has been developing a successful fee-for-service model. In Argentina, the energy service company in one of the provinces that tried this model experienced difficulties and installed no systems because of the underestimated installation and servicing costs (Nieuwenhout et al., 2001). In general, the experience with the fee-for-service model is still limited. Some successful examples demonstrate the viability of such a model. However, the main challenges are to organize operation and maintenance of the systems and establish fee collection that can cover the costs of the energy service company (Nieuwenhout et al., 2001).

Rural electrification policy and planning directly impacts the rates of the diffusion of renewable energy technologies. When the government fails to identify the niche for renewable energy in its policies, rural households are left with unrealistic expectations of grid extensions (Chowdhury, 2003; Martinot et al., 2002). It is reported

that such expectations negatively influence consumer demand for renewable energy. Examples to support this statement come from countries such as Sri Lanka, Vietnam and South Africa (Chowdhury, 2003; Hankins, 2006). With the cost of grid extension per kilometer in the developing world varying from \$8,000 USD to \$10,000 USD and rising to \$22,000 USD in difficult terrains, much of the rural population will remain off-grid for a long time (Richards, 2006). Even when the grid is extended, due to unreliable energy supply and high electricity tariffs, customers may choose to procure or retain their renewable energy systems (Miller & Hope, 2000).

Poor quality of the systems and poor installation, maintenance and servicing are among the common reasons for failure of renewable energy projects. Batteries, control chargers and fluorescent lights are the components that cause most technical problems. Based on data up to the year 2000<sup>11</sup>, almost a quarter of the systems installed in developing countries were no longer working, and an additional fifth of the systems were only partly operational (Nieuwenhout et al., 2001). Enacting codes and standards and establishing certification, testing and enforcement institutions are important steps for government to ensure that quality control issues are addressed. However, this relationship is not always straightforward. For example, in India, SHSs have to be tested by the Solar Energy Centre to be included in subsidized government programmes. In Kenya no such standards exist for the commercially distributed systems. However, in both countries around two-thirds of installed systems are in good order. This particular case suggests there must be other factors affecting quality control.

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<sup>11</sup> It was difficult to locate more recent data on the number of failed renewable energy systems in developing countries. However, it is noted that renewable energy projects in remote areas in developing countries continue to fail (Brent & Kruger, 2009).

There is a range of other barriers that hamper diffusion of renewable energy technologies, including, but not limited to: subsidies for competing fuels (e.g., kerosene); high import duties and taxes on renewable energy technologies; high transactions costs; lack of business financing and skills in renewable energy; lack of awareness and information; poor institutional and regulatory framework to encourage market expansion; and lack of transparency of subsidies (Cabraal, Cosgrove-Davies & Schaeffer, 1996; EIA, 2002; Martinot et al., 2001; Martinot et al., 2002; Miller & Hope, 2000).

### **Partnership Effectiveness<sup>12</sup>**

Do development partnerships really work? While there is an underlying logic that partnerships lead to the development outcomes, these partnerships are often analysed in their own right rather than in terms of how they are actually achieving the development outcomes (Geldof, Grimshaw, Kleine & Unwin, 2011). A recent study on the Information and Communication Technologies for Development (ICT4D) partnerships concluded that the partnership literature mostly ignored the development outcome angle of the partnerships (Geldof et al., 2011). Similarly, Dowling, Powell and Glendinning (2004) conducted research on partnerships involved in provision of health and social services and found that research was mainly focused on the process issues or on functioning of partnership in terms of addressing shared goals, rather than outcome issues, e.g., changes in service delivery, and impact on service users. They acknowledge this discrepancy as a major knowledge gap.

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In light of this research, I argue that in order to improve the outcomes of the partnership-based development interventions, both process issues and outcomes issues need to be integrated. Therefore, to analyze the effectiveness of international NGO-driven development partnerships involved in the diffusion of off-grid renewable energy technologies in developing countries, I adopt an approach that combines the process view and the development outcome view. Respectively the notions of partnership dynamics (process issues) and partnership outcomes (outcome issues) are introduced as constructs that can explain the effectiveness of partnerships in a more comprehensive and integrated way. The partnership dynamics notion answers the question of how well the partners work together in addressing joint objectives and focuses on the relationship between the partners, the management of the partnership, decision making process, and communication. Partnership outcomes are about how well the partnership achieves specific development outcomes.

The idea of integrating the process view and outcome view to address the effectiveness of partnerships has been adopted before, for example, in research on partnerships in tourism (Laing, Lee, Moore, Wegner & Weiler, 2009), public administration (Brinkerhoff, 2002b), provision of health and social services (Dowling et al., 2004; Provan & Milward, 1995). However, such research remains rare and is based on partnerships in the context of developed countries. To my best knowledge, the holistic approach to effectiveness combining process and outcome views has not been applied before in a research on international NGO-driven partnerships in rural renewable energy in developing countries.

The process view is well researched and the literature provides rich insights into the effectiveness factors of working together among partners. The development

literature emphasizes equality, trust, shared commitment, agreed division of tasks and responsibilities, compatible objectives, mutual agreement, transparency, shared contributions, shared rewards, win-win benefits, accountability, flexibility as important success factors of partnerships (Ashman, 2001a, 2001b; Clarke-Okah, 2004; Lewis, 1998). Similarly, partnership management studies highlight the following success criteria: mutual trust, resource dependency, commitment symmetry, shared common goals, converging cultures, leadership, resource exchange, schedule, communication, transparency, accountability, representation, and participation (Austin, 2000; Brass, Galaskiewicz, Greve & Tsai, 2004; Brinkerhoff, 2002a, 2002b; Dorado, Giles & Welch, 2009; Jamali & Keshishian, 2009; Kolk et al., 2008; Morse & McNamara, 2006; Samii, Van Wassenhove & Bhattacharya, 2002; Tennyson, 2003). The importance of the contextual factors (factors connected to environmental, cultural, and/or social contexts) is also acknowledged in both fields of knowledge. Partnership dynamics is often measured in terms of partner satisfaction with the goal achievements, satisfaction with the relationship (Ashman, 2001a), and benefits to partners (Brinkerhoff, 2002a), e.g., financial, and reputational benefits. In light of this research, financial benefits include the ability of the partnership to draw funding for the project; reputational benefits are about whether the partnership increased the profile and status of the partners; and technological benefits refer to the ability of partners to access technical expertise and technology. Partner satisfaction with the goal achievements, satisfaction with the relationship, and benefits to partners are variable criteria that are determined by the energy system and the partnership being studied. Significant differences in goals and expectations may affect which factors are found to be associated with success.

As for the factors affecting partnership outcomes, with some exceptions, the research is scarce (Brinkerhoff, 2002b; Provan & Milward, 1995). However, as discussed in the previous section, the technology diffusion literature in general and studies that specifically address the diffusion of renewable energy technologies in developing countries can provide a useful departing point in identifying factors that improve partnership outcomes in rural renewable energy. As for measures, we can think of partnership outcomes in terms of goal achievement, project sustainability, development reach<sup>13</sup> and benefits to users (Ashman, 2001a, 2001b). Goal achievement, project sustainability and benefits to users are variable measures that depend of the goals of a partnership and the energy system being implemented. As discussed above, it is possible that the factors of influence could vary from case to case if these variable outcome measures are quite distinct. In contrast, development reach is a fixed criterion, which does not vary from case to case. With regard to this measure the factors of influence are expected to be fairly consistent irrespective of the partnership being studied and the energy system being examined.

The project can be considered sustainable if there is a viable distribution system in place to reach remote off-grid communities, and if there are the necessary human, financial and technological capacities to effectively deliver energy service to the users. Equally important aspect of sustainability is the sustained use of the technology by users on a long-term basis (Ruiz-Mercado, Masera, Zamora & Smith, 2011). Adopted from Ruiz-Mercado et al. (2011), the sustained use of the technology is measured as the percentage of the population that continues using the technology in the long run from the population that initially accepted the technology. As discussed in the case studies, it

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<sup>13</sup> The research borrows the term “development reach” from Ashman (2001b, p.1101), which refers to “the numbers of people or institutions that benefited from the project”.

was not possible to discuss the long-term sustained use of the technology given the shorter time frame of the initiatives and the measure was cautiously applied based on the time frame between the initial adoption and the timing of the field work. Development reach can be deemed high when more than 1000 beneficiaries have been reached<sup>14</sup>; moderate – from 500 to 1000 beneficiaries impacted; and low – fewer than 500 beneficiaries reached.

The benefits to users may include economic, social and environmental benefits. Economic benefits are associated with savings from not using kerosene and candles – those can be observed after the systems are paid off or when a tariff is set at the level or below the previous expenditures on energy sources. Economic gains can also be observed when energy access results in opening of new businesses and when existing businesses expand their capacities. Social benefits include educational and health benefits, communication gains and ability to socialize in the evening. Environmental benefits are about improved indoor air quality, and using less fuel-based sources (such as kerosene) that are polluting.

Figure 4 presents a visualisation of the emergent conceptual framework, where the effectiveness of development partnerships in the diffusion of renewable energy technologies in remote rural communities in developing countries is understood in terms of partnership dynamics and partnerships outcomes, which can be measured by a set of specific indicators presented above. Development, partnership management and technology diffusion literature provides a preliminary set of factors discussed before in this section that can explain the success or effectiveness of the partnerships in question.

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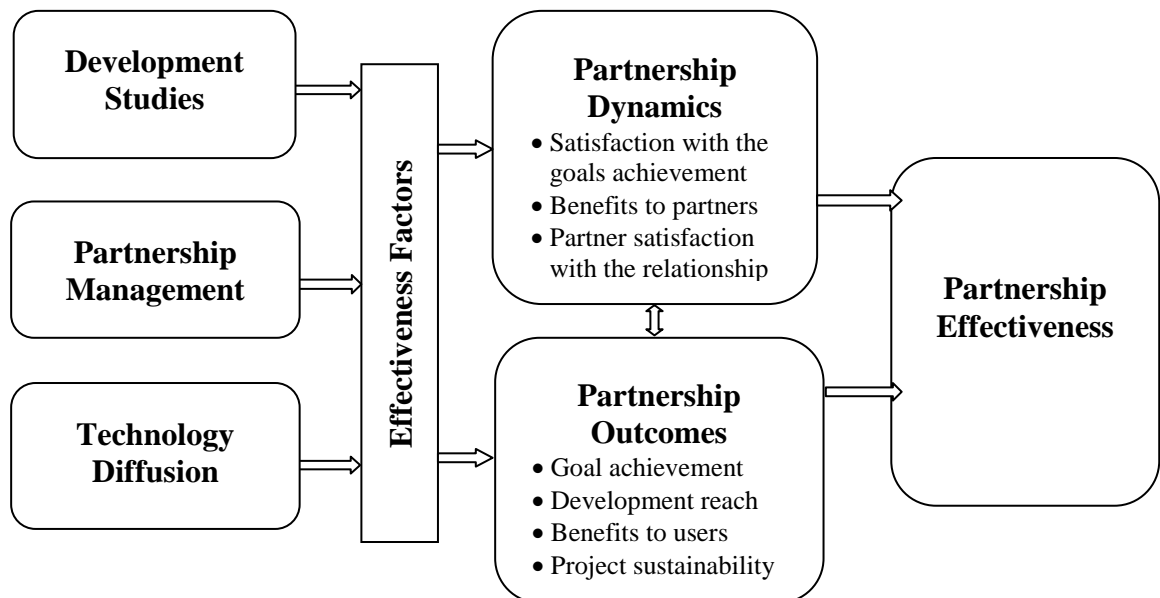
<sup>14</sup> Ashman (2001b) distinguishes between wide and narrow development reach. “Cases reaching more than 1,000 people were ranked as wide, while those reaching less were ranked as narrow” (Ashman, 2001b, p. 1102).



These preliminary factors guide the data collection and analysis during the case studies.

The conceptual framework is further revised based on findings.

Figure 4. Development Partnership Effectiveness: Preliminary Conceptual Framework



This Chapter provided the conceptual and theoretical underpinnings of this research. It discussed the literature in three key areas related to the phenomenon: development studies, partnership management, and innovation. These areas provided insights that guided the formulation of the preliminary conceptual framework presented here. The main knowledge gaps addressed by this research were highlighted as well. The next Chapter presents the research methodology and discusses research limitations and how they have been addressed.

## **CHAPTER THREE: RESEARCH METHODOLOGY**

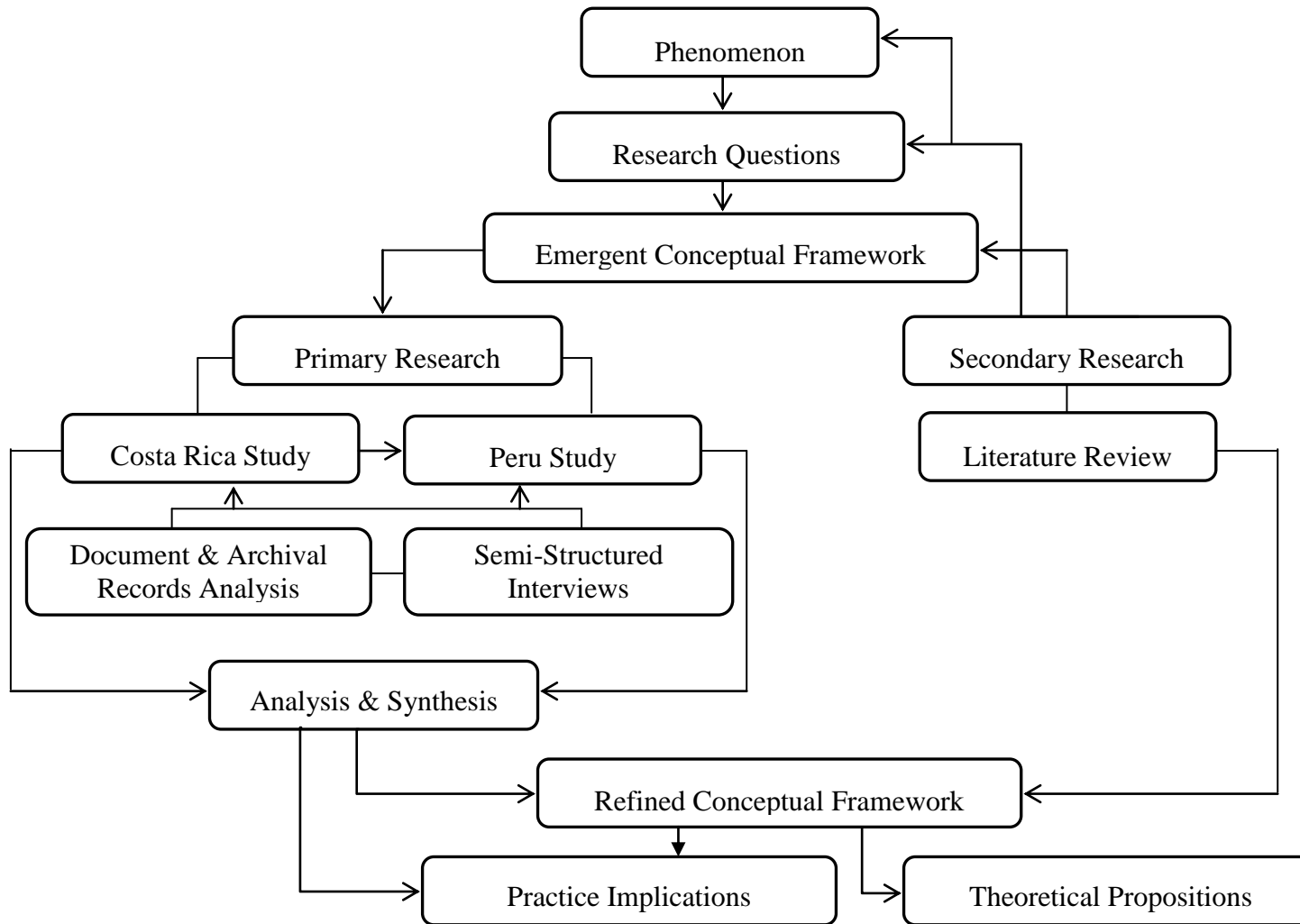
### **Overall Strategy**

Given the lack of theory on the NGO-driven partnerships involved in the diffusion of renewable energy technologies in remote rural communities in developing countries, this research is a qualitative inquiry, exploratory in nature and employs an inductive approach. That is, opposite to the hypothetical-deductive approach, inductive analysis does not assume important variables and the relationships among them before the data collection has commenced. Rather, categories and analysis dimensions emerge during the research (Patton, 2002). Such research is guided by analytical principles rather than rules and focuses on details of the data, from which patterns emerge, which inform theoretical propositions and constructs (Patton, 2002). The secondary research, which involved literature review, informed the topic of this research, key research questions and an emergent conceptual framework. For the primary research, a two-case study design was employed following guidelines by Yin (2009). The reason behind choosing a multiple study design versus a single case study was to strengthen the external validity of the findings as well as to have an opportunity for theoretical replication compared to what a single case may yield (Yin, 2009).

A two-stage approach was taken to the case studies. First, the Costa Rica study was conducted, which provided insights into the nature of studied partnerships and allowed the development of an initial set of propositions on factors that appear to influence the effectiveness of partnerships. These propositions and insights informed the Peru study and its findings were contrasted with those from the Costa Rica study. Documentation and archival records analysis and semi-structured interviews were chosen as methods for data collection in both studies. The primary data was collected

during two field trips to Costa Rica and Peru. The data was analyzed and synthesized and resulted in the refined conceptual framework with a set of theoretical propositions. As well, practice implications or recommendations aimed at the organizations and individuals involved in development partnerships have been made. The research methodology is visualized in Figure 5.

Figure 5. Research Methodology



Other types of inquiries, including quantitative research and a mixed methodology combining qualitative and quantitative research, were contemplated, but after careful consideration were rejected. Quantitative methods were rejected because of their emphasis on the measurements and relationship between variables that can lead to generalizations but lack a concern for the depth and detail, the process and meanings (Denzin & Lincoln, 2005), that had been highlighted in the literature review. Quantitative research assumes the researcher knows in advance what exactly they are measuring (Patton, 2002), which was not the case here. There were emergent ideas, concepts and analytical tools that formed the preliminary conceptual framework, but not the predetermined variables that can be tested through quantitative instruments. The research questions led to a qualitative approach in this research, which aimed to determine critical variables and dimensions, which were not available *a priori*.

Furthermore, there are a number of logistical and operational challenges related to the studied partnerships, which inevitably would impact the data collection. For quantitative research, a large sample of partnerships would be necessary in order to yield statistically significant findings. That would require a much more extensive, very time consuming and costly field work to remote and dispersed communities in multiple developing countries. Such field work was not feasible for me given my financial constraints and allotted time.

An electronic and/or telephone survey of partnerships was considered to follow the Costa Rica study, which would provide a set of preliminary variables for a survey. However, such a survey would likely work if the research was concerned only with the perspectives of the international NGOs and well established and equipped local partners

that may engage in such a survey. This method would not be appropriate for data collection on the perspective of small community based organizations, which, in some instances, may not be reachable from overseas and certainly less realistic for data collection on the perspective of beneficiaries in remote villages in developing countries due to lack of basic infrastructure in the communities, including information and communication technologies, language barriers and cultural considerations, which make remote data collection unfeasible.

It is important to mention that a significant aspect of my research strategy was to engage with the scholarly community in each area of the research in order to: keep abreast with the developments in these fields; network and develop working relationships with other researchers; share the research ideas; obtain feedback on this research and refine the conceptual framework and methodology. Thus, in the development field I participated in the conference on Partners in Development – Building A Better Future Through Collaboration at the St. Mary's University in Halifax, March 15-17, 2012, the Congress 2011 of the Humanities and Social Sciences/CASID Annual Conference in Fredericton, New Brunswick, and the Summer School on Monitoring and Evaluation of International Development Programs in Bologna, Italy, June 7-12, 2010. In the partnership management field, in particular, the BoP innovations and partnerships angle, I attended the oikos UNDP Young Scholars Development Academy 2010 on Inclusive Partnerships for Sustainable Market Innovations, 29 August – 3 September 2010, in Turrialba and Alajuela, Costa Rica and the Subsistence Marketplaces Conference in Chicago, July 9-11, 2010. I presented to and engaged with the innovation community during the 7<sup>th</sup> International PhD School on National Systems

of Innovation and Economic Development, the Global Network for Economics of Learning, Innovation, and Competence Building Systems (Globelics) Academy, Tampere, Finland in May, 2011 and at the 9<sup>th</sup> International Conference of Globelics, Buenos Aires, Argentina, November 15-17, 2011. These interactions helped me to formulate, refine and strengthen the theoretical and conceptual framework and methodology. They also confirmed the relevance of this topic and the significance of the findings.

My experience with the International Development Research Centre (IDRC) has also played an important role in focusing my research and positioning my involvement with these fields. Through the Research Internship 2010 and Professional Development Award 2011, I deepened my knowledge in the field of international development with focus on a science, technology and innovation through my research work, field work and the work of Innovation for Inclusive Development (IID) program, which hosted me for over two years. Through interactions with IDRC colleagues and numerous seminars, workshops and presentations, I expanded my understanding in other dimensions of the international development field as well, for example, eco-health, climate change and adaptation, and women issues. I also presented this research at IDRC in 2010 and 2012 and received useful feedback, which was incorporated into this thesis.

I also engaged with the research participants after the data collection where I shared my preliminary findings either through presentations and/or written documents. These interactions and feedback were important in terms of giving back to the research participants, verifying validity and reliability of data and also ensuring the relevance of this research to practice.

## Secondary Research

The secondary research started with the literature review. The literature review is essential for the research because: it provides an understanding of the subject, its significance and structure; helps to formulate research topic, questions and direction; and provides a basis against which the conclusions can be verified and subsequent research can be compared (Gray, 2004). At first, the literature review was conducted in three key research areas discussed in Chapter 2 in order to determine important concepts, theoretical frameworks and analytical tools that helped to build the conceptual framework for this research. It also helped to develop and justify research methodology.

The literature search was undertaken through library catalogues, electronic journal catalogues, Internet search by key words and through discussion with experts in the pertinent fields of knowledge. Among others, the following key words were utilized:

- 1) partnerships category: partnerships, development partnerships, North-South partnerships, NGO partnerships, cross-sector partnerships, BoP partnerships, partnerships and developing countries, partnerships and poverty, partnerships and renewable energy, partnerships and technology diffusion, partnerships and rural energy (the search was also conducted with the words: collaboration, cooperation, interorganizational relationships and alliance instead of partnership);
- 2) NGO category: NGOs, development NGOs, NGOs and poverty, NGO and developing countries, NGOs and renewable energy, NGOs and rural electrification, non-profit organizations, non-profit sector, community based organizations, voluntary sector.



- 3) Diffusion of renewable energy technologies category: technology diffusion, diffusion and renewable energy, renewable energy and developing countries, renewable energy diffusion, energy poverty, energy access, rural energy, rural electrification, energy and development.

Identified literature was critically analysed with attention to the validity and reliability of the sources. Using the Internet as a source presents some difficulties. There is an overwhelming amount of information available through the Internet that lacks quality and relevance. To address this problem, only sources published by credible and recognized authors and organizations were considered for the research.

### **Primary Research**

The case study was chosen as a preferred method for the research, because: a) the research focuses on contemporary phenomenon within a real-life context, where the context is significant and impacts the results; and b) the researcher has little influence over events, i.e. cannot manipulate the factors of interests (Yin, 2009). The research included an exploratory multiple case study in Costa Rica and an exploratory case study in Peru. An exploratory case study was chosen because the research topic is not well understood and there is a need for an exploratory work to provide the base for further investigation. Furthermore, this approach helps to address the complexity of the phenomenon, which may not be approached by other forms for research, e.g., experimental research. At the same time, choosing multiple cases enables the researcher to investigate the differences within and between cases with the goal of replication of findings across cases (Yin, 2009). Such approach is also considered as robust and reliable (Baxter & Jack, 2008).

Furthermore, case studies have been a frequent choice for the research in the pertinent fields. Some examples include: a study of business and NGO partnerships in Lebanon (Jamali & Keshishian, 2009); a study of Dutch development partnerships (Kolk et al., 2008), a study on cross-sector partnerships in South Africa and Zambia (Rein & Stott, 2008), a case study of the introduction of solar energy technologies in Tanzania (Gullberg, Ilskog, Katyega & Kjellstrom, 2005). This is yet another justification why the case study methodology is a good fit for this research.

The cases were carefully chosen based on the following selection criteria. First and foremost, a case had to have the presence of a development partnership involved in the diffusion of renewable energy technologies in remote rural communities in a developing country. Second, it had to be a partnership driven by an international NGO that has been operating at least for ten years and has had partnerships in more than one developing country. It was important that candidate international NGOs be operational for at least ten years and work in more than one developing country so that they would have built up sufficient learning and experience on partnerships in different contexts so as to increase the reliability of the findings and their relevance to other international NGOs. Size was not a criterion for selection as there was a great diversity of NGOs promoting rural renewable energy in developing countries observed in terms of size. This type of partnership was the unit of analysis. Third, it had to be feasible to access all partners in the partnership, visit villages and interview beneficiaries. Fourth, the research participants had to be interested in participating in this research. The participation was fully voluntarily and was not remunerated financially.

At the beginning, I conducted a global scan of renewable energy-based development initiatives through personal contacts, IDRC, rural energy and development networks, Internet search, reviewing the recipients of the awards in this area, and reviewing literature for examples. The global scan identified a range of eligible cases. An international NGO from each case was approached to discuss an opportunity for doing a case study research on partnerships driven by this organization. When an organization expressed an interest, I reviewed the documentation of their different partnership-based projects and discussed with them the feasibility of doing field work in specific sites.

Geographical representativeness was not a factor in selecting the cases because, as seen during the global scan, the geography of partnerships in rural renewable energy was very diverse; partnerships were present in each developing country region with no particular concentration in specific areas. Furthermore, differences within regions can be as great as between regions, so selecting cases in different regions would not necessarily provide a greater level of representativeness. It was discussed with the chosen NGOs, which operated in different developing country regions, what project sites to visit given my research objectives, and the time and other resources available for this research. Therefore, certain logistical considerations played a role as well. For example, the travel from North America to Africa or Asia would have been lengthier and more expensive than to some parts of Latin America. In the end, the case selection criteria led me to Latin America rather than identifying cases specifically in Latin America. In fact, Latin America was not initially considered as the first choice due to

lack of my proficiency in Spanish. Nevertheless, the language issues were successfully resolved during the field work by involving competent local translators.

Both cases that were chosen met all selection criteria and were deemed as representative examples (Yin, 2003) of experienced international NGOs working in rural renewable energy in more than one developing country. All the chosen cases involved international NGOs that have worked in developing countries for at least ten years and have been internationally recognized for their work in rural renewable energy. Having such experience allowed these organizations to comment on transferability of their partnership model to other contexts and speak about successes and failures over time. There was also an additional “plus” in each case. In the case of Costa Rica, there was an opportunity to compare two partnerships driven by the same international NGOs taking place in the same context but with different local partners. This created a good comparison opportunity, because, while seemingly having comparable chances for success and with similar contextual make-up and actors involved, the initiatives unfolded differently with varying degrees of success. The Peru case focused on the long-term operations of an international NGO via a partnership model, which was an opportunity to explore a partnership model that was successfully employed over time in the country with documented positive and lasting impacts on wellbeing of the recipient communities.

The cases shared similarities, but also had distinct features. The most important distinction is that in the Costa Rica case the international NGOs did not have a local base in Costa Rica and partnered with a local organization and in the Peru Case the international NGO was working through its regional and local offices in the country,

which partnered with the municipalities and communities. In Costa Rica, the partnership focused on providing solar powered lighting technologies, while in Peru there was a broader range of renewable energy technologies and resulting energy uses.

Both studies included site visits and utilized documentation and archival analysis and semi-structured interviews for data collection. To enhance the validity and reliability of this research, the data sources were carefully selected, a consistent strategy for data collection in each case study was followed, and the conclusions were confirmed with the key informants from the organizations (Gray, 2004).

The first study examined and compared two development partnerships driven by the international NGOs, Light Up The World and Y Service Club, that are implementing off-grid solar energy lighting programs with indigenous communities in the Talamanca canton, Limon province, Costa Rica. The goal of the study was to explore the nature of the development partnerships driven by NGOs in the diffusion of renewable energy technologies in off-grid communities in a developing country context and identify factors that impact the effectiveness of these partnerships. The findings of the Costa Rica study fed into the study in Peru, which focused on the partnership model employed by Practical Action (previously known as the Intermediate Technology Development Group (ITDG)), an international NGO based in the UK with a regional office in Peru since 1985. The study focused on partnerships promoting renewable energy for development in remote rural communities in Cajamarca, Peru.

To collect primary data for the first exploratory case study I travelled to Costa Rica for five weeks from July 30<sup>th</sup> until September 4<sup>th</sup>, 2010. For the second study I went to Peru for two and a half weeks from August 30<sup>th</sup> until September 15<sup>th</sup>, 2011. In

the case of Costa Rica, I also attended microfinance and technical training and observed installations of solar lighting systems in the remote community of Los Cocos as part of one of the initiatives in Talamanca. Observing these activities allowed me to gain first-hand insights into the development work and interactions between the partners. It also helped to build a rapport with the research participants. The degree of exposure I had through this field work cannot compare with the interviews I could have taken in the offices of the partners or via telephone. I was following the partners and interacting with them while on the road, during installations of solar systems, or while having meals in the community centre that hosted us. In addition to the formally scheduled interviews, following the semi-structured protocol, there were a lot of informal discussions that fed into this research as well. Observations were made about interactions among the partners, the renewable energy system infrastructure and communities. While having previous experience in community-based energy for development work, stepping into the terrain gave me a greater appreciation of the realities the organizations and their beneficiaries are facing and of the solutions being developed in the particular contexts.

In both cases I started with the review of documents and archival records of the partnerships. Documentation sources included partners' agreements, studies, project proposals, project reports, and letters related to the partnerships and projects. Archival records included baseline surveys, impact assessments, maps and charts of the beneficiary communities. Documentation and archival records analysis aimed at building a detailed account of studied partnerships and projects, identifying key participants in each project, understanding the context for each case, determining where

possible the progress of each partnership and factors responsible for their successes or failures.

Further data was gathered during semi-structured interviews. The semi-structured format allowed flexibility with regard to the questions and the order of topics discussed. Where appropriate, such a format also allowed for probing of views and questions to elaborate on the answers (Gray, 2004). I conducted the interviews with the representatives of the respective organizations. The representatives were typically project managers and other staff members who were responsible for the projects and partnerships. They were chosen for their first-hand knowledge and experience with the partnerships. The representatives were asked to comment on the project goals, choices for partners, partnership goals, the progress of partners in achieving these goals, what works and does not work, what contributes to successes, and what poses challenges. These topics and issues constituted the interview guides, and the probes were based on the emergent conceptual framework. Semi-structured interviews were also conducted with the beneficiaries to help understand partnerships benefits for the communities and the dynamics of the relationship between beneficiaries and implementing partners. I also met with other organizations and individuals in Costa Rica (an NGO, a public energy utility and a university professor) and Peru (a government agency, an NGO and a research institute) working in the off-grid renewable energy area. These organizations and individuals were interviewed about their experience with off-grid energy projects and partnerships in these countries. These interviews helped to understand the broader context in which the partnerships in question are taking place. The issues of validity and reliability were addressed by reducing interviewer bias (discussed in the following

section on Research Limitations), ensuring consistency of the questions with the research objectives and demonstrating accuracy and neutrality. Building rapport using active listening skills and appropriate language was important in conducting the interviews (Gray, 2004).

In total, 21 interviews were conducted as part of the Costa Rica study and 40 interviews as part of the Peru study. The list of interviews in Costa Rica is provided in Table 2, and for Peru, in Table 3.

Table 2. List of Interviews, Costa Rica Study

<b>Interviews</b>	<b>No</b>
ACEM	2
APPTA	1
Y Service Club	1
LUTW	1
ACEM Tutors/ Beneficiaries	5
APPTA Tutors/ Beneficiaries	1
Beneficiaries	7
ICE (Energy utility)	1
E+Co	1
National University of Costa Rica	1
<b>TOTAL</b>	<b>21</b>

It is important to note that six interviews in Costa Rica with tutors/technicians from local partnering organizations and five interviews in Peru with community



enterprise members combined questions for partners and beneficiaries because these individuals were both the representatives of partnering organizations and the beneficiaries. The interview guides for each group of participants can be found in Appendix E, F and G.

Table 3. List of Interviews, Peru Study

<b>Interviews</b>	<b>No</b>
Practical Action, UK office	2
Practical Action, Lima office	1
Practical Action, Cajamarca office	7
Community Enterprise members/Beneficiaries	5
Community leaders/Beneficiaries	1
Municipality of Tumbaden	3
Beneficiaries	17
Ministry of Environment	2
International Potato Center	1
World Federation of Engineering Organizations - Peru	1
<b>TOTAL</b>	<b>40</b>

In the case of Costa Rica, most interviews with NGOs and other key informants were conducted in English. In the case of beneficiaries, most of the interviews were conducted in Spanish with the help of a translator. There was an instance where an

interview was conducted in the indigenous language of Cabecar, and then interpreted into Spanish and then into English.

In the case of the Peru study, out of 40 interviews only five interviews were conducted in English and 35 interviews were in Spanish with the help of a translator. In both case studies, all interviews were audio taped. In addition, interview notes were taken in case of any mechanical failure. The interviews were transcribed and then coded. Descriptive codes were applied to organize responses. These codes included categories and subcategories based on research questions, literature review and emergent conceptual framework (precoding) and were revised based on the interviews (postcoding).

This research received ethics approval from the Conjoint Faculties Research Ethics Board for the University of Calgary for both studies. All research activities have carefully followed the approved research protocol, including informed consent process. The consent forms were available both in English and Spanish. A written consent form was used with all research participants except beneficiaries, as illiteracy rates can be high among this group. In the case of beneficiaries, a simplified consent form was used and a verbal consent approval was allowed by the Ethics Board. The copies of the English consent forms are available in Appendix A and B for the Costa Study and in Appendix C and D for the Peru study.

### **Research Limitations**

This research has a number of limitations, which is important to note. The topic chosen is complex and broad and all attempts were made to address the complexity. However, certain boundaries had to be set to allow for a focused and coherent

implementation of this work. Thus, the choice of literature included three fields of knowledge: development, partnership management and innovation. Thematic and conceptual choices had to be made within these broad areas in order to make this research manageable and feasible given the time and other resources available to me and also avoid overcrowding of conceptual constructs and theoretical approaches and ensure coherence.

Thus, in development field I focused on literature discussing development NGOs and partnerships between North and South NGOs and omitted in-depth discussions around community development and general development theories. Within the partnership management literature the focus was on partnerships involving NGO and the BoP and subsistence marketplace partnerships. General partnership theories were also brought to some extent into the discussions around the nature of partnerships. The innovation literature provided insights into the technology diffusion processes and innovation system approach. Studies specifically focusing on diffusion of renewable energy technologies in developing countries were consulted as well. The research did not include literature on grassroots innovations, innovation capacities and capabilities.

Then there are methodological limitations related to undertaking an explorative qualitative research. Qualitative research as any other type of inquiry has its strengths and weaknesses. One of the limitations of qualitative research is that, while it produces a great deal of information about a smaller number of cases, it reduces the ability to generalize the findings (Patton, 2002). While the small number of cases used in this research invariably limited the generalizability of findings, the study generated important insights into the studied phenomenon and formulated theoretical propositions

in an attempt to start building theory rather than testing it. Yin (2003) calls it “analytic generalization”, where case study research is “[...] generalizable to theoretical propositions and not to populations or universes” (p. 10).

The research focused only on a small number of international NGOs operating in a specific context of remote rural communities in two developing countries and therefore we need to be careful in extrapolating the findings to other international NGOs promoting the diffusion of rural renewable energy technologies in other developing countries. During the research the international NGOs were also asked to comment about applicability of their partnership model in other developing countries in which they worked. They noted that their partnership model in the studied countries was also applied in other regions, such as Africa and Asia, and they saw that the core factors of effective partnership were transferrable, even while the specifics of implementing the model varied in accordance with the local context. Potentially, the research findings can be applicable to comparable organizations working in similar contexts, however, we may see a variation in the implementation mode.

Another limitation is related to the researcher biases, which may occur in qualitative case studies more frequently than in quantitative research (Yin, 2003). Furthermore, a majority of the interviews required the use of translators who could have influenced the responses because of their own biases. Given that I travelled to the communities with the representatives of local implementing organizations, possible biases could have been present in the testimonials or anecdotal evidence of beneficiaries due to their potential misperception of me being part of these local implementing organizations. However, to minimize such confusion I rigorously followed the informed

consent process, approved by the Ethics Board, with each research participant, where all efforts were made to clarify the purpose of my research and my independent role as a researcher.

In terms of possible biases in the responses of beneficiaries, these are deemed to be low. Because beneficiaries were paying for the systems or services they received, and were not reliant on donor handouts, they had every reason to be candid, open about their concerns, and willing to share their experiences. In addition, attention was paid to the payment discipline in the cases, as an indicator of whether people were satisfied with the service or product. If beneficiaries were not satisfied, they would likely stop paying for the renewable energy systems and return to using candles or kerosene.

Also important to note as a source of potential bias is my prior work experience at LUTW, one of the research participants in the Costa Rica study. However, during field work I was no longer involved with LUTW either as an employee or volunteer and it was made clear to all my research participants from the outset that I was an individual researcher collecting data for PhD research and had no affiliation with LUTW. In addition, both Costa Rica partnerships that were compared included LUTW, which automatically excluded an opportunity of potentially favouring one partnership over another during their comparison. Furthermore, another study in Peru was conducted on partnerships not involving LUTW, which allowed me to verify the findings of the Costa Rica study.

Both researcher and translator biases were further reduced through the use of triangulation (Patton, 2002), where a variety of data sources were used such as archival information, documentation and interviews. Also, in most cases, multiple research

participants from each partnering organization and all partners of the studied partnerships were involved and this strategy enabled triangulation of data collected for each actor and for the partnership as a whole. To enhance the validity and reliability of this research, the data sources were carefully selected, a consistent strategy for data collection in each case study was followed, and the conclusions were confirmed with the research participants from the organizations (Gray, 2004).

Furthermore, logistical challenges and difficult geography and terrain limited the ability to reach more communities and interview more beneficiaries. There were also timeframe and budget constraints that impacted the duration of field work. More extensive field work could have allowed for deeper insights into dynamics of the relationships over time and outcomes of the partnerships to beneficiaries. Acknowledging this limitation I did not employ the methods of participant observation, for example, which require prolonged immersion in studied locality. Also, prior to the field work, I had conducted a significant amount of preparatory work, which allowed for a more focused and intensive collection of needed data within the given timeframe.

This Chapter presented the overall research strategy, explained the rationale for choosing specific methods to collect and analyze data, and described their application. It also outlined research limitations and how these have been dealt with. The next Chapter presents the case study in Costa Rica highlighting the context of the study, the partnership structure, roles of the actors involved and their linkages, drivers and barriers to the studied partnerships. The preliminary theoretical propositions on factors associated with partnership effectiveness are put forward.

## CHAPTER FOUR: EXPLORATORY CASE STUDY IN TALAMANCA, COSTA RICA<sup>15</sup>

### Background

Talamanca is the poorest canton in Costa Rica, located in the Limon province, in the south of the country (Figure 6), which scored 9.75 in the Social Development Index in the last national census with a score of ten signifying least development (APPTA, n.d.). Similarly to the rest of Costa Rica, poverty in Talamanca is concentrated among the indigenous and Afro-Caribbean populations. The municipality of Talamanca reported in 2003 that about half of its population (49.7%) was living in poverty (Whelan, 2005). Total population of Talamanca is 33,569 with indigenous population (primarily Bribri and Cabecar indigenous people) accounting for 12,118 (INEC, n.d.). The district of Bratsi in the canton, where the Bribri and Cabecar indigenous territories are located, has the highest concentration of poverty within Talamanca (Whelan, 2005).

The Bribri and Cabecar indigenous territories lack access to basic services, including access to health care, education, transportation and energy. Infant mortality and malnutrition in the area is much higher than the national average (Whelan, 2005). The education levels are very low – the average grade level achieved is the fourth grade. Only 14% of the population complete secondary education. Illiteracy rates are as high as 30% among the Bribri and 50% among the Cabecar (Whelan, 2005). Indigenous people are primarily involved in agriculture producing cacao, banana, plantain, and an

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<sup>15</sup> Parts of this Chapter appear in Platonova (2012). Copyright 2012, IGI Global, [www.igi-global.com](http://www.igi-global.com). Posted by permission of the publisher.

increasing number of producers are raising animals for consumption and sales: pork, hens, bovine cattle and fish (APPTA, n.d.).

Figure 6: Talamanca Projects Map



Notes: Map is courtesy of ACEM.

The income levels are among the lowest in Costa Rica. The average monthly income of a family of four in Talamanca is approximately \$100 USD making it difficult to meet their basic needs (Whelan, 2005). Until very recently the communication and transportation infrastructure was practically non-existent in the area. Even though the infrastructure conditions have improved since then, the issues of poor socio-economic conditions remain.

While country-wide electrification rates are high – over 98%, the highest rate in Central America (IEA, 2010b), many households in Talamanca have no access to electricity. As indicated during interviews with the partnering organizations and a Costa



Rican publicly owned energy utility, one of the reasons is their remote locations and low population density, which make grid extension difficult. However, even when the grid is expanded, connecting to this grid is prohibitively expensive. During interviews with the beneficiaries, it was noted that one can spend over (equivalent of) \$200 CAD<sup>16</sup> for a connection kit and \$10 CAD for each meter of wiring. Thus, somebody who lives 50 meters from the grid would have to spend about \$700-800 CAD in order to connect, which is well beyond their means. In the words of one of the beneficiaries who is also a coordinator of the educational project with the indigenous communities in Talamanca:

Some people might be moving closer to the road where the grid will be, but there will be still a bunch of people who will not move. There will be demand for solar and less centralized technologies. I am not going to move closer to where the grid will be. (Local education coordinator, personal communication, August 4, 2010)

Off-grid households are relying on kerosene and candles to meet their lighting needs (Photo1). In addition, people use flashlights that are running off dry-cell batteries. As indicated during interviews with the partnering organizations, recycling for these batteries is non-existent in the area. I observed during my visits to the communities that many of the batteries were disposed around the homes and in the rainforest. The interviewed beneficiaries indicate that often a kerosene lamp is used in the kitchen, and candles – for studying. People use light for a few hours in the evening before going to bed at around 7-8 pm and in the morning after waking up at around 3 am. Based on interviews with the beneficiaries and local partnering organizations, lighting expenditures for a family of four can be as high as \$30 CAD per month – up to one third

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<sup>16</sup> Using OANDA currency exchange service at [www.oanda.com](http://www.oanda.com), foreign currency exchange rates for the dates of field work have been applied. The equivalent amounts in Canadian dollars are being noted in this research.

of their income. People interviewed in Talamanca, who were using kerosene and candles, knew from their first-hand experience that these are not only expensive, but also inefficient sources, which have negative health, safety and environmental impacts.

Photo 1: Lighting Sources in Off-Grid Communities in Talamanca, Costa Rica<sup>17</sup>



Notes: The picture of a candle in this collage is courtesy of Brian Minielly.

To address the issue of access to sustainable energy, international NGOs facilitated provision of solar based light emitting diode (LED) lighting in remote rural communities in Talamanca through ACEM and APPTA Solar Energy Lighting Initiatives. Despite being in the same region of the country, these initiatives evolved in parallel independently, mainly because ACEM and APPTA are very distinct organizations often working in different communities in Talamanca. Their initiatives are described in the following sections.

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<sup>17</sup> All photos have been taken by the author unless otherwise stated.

**ACEM Solar Energy Lighting Initiative<sup>18</sup>**

One of the studied solar energy initiatives is led by a local NGO called Association for Science and Moral Education (ACEM), which has been running an educational program for development called Preparation for Social Action (PSA) in Talamanca since 2001. PSA is a two year tutor-delivered program for youth to improve their knowledge in areas such as math, science and technology, language and communication, and community service. Its tutors and learners throughout Talamanca form a network of people from the communities. The solar energy lighting initiative commenced in 2008. ACEM saw a natural fit between solar lighting and education. As Luis Dumani, ACEM Executive Director, notes:

We know we are in an indigenous community. We were estimating that if we bring better light, they will have better light for studying, they could study more, the study will be more meaningful, deeper, their spaces of cultural interaction will be improved, better environment to communicate, to do things. (L. Dumani, personal communication, August 6, 2010)

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<sup>18</sup> Description of the ACEM Initiative is based on interviews with ACEM, LUTW, Y Service Club, and beneficiaries; and documentation review, which consisted of the following sources: ACEM's brochure, web-site and project information provided by ACEM, including data on the number of installed systems, number of beneficiaries reached, and financial data.

Photo 2: ACEM Installations in Los Cocos, Talamanca, August 2010



The organization recruited technicians, most of whom are the PSA tutors who are trusted and well-known by the recipient communities. The PSA tutors/technicians became the technical backbone for the project. The initiative adopted a microfinance approach, with families redirecting payments previously used for candles and kerosene toward the solar lighting system for their home. ACEM established a formal contract system where a beneficiary signs the contract, which clearly specifies responsibilities of the implementing agency – ACEM and the beneficiary. It was noted that when people sign a contract they feel they are part of something important and take the contract responsibilities seriously. There are also receipts issued for each purchase. A local coordinator hired by ACEM is fully responsible for administration and management of this project on the ground. As of the end of September 2010, ACEM installed 378

systems in 15 communities in Talamanca. The organization is fully responsible for the implementation of the project, provides financial, technical and human resources, and conducts monitoring and evaluation of the initiative.

An important aspect of this project is the partnership with the international NGOs, which play an important role in the initiative. This project is facilitated by two international NGOs: Light Up The World and Y Service Club. Below each international partner is described based on interviews and documentation review, which included the presented organizations' web-sites, brochures, annual reports, project proposals, project reports, and project agreements.

Light Up The World (LUTW) is an international development NGO based in Calgary, Alberta, Canada, that has pioneered the use of solid state lighting solutions powered by renewable energy for the world's poor who do not have access to the electric grid and rely on kerosene, candles and traditional biomass for their lighting needs. LUTW has been operating in the field since 2001 with the first lighting installations completed by its founder, Dr. Dave Irvine-Halliday in 1999. At the core of LUTW's approach are partnerships with major manufacturers, NGOs, local communities and academia. LUTW built partnerships with the manufacturers of the components of lighting and negotiated social pricing arrangements, which allow the organizations supported by LUTW to access the technology at affordable prices. LUTW, as an intermediary, bridges the gaps in the technological supply chain, which fails to reach the poorest of the poor. On the ground, LUTW is working with local grassroots organizations, which understand the local environment for technological and social innovations, and are connected to and trusted by the community members. It

equips the local partners and stimulates local social innovations in distribution and servicing that are essential in the sustainable energy service delivery in remote rural communities in developing countries.

LUTW has been involved with ACEM since March 2009. LUTW's role in this project is to co-fund it and provide technology and related technical support – to be a hands-on donor. It contributes to planning and discussion about the ACEM project design, assists in designing systems for different power needs, provides technical specifications of the systems, helps to identify and procure necessary solar system components, and facilitates shipping of these components from Canada and logistics of component procurement in Costa Rica. Together with Y Service Club, LUTW also provided a technical training seminar on solar systems to ACEM technicians in 2010.

Y Service Clubs are community service clubs working towards developing global citizens, building culture and peace internationally, promoting cross-cultural, cross-border international relationships, and building a web of relationships and knowledge about other places and cultures through connections with clubs all over the world. The club that is involved in this project is the Owen Sound Y Service Club based in Ontario, Canada. Its role in the project is to provide training to local implementing organizations on solar system concepts and on how to assemble the complete systems and install them. This training also covers project administration. Y Service Club provides assistance around logistical aspects of system installations, human resource management, inventory management and contracts with users. The organization is also actively involved in fundraising for the project and conducting training and monitoring

visits to Costa Rica since March 2007. The partnering organizations have the formal agreement that specifies their roles, responsibilities and timelines.

### **APPTA Solar Energy Lighting Initiative<sup>19</sup>**

The other Costa Rican initiative that was studied is implemented by APPTA, an organic producers' cooperative founded in 1987. Currently the association consists of 1067 producers of which 80% is indigenous Bribri and Cabecar. Women constitute 38% of the association members. The cooperative has been involved with solar energy since 2004. APPTA saw a good match between this project and its main mission. As Walter Rodriguez, Director of Marketing and Development of APPTA, states:

APPTA has two big objectives: 1) improve the standards of our members, and, at the same time 2) protect the natural environment. Through the lighting project we meet both objectives. (W. Rodriguez, personal communication, August 9, 2010, translated from Spanish)

So far the organization has installed 117 systems. There are no paid staff dedicated to this initiative. All activities have been performed on a volunteer basis. The organization is fully consumed by the matters related to their main operations as a cooperative and complexities of this business have not allowed them to prioritize the solar program yet. However, there is a full realization on the part of the organization that for this project to move forward it should be integrated into its strategic priorities. The most recent development is that a group of technicians has been trained and the project is now overseen by the Executive Director of the cooperative. New installations by the newly trained technicians started after I completed my field work.

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<sup>19</sup> Description of the APPTA Initiative is based on interviews with APPTA, LUTW, Y Service Club, and beneficiaries; and review of APPTA web-site information.



Photo 3: APPTA Systems in Off-Grid Households in Talamanca



As in the case of the ACEM initiative, the APPTA Solar Energy Lighting Initiative is facilitated by LUTW and Y Service Club, which play similar roles as in the ACEM initiative. One distinction from the ACEM initiative is that Y Service Club is the sole provider of the technical training to APPTA. Also, LUTW does not directly co-fund the project, but rather helps to finance it through other partners in this initiative (Y Service Club and David Wiwchar). Furthermore, in contrast to the ACEM project, there is one more partner, an individual David Wiwchar, Vice Principal of Vision Lively District Secondary School based in Ontario, Canada. Mr. Wiwchar is the founder of the Light Up Costa Rica program. He runs an educational program where he brings Canadian high school students to Costa Rica during March break to be involved in solar



lighting projects. Through his work and his previous experience and contacts in Costa Rica, Mr. Wiwchar introduced solar lighting to areas of need and facilitated linkages with the potential implementation partners. In Talamanca, he was the one to introduce the idea of a solar lighting project to APPTA.

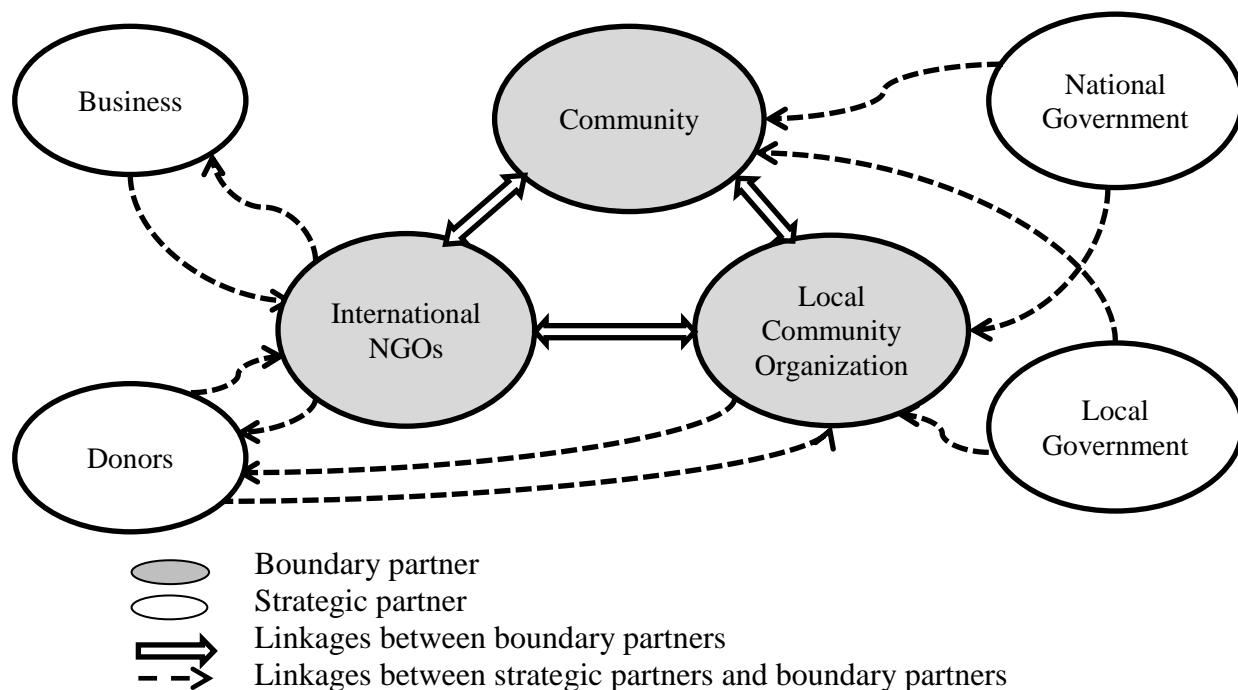
## **Nature of Partnerships**

### ***Actors and Linkages***

At first glance, there is a myriad of actors involved in the presented partnerships in a variety of ways. The innovation system (IS) framework helps to map out actors within these partnerships, and highlight their linkages, and interactions. The framework also helps position these partnerships within a larger system of actors and interactions that are part of the technological diffusion process. Figure 7 shows a map of actors, and their linkages and interactions in the studied partnerships explained below.

The development partnership domain constitutes actors that are the focus of this research. These are the international NGOs and local organizations working with the target communities. They can be called “the boundary partners” — organizations that are directly interacting within the development project and whose behaviour the partnership can have opportunities to influence (Earl, Carden & Smutylo, 2001). The boundary partners have close linkages and frequent interactions. Stronger linkages are manifested through regular and open communication, regular exchange of knowledge about project progress and sharing of learning from the field, and open discussion of challenges and the ways to overcome them.

Figure 7: Map of Actors and Linkages in Development Partnerships in Talamanca,  
Costa Rica



Based on interviews and my observations of the project activities during field trip, the international NGOs in the studied partnerships play an important catalytic role, while their local partners play a central role in implementing the solar lighting projects and are closely linked with the beneficiaries. Participating international NGOs facilitate access to financial, management and technical resources and help build capacities that are needed by local organizations to implement the projects and ensure their sustainability. Local implementing organizations, ACEM (an NGO) and APPTA (an organic producers' cooperative), which have presence in the community, are central to the project since they understand the local environment for technological innovation and its diffusion. They are closely connected with and are trusted by the community. They are leading the planning and implementation of the projects, and are fully responsible

for monitoring and evaluation activities. These local organizations provide feedback to the international NGOs on the project progress, engage in the exchanges that help move projects ahead, deal with the challenges and nurture successes.

As indicated in interviews with the international and local partners, LUTW as a supply chain intermediary allows organizations like ACEM and APPTA to access best in class solar and LED technology at a lower cost. This is possible due to LUTW's established relationships with the manufacturers of components (indicated as business in Figure 7). These are contractual relationships between an NGO that acts as a distributor and a manufacturer that plays a role of a supplier. Using the language of Earl et al. (2001), these are “strategic partners” that provide resources to the initiatives but are not directly involved in the design and implementation of these initiatives. In return, business partners, such as manufacturers, gain corporate social responsibility benefits and an opportunity for their products to be introduced into new markets. Other strategic partners include donors, which provide needed funding for the international NGOs and the local NGO. The linkages between these actors include financial flows to the NGOs and reporting from the NGOs to the donors.

The partnership map in Figure 7 also highlights both national and local governments as participating actors in the larger system. The local partners have linkages with the local authorities, which, according to interviews with the local partners, play a facilitating role in the projects. However, the linkages with the national government were noted as weak. The national authorities were largely unaware of these partnerships and initiatives (M. Mora, personal communication, August 24, 2010). The boundary partners indicated that it would be important to coordinate with the national

government, in particular, ICE, the Costa Rican Electricity Institute (in Spanish – el Instituto Costarricense de Electricidad) – a Costa Rican publicly owned energy utility responsible for electrification, and be better informed of the government plans for grid extension into the area. Local organizations could benefit from accessing certain funds and/or technical expertise from ICE. In turn, the government could rely on these organizations to cover Talamanca communities, that will not be reached by the grid, and expand its own capacities in the off-grid rural electrification by learning from these projects. As Luis Dumani, ACEM Executive Director, points out:

With government, it will be important to coordinate certain issues. [...] The grid is getting into the reserve [where project communities are]. [...] We should be more aware what the plans of the government are, their capacities. If we can coordinate [with the government], especially with ICE, maybe we can help with some of their plans. Maybe we can have access to certain funds or technical advice or cover areas where they will not go. (L. Dumani, personal communication, August 6, 2010)

The ICE representative, Misael Mora, who is a coordinator of the National Project on Renewable Energy-based Rural Electrification, pointed out that they have already collaborated with an NGO in renewable energy electrification of remote communities in other areas (M. Mora, personal communication, August 24, 2010). In sum, there are unrealized opportunities for national government involvement with the studied initiatives, which can be a win-win scenario for energy regulators and providers, local organizations and communities.

### ***Drivers***

The exploratory study showed that community service is the key driver for the partnering organizations. While responding to specific community needs, an NGO

activity is often related to market or government failures. As indicated during interviews, in the case of the NGO-driven initiatives in Talamanca, it is a response to the government not being able to extend the grid to some communities, which is primarily due to economic reasons. It is also about market failure where the market has not acknowledged demand for sustainable off-grid lighting services.

The international NGOs in the studied partnerships, LUTW and Y Service Club, play the role of hands-on donors where they do not only (co-) fund development projects but also help local organizations build capacities necessary to sustain these projects. According to interviews and informal discussions with the local organizations, they experience a certain level of resource dependencies in technology, capacity and financing, which necessitate involvement of the organizations, such as the international NGOs, that can provide such resources. The participating international NGOs bring project management and technical expertise, access to technology at lower cost, and funding – resources that are indicated by the studied local and international organizations as essential to the successful implementation of a project.

According to interviews with both international NGOs, they need to work with the local organizations in order to ensure the necessary closeness to the communities, in order to understand the communities' needs and realities, and gain trust of the communities' members. The respondents from the international NGOs indicate that without having a local base it is costly in terms of time, human and financial resources to build strong community relationships within a short period of time. Therefore, partnering with the locally embedded organizations is essential to the success in this type of initiative.

## ***Challenges***

The international NGOs, LUTW and Y Service Club, and the local NGO ACEM, one of their local implementation partners, indicate that they are often vulnerable due to financial constraints and reliance on external funding. According to interviews and informal discussions with these organizations, the funding availability is limited in terms of its amount and duration. Most frequently, only one to two year grants are available. Every year they are searching for funding, which distracts from their main development operations. The interviewed international NGOs and the local NGO ACEM emphasized the lack of financial sustainability as a key constraint to their operations. In the case of APPTA, which is a cooperative and does not rely on donor funding, financial constraints due to market fluctuations were pointed out as key challenges (W. Rodriguez, personal communication, August 9, 2010).

Another set of barriers is related to logistics and infrastructure. As indicated during interviews, the climate in Talamanca is challenging and devastating rains often shut down communications and flood the communities, which make community access impossible. Even basic roads were non-existent until a year ago. Currently, as observed during my field work, some communities are accessible by gravel roads; however, access remains difficult in many cases. Partnering organizations indicated that these constraints presented major challenges for the local organizations to reach the communities and for the international NGOs to conduct field visits and capacity building activities on ground. The constraints related to the lack of basic infrastructure and difficult access I observed first-hand during the field trip when the installations took place in one of the project communities.

As indicated during interviews, cross-cultural communication, lack of communication capacities, and language barriers can be challenging as well. Phone and/or e-mail may not be regularly available and/or are not appropriate to deal with some organizations in Talamanca, which makes it difficult for international NGOs to engage remotely. You have to be face-to-face with people on a regular basis to get things going. As Brian Minielly, President of Owen Sound Y Service Club, explains:

People [in the indigenous communities of Talamanca] will not communicate effectively, upfront and clear or make commitments to people they do not know, have never met and who are not standing in front of them at the time when they are trying to do it, will not negotiate over phone or e-mail. [...] I have to fly from Canada to meet with the Chairman of the APPTA Board face-to-face [...]. (B. Minielly, personal communication, August 4, 2010)

Further, he points out:

ACEM was a group I could communicate with, having primary people who were bilingual in English and Spanish so that I could communicate effectively with them and because they had willingness and resources (office, computer that worked, telephone) that they were able to communicate with me to do effectively planning from a distance. I could not do planning on a distance with the other project members [e.g., APPTA]. (B. Minielly, personal communication, August 4, 2010)

Another challenge is the coordination among multiple actors within a project and managing expectations. Christoph Schultz, Projects Director of LUTW, states:

Ideally you are not dealing with too many different organizations and/or individuals. Having more than one organization, [it is a] coordination issue. (C. Schultz, personal communication, August 8, 2010)

According to interviews, having regular and open communication as well as a formal agreement clearly specifying the roles and responsibilities are central in

mitigating this problem. The role of effective communication and contracts are discussed later in this Chapter in the section Partnership Dynamics.

There are also technological challenges. As indicated by the international NGOs and their local partners during interviews, batteries remain the most vulnerable component in the solar lighting system. They point out that, depending on the use, batteries in the solar system need to be replaced approximately every two to three years. The local partners need to provide a battery replacement option to the users to ensure that the system remains functional over the extended period of time.

### **Partnership Effectiveness**

The studied partnerships in Costa Rica were qualitatively compared using the effectiveness measures introduced in Chapter 2 (Table 4). The scores of low, moderate or high were applied for each measure. The ACEM Solar Lighting Initiative emerged as a more effective partnership overall.

All partners of the ACEM initiative reported high satisfaction with the progress of their work. In the case of the APPTA initiative, partnering organizations were moderately satisfied and hoped for better development of the project. In both cases, partners were satisfied with the relationship overall. Though, as noted during interviews, in the case of the APPTA initiative, the language barriers between the local partner and the international partner involved in building the technological and organizational capacity in renewable energy affected the regularity and quality of interactions at times. Furthermore, the satisfaction with the relationship could have been higher in the ACEM case due to a higher satisfaction with the project progress. In both cases, partners indicated that they derived moderate to high benefits, including access to



financing and technology, and reputational gains. Overall, both partnerships scored similarly with regard to partnership dynamics.

Table 4. Comparing Effectiveness of Development Partnerships in Talamanca

<i>Effectiveness Measures</i>	<i>ACEM Solar Lighting Initiative (2008-08/2010)</i>	<i>APPTA Solar Lighting Initiative (2004-08/2010)</i>
<b>PARTNERSHIP DYNAMICS</b>		
Partner satisfaction with the goal achievement	+++	++
Partner satisfaction with the relationship	+++	++
Financial benefits	+++	++
Reputational benefits	++	++
Technological benefits	+++	+++
<b>PARTNERSHIP OUTCOMES</b>		
Goal achievement	+++	++
Development reach	+++	+
Benefits to users	+++	++
Project sustainability	+++	+

Notes: +++ High; ++ Moderate; + Low

The key differences were noted in the partnership outcomes. The ACEM initiative scored high on all measures: goal achievement, development reach, benefits to users, and project sustainability. The other initiative scored low on development reach and project sustainability. As noted earlier, as of July 31<sup>st</sup>, 2010, ACEM has installed 378 systems and has reached 1,890 beneficiaries. APPTA has installed 117 systems,

which can be roughly translated into about 500 beneficiaries. The exact numbers were not available.

Beneficiaries in the ACEM project who were interviewed – some had a system for almost two years – were satisfied with the solar lighting and noted the number of positive impacts it has on their life. In the words of one beneficiary from China Kicha:

I am very happy to have solar system for illumination. I was pleased to have the opportunity to have the light. It helped me a lot. I feel more comfortable to have better light for cooking, to work in the kitchen, to use it with the children at night to study. It was too difficult before with the candles. (Beneficiary in China Kicha, personal communication, August 7, 2010, translated from Spanish)

Important outcomes in the ACEM initiative include children spending more time after sunset doing their homework and reading books, and families having extended hours for productive and social uses. One of the ACEM tutors/technicians reports:

Before students would not do homework, now they are doing their homework more often [...]. Students are more comfortable doing homework. This light is better for studying. They do not have to spend more money in candles. (ACEM Tutor, personal communication, August 4, 2010, translated from Spanish)

During visits to homes where APPTA systems had been installed for up to three years, users expressed satisfaction with the system and noted positive educational and social benefits of having solar lighting similar to those in the ACEM project. However, some households also had the ACEM system and the APPTA system was running off the battery from the ACEM system, without which, the APPTA systems would not work as the batteries needed replacement. In the case of these households, in the

absence of ACEM systems or a battery replacement option, it is reasonable to conclude that the APPTA beneficiaries would no longer be able to use the lighting system.

The score on project sustainability was high in the case of ACEM and low in the APPTA case. The microfinance approach, which is an important aspect of the project sustainability, was better adopted in the ACEM project. According to interviews with ACEM and beneficiaries and ACEM project reports, the monthly payments in the communities served by ACEM were regularly made and collected by the ACEM local coordinator. As systems are repaid in full, the households note an increase in their disposable income, which improves the economic situation of families. As noted during interviews with ACEM and the international partners, the payback period to date for the systems in this project has been less than two years. In the case of the APPTA initiative, the administration of the payments can be characterized as ad hoc. There were indications during interviews that some beneficiaries would pay at the APPTA office, but, due to lack of documentation, it was difficult to track the payment discipline.

As observed during field work and based on interviews, ACEM also had an established system for maintenance and repairs of the system and a well-functioning system for billing the users. In the case of APPTA, according to interviews, informal discussions and my observations, there was a lack of human, financial and technological capacities to provide effective management of the solar systems.

According to the ACEM's statistical information on installations and the number of the users that purchased and continued using the system, the sustained use of the technology after the initial adoption and up to the time of my field work was high, close to 100%, which means that almost all users who initially adopted the technology

continued using it. In the case of APPTA, the exact data was not available and it was difficult to evaluate the levels of the sustained use of the technology. There was some evidence that some users could not use the system anymore due to failed batteries.

It is important to note that the analysis focused on partnerships since their inception and up to the time of field work in August, 2010, which is a two year period for the ACEM initiative and a six year period for the APPTA project. Therefore, the evaluations of project sustainability have to be understood within this timeframe. The operationalization of sustainability (discussed on page 32) takes this into account, but it is too early in the process to talk about how sustainable these initiatives will be in the long run. Furthermore, there were several key changes made in APPTA that have the potential to improve their development outcomes going forward, but which had yet to manifest themselves at the time of evaluation. As Walter Rodriguez, Director of Marketing and Development of APPTA, explains:

Now, that [the solar lighting initiative] is being institutionalized, it became a more professional contract. Today somebody is going to collect the payments. There is a team of local inspectors, who check on certification. Some of them have been trained to go out, install, maintain [systems] and we pay them for this work. [...] [APPTA] institutionalizes [the solar lighting initiative] for the first time this year [...]. Now it is different, because there are different people, trained, they have been going out and giving follow-ups. (W. Rodriguez, personal communication, August 9, 2010, translated from Spanish)

Since these are very recent changes, for example, the technical training was delivered to the group of inspectors four weeks before the interview; it was difficult to assess how this new system will work and what its outcomes will be. However, these changes are important developments that can potentially have a positive impact on

effectiveness of the partnership involving this local partner. The following sections further examine partnership dynamics and partnership outcomes in the studied cases and explain the factors that contributed to partnership effectiveness.

### ***Partnership Dynamics***

The analysis of partnership dynamics in Talamanca identified a set of factors that contribute to an effective partnership, such as: shared values and goals, complementary expertise and capacities, confidence and trust, clear roles and responsibilities, regular and open communication, personality match and continuity of staff. Thus, Christoph Schultz, Projects Director of LUTW, talks about dynamics success factors:

[...] The partnership makes sense because we are trying to achieve the same things and they [partners] have certain skills and capacities to do things that we can't do and we have certain skills, capacities. We complement each other. [...] Functional partnerships are result of essentially communication. [...] Commonalities of business or communication cultures, [...as well as] clear understanding of roles and responsibilities [are important]. (C. Schultz, personal communication, August 8, 2010)

He continues:

It [the ACEM Initiative] is successful because there was a good partnership based on good communication. Sharing ideas on different things, having e-mails go around — there is a lot of communication, which again takes time. A lot of time organizations do not spend enough time because it [communication] takes a lot of time, but it pays off. (C. Schultz, personal communication, August 8, 2010)

The views about the importance of open and regular communication, shared values and goals, and complementary expertise and skills were widely shared by all

partners. In addition, the roles and responsibilities of the international NGOs vis-à-vis the local organizations, as described in the previous sections, were clearly divided and defined in the reviewed contracts, and this appeared to be a contributing factor to the overall success of the partnerships.

In interviews and informal discussions with the international NGOs, LUTW and Y Service Club, and their local partners, confidence and trust was highlighted as a key factor of success. For example, in response to the question about what contributes to the success of the partnership, Isolina Selles Saldana, ACEM Local Coordinator, points out, “[It is] the confidence we [partnering organizations] have in each other and communication” (I. S. Saldana, personal communication, August 7, 2010, translated from Spanish).

The organizations also emphasized the importance of personalities. For example, Walter Rodriguez from APPTA talked about the partnership from the dynamics point of view, “I feel like it always functioned. We have always clicked” (W. Rodriguez, personal communication, August 9, 2010, translated from Spanish). Luis Dumani from ACEM points out, “In my experience, institutional relationships depend a lot on individuals, personalities” (L. Dumani, personal communication, August 6, 2010).

Mr. Dumani also raises a question about what happens if either of the individuals from partnering organizations leaves. Clearly, a continuation of staff appears to be an important factor as relationships take time to build. As respondents indicate, it takes time and effort to build trust and confidence. Furthermore, individuals involved in these partnerships also retain tacit knowledge about their work, which cannot be easily transferred to a newcomer.

Based on this analysis, a set of propositions (1a - g) affecting partnership dynamics as part of the overall partnerships effectiveness was put forward.

**Proposition 1 (a - g): Successful partnership dynamics are associated with:**

- a) **Shared values and goals,**
- b) **Complementary expertise and capacities,**
- c) **Confidence and trust,**
- d) **Clear roles and responsibilities,**
- e) **Regular and open communication,**
- f) **Personality match,**
- g) **Continuity of staff.**

### ***Partnership Outcomes***

The analysis of the partnerships showed that their ability to achieve development outcomes was mainly dependent on four sets of factors, which can be divided into the following categories:

- Local champion,
- Organizational capacity,
- Community involvement, and
- Appropriate technology.

With regard to the local champion and organizational capacity factors, it was critical to the studied partnerships to have an established and committed local partner that had experience with the community members and their trust; developed an effective network in the community; prioritized the renewable energy project in its mission; had

the resources and skills to build necessary capacities for providing the renewable energy services; and was able to institutionalize learning. ACEM was such champion for the partnership. According to interviews with ACEM and its international partners and documentation review<sup>20</sup>, the organization was able to identify the beneficiaries, secure financial resources, hire local staff, train technicians and establish the system of payment collection and address the lighting needs of 10% of target population during the period of two years. This was possible primarily because of the initial capacities of ACEM developed through the successful education program that the organization has been running in the area for almost a decade, and through their full commitment to the solar energy initiative and their ability to prioritize it and allocate resources and staff. As pointed out by ACEM and the international NGOs, the network of tutors as part of the educational program of ACEM has effectively become a solar energy network and was the key asset for the solar lighting project. The tutors/technicians and the local coordinator are from the community and enjoy a great degree of trust from the beneficiaries. Having community trust appears to be important in the success of the project. Isolina Selles Saldana, ACEM Local Coordinator, emphasizes:

Of course, because I had previous contact with the families [from project communities], it helped with communication. People trust me. If it was a foreigner, it would be more difficult. (I. S. Saldana, personal communication, August 7, 2010, translated from Spanish)

Furthermore, as noted during interviews and documentation review<sup>21</sup>, ACEM developed administrative procedures for this project through a contract and receipt

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<sup>20</sup> The documents were comprised of project reports with the statistical information provided by ACEM.

<sup>21</sup> Documentation sources consisted of templates of a contract between ACEM and a beneficiary and receipts.



system. The formal contract is concluded with each user and the official receipts are issued for monthly payments for the solar lighting systems by the users. ACEM also pointed that they built fundraising capacities by preparing several successful grant proposals submitted to the regional donors. According to interviews, ACEM had a committed leadership and paid staff fully responsible for coordination and management of the project. Accountability and transparency were noted by ACEM as key in having trust of beneficiaries, partners and donors. Most importantly, as explained during interviews, ACEM approached solar lighting systems not as the gadget, but as a knowledge, which can be taught, learnt, shared, modified and improved. This conceptualization allowed the integration of this project into their main educational activities in Talamanca. In words of the ACEM Executive Director:

Our mission is to develop capacity. We use education as a tool for development. I did not want just to bring the equipment to a community and that is it. I was thinking how we could combine both things. (L. Dumani, personal communication, August 6, 2010)

ACEM was particularly successful in institutionalizing its learning processes. As Luis Dumani of ACEM notes:

We have a good, identified and proven methodology based on reflection, action and consultation study that we have been implementing for a couple of years already. (L. Dumani, personal communication, August 7, 2010)

Interviews with ACEM representatives explained how the organization is able to learn from what happens and acts based on this learning. ACEM has different spaces and methodology for learning. During bi-weekly meetings the local coordinator and tutors discuss day-to-day matters and reflect upon their work. Every month or two there

is a meeting among all tutors and the Executive Director to reflect and consult about more strategic issues related to advancement of the program. The tutors use “the reflection book” (a report) as a tool for learning and tutoring where every three months they write a report on their learning and reflections.

One example of their learning methodology in practice is the pilot project of ACEM at the beginning of their activities with the solar technology, which was described in interviews with ACEM representatives. The organization started by installing 60 solar powered lighting systems, which revealed some of the weaknesses of the initial system design that ACEM chose to use. The system initially included a solar panel (10 Watt (W)), two white LED lights (1.8 W each), 12 Volt (V) 7 Ampere hour (Ah) battery, switches and wiring. A charge controller, which limits the rate at which electric current is added to or drawn from electric batteries, was not added as ACEM wanted to keep the cost of the system as low as possible. The batteries started failing as people would drain the battery by using extensively the lights. One of the technicians from ACEM explains:

The first project [pilot project] did not include charge controllers and that was the problem. Yorkin was the community, where these systems were installed. Many panels failed because people did not know how long to use the light. When the weather is like today – cloudy, they have to use the lights less. When they do not have [charge] controller, they do not know when they need to turn off the lights and that is the cause of the problem. At that time, many times I went to fix solar panels. Kekoldi was another community [where the systems without charge controllers were installed]. (ACEM technician, personal communication, August 4, 2010, translated from Spanish)

These problems were communicated by the technicians to the coordinator and the discussion started on how to improve the design of the system. A charge controller

was added to the system and users were trained on how to use it. Since this improvement there has not been a single problem reported with the batteries. As one of the ACEM technician notes, “I do not have to go now to fix [solar systems]. [...] After we put charge controllers, I do not receive any complaints” (ACEM technician, personal communication, August 4, 2010, translated from Spanish). From this example it is clear that, if there was no mechanism in place to learn from mistakes and quickly act upon them, the organization would keep installing inferior systems, which could have jeopardized the successful adoption of the technology by the community.

In contrast, APPTA, according to interviews and informal discussions with APPTA and its international partners, while having a network of inspectors as part of its operations as a cooperative, was not able to fully benefit from it. It had difficulty integrating the project into its main activities and prioritizing it. As Walter Rodriguez from APPTA explains:

It has been very difficult to sustain organization because banana price has fallen and there was a lack of market. For many years I tried to get the [solar] project through, but it has not been possible to prioritize it. (W. Rodriguez, personal communication, August 9, 2010, translated from Spanish)

As noted during interviews, the organization enjoys a great degree of the community trust and is much respected among community members. However, there was no paid staff dedicated to engage with the community for this initiative. The interviewees noted that there was also a lack of resources and capacity to deliver effective system for maintenance and repairs of the solar systems. There are some developments, highlighted before, that indicate that the project is becoming

institutionalized, a group of technicians is being trained and a general manager is taking on the role of leader for this project. However, it is too early to predict what outcomes these developments will lead to.

Based on the evidence from the Costa Rica case study, I put forward a set of propositions that relate to a local champion (propositions 2a, b) and organizational capacity that encompasses technological know-how, training capacity, and learning ability (propositions 2 c, d, e).

**Proposition 2 (a - e): Successful partnership outcomes are associated with:**

- a. Partnering with an established local organization that is trusted by the community;**
- b. Partnering with an established local organization with an established community network;**
- c. Partnering with an established local organization that has human resources, finances and skills to train and educate the community about the merits, use and maintenance of the renewable energy system;**
- d. Partnering with an established local organization that is capable of building technological capacity to install, repair and maintain the chosen renewable energy system; and**
- e. Partnering with a local organization that institutionalized learning from doing.**

In the case of ACEM, based on interviews and my observations, community members embraced the projects and were actively involved in these projects and had

strong sense of ownership. I observed the interactions between the technicians of ACEM and beneficiaries during installations in the community of Los Cocos. The technicians carefully listened to the users and were responding to their suggestions with regard to the desired location of the lights and other related matters. After the installations, the technicians returned to the community and encouraged feedback from the users. The users continually provided feedback throughout the course of the project. As indicated in interviews with ACEM staff, the system design, as well as the management of the process, have been changing as the project progressed, which directly accounted for the users' specific needs and suggestions. This leads us to a proposition on community involvement:

**Proposition 2f: Successful partnership outcomes are associated with community participation throughout the course of a renewable energy project.**

As for the technology aspects, the key characteristics that impact the adoption of technologies, confirmed during interviews with the beneficiaries and implementing partners, were related to the appropriateness of the technology in terms of meeting users' needs; technology affordability reflected in the pricing and financing; and technology quality and benefits over the alternative energy sources available in the community. Thus, solar lighting systems were responding to the beneficiaries' need for better lighting services and provided significant advantages in terms of quality of light in comparison to the kerosene lamps and candles that were previously used by the beneficiaries. The systems were evaluated by the beneficiaries as fairly easy to use. The users could observe the benefits from using the new technology. The technology was deemed as affordable as the microfinance payments were set at levels comparable to

what the users used to spend on kerosene and candles before the arrival of the solar lighting system. Furthermore, the payback period was one to two years, after which the system was nearly maintenance and cost free. These findings lead us to the following set of propositions in the appropriate technology category:

**Proposition 2 (g - i): Successful partnership outcomes are associated with:**

- g. Providing technology that meets users' needs and is appropriate to their context;**
- h. Providing technology priced or financed at the same level or below the alternatives available to the community;**
- i. Providing technology that provides visible and superior quality and benefits over the alternatives available to the community.**

Despite the importance of technological aspects, what came out strongly from the Costa Rica study is that technological diffusion is very much about capacity building and knowledge. As Brian Minielly, President of Owen Sound Y Service Club, points out:

What we are doing is building human capacity and transferring knowledge and skill and vision and raising expectations and building their [communities'] capacity to take it over and run with it and helping them find that there are a lot of things they can do – that they have the resources and that they have the intelligence. All they need is a chance and maybe some technical help from somebody who has done it before to help them see that possibilities are there that they had not considered before and go with it. That means that you do not just dump technology in the community. You bring technology if you can have the resources to bring the technology, but it is more important to bring the support for the people and their growth and development as individuals and as communities. [...] Development is something that has to be defined in

terms of people you are working with and you are working for. (B. Minielly, personal communication, August 4, 2010)

This Chapter focused on the Costa Rica study highlighting the context of the studied partnerships and describing the actors involved in these partnerships, their roles and linkages. Also, partnership drivers and challenges were presented. The discussion focused on indentifying factors that are associated with successful partnership dynamics and successful partnership outcomes in the studied cases. These factors were presented through a set of theoretical propositions, which fed into the Peru study. The study of development partnerships in Peru is presented in depth in the next Chapter.

## CHAPTER FIVE: EXPLORATORY CASE STUDY IN CAJAMARCA, PERU<sup>22</sup>

### Background

Cajamarca is a region in Peru located in the northern part of the country, which borders with Ecuador. It is located in the Andes Mountain Range and partly in the Amazon Rainforest. Total population is more than 1.4 million people. Cajamarca is the third poorest region in Peru with the majority of people (64.5%) being below the poverty line and living on less than \$2 USD per day (INEI, 2007). The population is predominately rural in nature, involved in subsistence agriculture, agroforestry and animal husbandry (Bury, 2004). Rural dwellers grow potatoes and other Andean tubers (*oca*, *olluco*), barley and broad beans, crops like *mashua* and *chocho*, or *chugur* (lupine) and also raise sheep and pigs, guinea pigs, chickens and rabbits mainly for own consumption (Love & Garwood, 2011). Many villagers grow cattle for milk production, which is an important income source for farmers of Cajamarca (Pradel, Yanggen, Polastri & Leon-Velarde, 2005). About three quarters of all produced milk is sold by farmers to Nestlé or Gloria S.A. and the rest goes to the small dairy processors, mainly cheese makers (Garcia & Gomez, 2006).

Cajamarca is also a host to Yanacocha, owned by United States' Newmont Mining Company, which is one of the largest and most profitable gold mines in the world. When the mine began its operations in 1992, it held a promise of improved economy, increased employment and better infrastructure in the region. However, as operations started to expand the negative impacts began to prevail (Herz, Sohn & La

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<sup>22</sup> Parts of this Chapter and some images appear in Platonova (in press). Copyright 2012, IGI Global, [www.igi-global.com](http://www.igi-global.com). Posted by permission of the publisher.



Vina, 2007). Jeffrey Bury (2004), who researched the impacts of Yanacocha on the livelihoods of communities in Cajamarca, concluded that, while the produced and human resources increased as a result of the mine, though not evenly, the access to natural and social capital resources declined.

Many people in Cajamarca region lack basic infrastructure, such as access to water and sanitation. Cajamarca also has the lowest electrification rates in the country with about 60% of population lacking access to electricity (Ferrer-Marti et al., 2010). Countrywide, the electrification rates have improved over the years rising from 56.8% in 1993 to 76% in 2003 (Kozulj, Di Sbroiavacca, Dubrovsky & Bravo, 2005). However, with 6 million people still without access to electricity, Peru has one of the lowest electrification rates in Latin America. More than 84% of rural households in Peru use firewood for cooking, about 60% rely on candles and kerosene for lighting, and 74% use dry cell batteries for small appliances such as radios and flashlights (Meier, Tuntivate, Barnes, Bogach & Farchy, 2010). About 11% use car batteries for electric appliances (Meier et al., 2010). In the province of San Pablo (one of 13 provinces in the Cajamarca region) where my study took place, only 13.6% of population are connected to the electric grid. The villages are very dispersed, isolated and poor, making electric grid extension difficult and unaffordable. However, there is a relative abundance of renewable resources in this area, such as wind, water and solar, which makes these communities good candidates for the decentralized renewable energy systems. Practical Action Latin America has been working in the area since 1985 providing sustainable infrastructure to these communities and promoting their development.

### **Practical Action Latin America<sup>23</sup>**

Practical Action (formerly known as the Intermediate Technology Development Group) is an international NGO founded in 1966 by the economist and philosopher Dr. Ernst Friedrich "Fritz" Schumacher, the author of the influential book *Small is Beautiful: Economics as if People Mattered*. Schumacher's ideas and philosophy around “intermediate technologies” responding to people’s needs in developing countries continue to inspire Practical Action’s work, whose vision is a world free of poverty and injustice, in which technology is used to the benefit of all. Its mission is to use technology to address poverty, working with poor people to build their capabilities, improve their access to technical options and knowledge, and help them influence the social, economic and institutional systems for innovation and use of technology.

Practical Action is based in the UK, with the total staff of 520 people, and works in more than 40 countries with offices in Kenya, Zimbabwe, Zambia, Peru, Bolivia, Sudan, Nepal, Sri Lanka, India, and Bangladesh. The organization works in four broad priority areas: reducing vulnerability, making markets work for poor people, improving access to infrastructure services and responding to new technologies. Energy is one of the sectors under infrastructure services where Practical Action has built an international reputation as a global leader in promoting sustainable energy services to the poor around the world. The organization launched POWERFUL, a group of energy companies and finance institutions that develop solutions to energy poverty. It also published *Poor people’s energy outlook 2012: Energy for earning a living* report, which focused on energy poverty and presented the goals for universal energy access from

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<sup>23</sup> This section is based on Practical Action (n.d.) and Practical Action Latin America (n.d.)

sustainable sources. Practical Action is also active in campaigning and policy work, which has been recognized by the UN.

Practical Action Latin America (in Spanish – Soluciones Prácticas) is a regional office of Practical Action for Latin America based in Peru since 1985, which has greatly contributed to the reputation of the organization as a leader in sustainable energy for development. The organization developed and applied innovative delivery models and financial mechanisms to implement renewable energy solutions in remote rural communities. Working in partnership with communities, municipalities, NGOs, and other organizations it promotes local development by providing energy for residential and productive uses in communities, as well as for schools, churches, community centres and health clinics that are not connected to the electric grid. Since its inception in 1985, around 60 mini- and micro-hydro power stations and over 60 small wind generators have been installed in Peru and in other countries in the region benefitting over 6,200 families (over 30,000 rural people). The organization has also developed expertise in and installed solar, wind and bioenergy technologies. It established the Center for Training and Demonstration of Appropriate Technologies (abbreviated in Spanish as CEDECAP), which serves as a training, demonstration and excellence centre on renewable energies and information and communication technologies (ICTs) located in Cajamarca, Peru. The organization coordinates the Latin American Hydro Energy Network (Hidrored) and is responsible for organizing the *Latin American Conferences on Small Scale Hydro Energy Use* every two years. It also publishes the journal *Hidrored* with over 700 subscribers from around the world. A total of 70 publications on renewable energy and basic services for rural development have been developed and

disseminated. This work has been widely recognized through prestigious awards, including the 2008 UNEP Sasakawa Prize for making a substantial contribution to the protection and management of the environment, and the 2007 Ashden Award for its work using micro-hydro to bring electricity to remote villages.

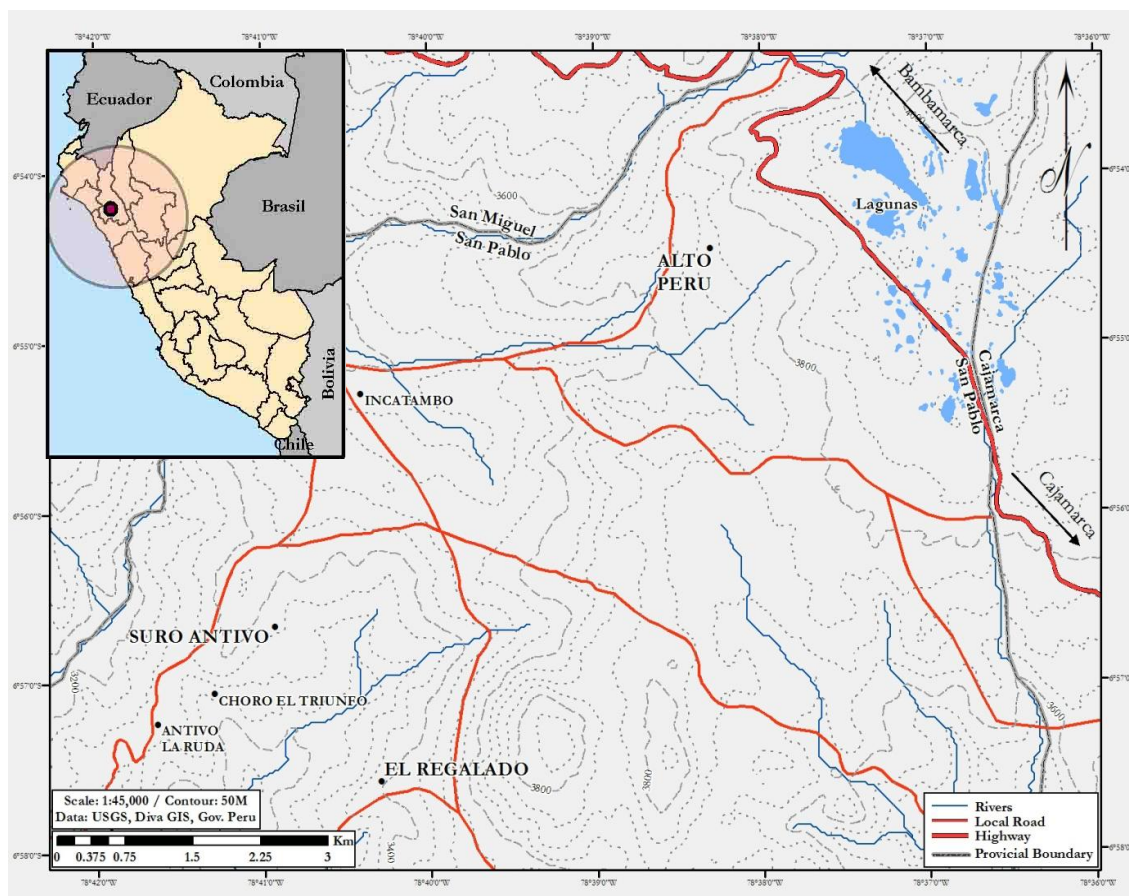
### **Communities Involved in the Study<sup>24</sup>**

During my field work I focused on three communities, which were electrified by Practical Action with the renewable energy technologies: Alto Peru, Suro Antivo and El Regalado. All three are situated in the district of Tumbaden, San Pablo province of Cajamarca region (Figure 8) and are not connected to the electric grid. The three communities are located in the northern inter-Andean valleys of the Peruvian Andes at high altitudes ranging from 2500 to 4000 meters above sea level (m.a.s.l.) with Alto Peru being situated the highest among three communities. The climate is defined by two seasons: the rainy season between December and May, and the dry season – accompanied by winds of greater intensity – between June and November. The temperatures range between 10 °C and 22 °C. The communities are rural in nature and their productive activities include livestock, agriculture, and services. Of these, agriculture and livestock are the most important activities. Using traditional practices and tools, people grow mainly potatoes, barley, and beans for own consumption. They raise cattle primarily for the milk production and also grow sheep, pigs, guinea pigs, chickens and rabbits for personal consumption. Milk production is often the main source of income. Villagers also raise horses, but mostly for transporting goods. Some people also work in the Yanacocha gold mine.

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<sup>24</sup> Background information on communities is primarily based on Soluciones Prácticas (2010), Soluciones Prácticas (2009), and Soluciones Prácticas (2008).

Figure 8. Map of the Studied Communities



Source: Platonova (in press)

Notes: Map is courtesy of John M. Steed

Education levels are generally low. For example, in Alto Peru only 26% of people have completed primary school. El Regalado has the highest education rates of the three studied communities. Generally, rural women tend to have lower education levels than men. Families lack access to basic services, such as water and sanitation. Before Practical Action became involved there was no access to electricity in these communities. Most people relied primarily on candles for lighting and dry cell batteries to run small radios and flashlights. In some cases, kerosene, car batteries, gas lamps and small generators were used to address the energy needs. The average monthly

expenditure of a family on candles and batteries combined amounted to 12.98 Peruvian Nuevo Sol (PEN) (or \$4.7 CAD<sup>25</sup>) in Alto Peru, 10.88 PEN (or \$3.9 CAD) in Suro Antivo and 14 PEN (or \$5 CAD) in El Regalado. The monthly income fluctuated throughout the year reflecting the seasonality of agricultural activities, but averaged at about 200 PEN (\$71.6 CAD) – 300 PEN (\$107 CAD) per month.

Among the three communities Alto Peru, located at 3800 m.a.s.l., has probably the most complex geography and is the most spread out. Out of a total of 85 households (345 inhabitants), 31 households are more densely located in the upper part of the community, while 54 homes are widely dispersed in the lower part. The renewable energy project started in 2009. It is a technologically complex project and includes three different types of energy systems: individual solar panels, wind turbines and pico-hydro (2 kW). As indicated during interviews with Practical Action representatives from Cajamarca office, these technological choices have been largely influenced by the diverse geography of the community and by the type of renewable energy resources available locally. Renewable energy systems provide energy to families, the school, the church and the health clinic, which serves four communities: Alto Peru, Quebrada Honda, Las Lagunas, and Morowisha (Photo 4).

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<sup>25</sup> Using OANDA currency exchange service at [www.oanda.com](http://www.oanda.com), foreign currency exchange rates for the dates of field work have been applied.

Photo 4: Renewable Energy Uses in Alto Peru



Notes: upper left photo – wind powered church and homes (source: Platonova (in press)); upper right – solar powered home; lower left – hydro-powered local school; lower right – a medical doctor with the hydro-powered computer in health clinic.

Suro Antivo has about 60 families with total population of 203 people. The energy project started in 2010 and micro-hydro system started running in spring, 2011 (Photo 5). Prior to that, Practical Action has been working in the community on a water project, which was completed in 2009. According to interviews, after the water project, the community came forward requesting a micro-hydro project. A micro-hydro system of 25 kW was installed to provide energy to families, the school, and a local store.



Photo 5: Renewable Energy Uses in Suro Antivo



Notes: upper left photo – hydro-powered local school (source: Platonova (in press)); upper right – hydro-powered lighting in the local school; lower left – a local woman in a hydro-powered local store; lower right – hydro-powered computer in the school.

El Regalado is a community of 60 families. The renewable energy project started in 2008. The 12 kW micro-hydro energy system powers homes, schools and local businesses (carpentry workshops) (Photo 6). The system also provides energy to the health clinic, which serves six surrounding communities. The high school attracts students from many neighbouring villages.



Photo 6: Renewable Energy Uses in El Regalado



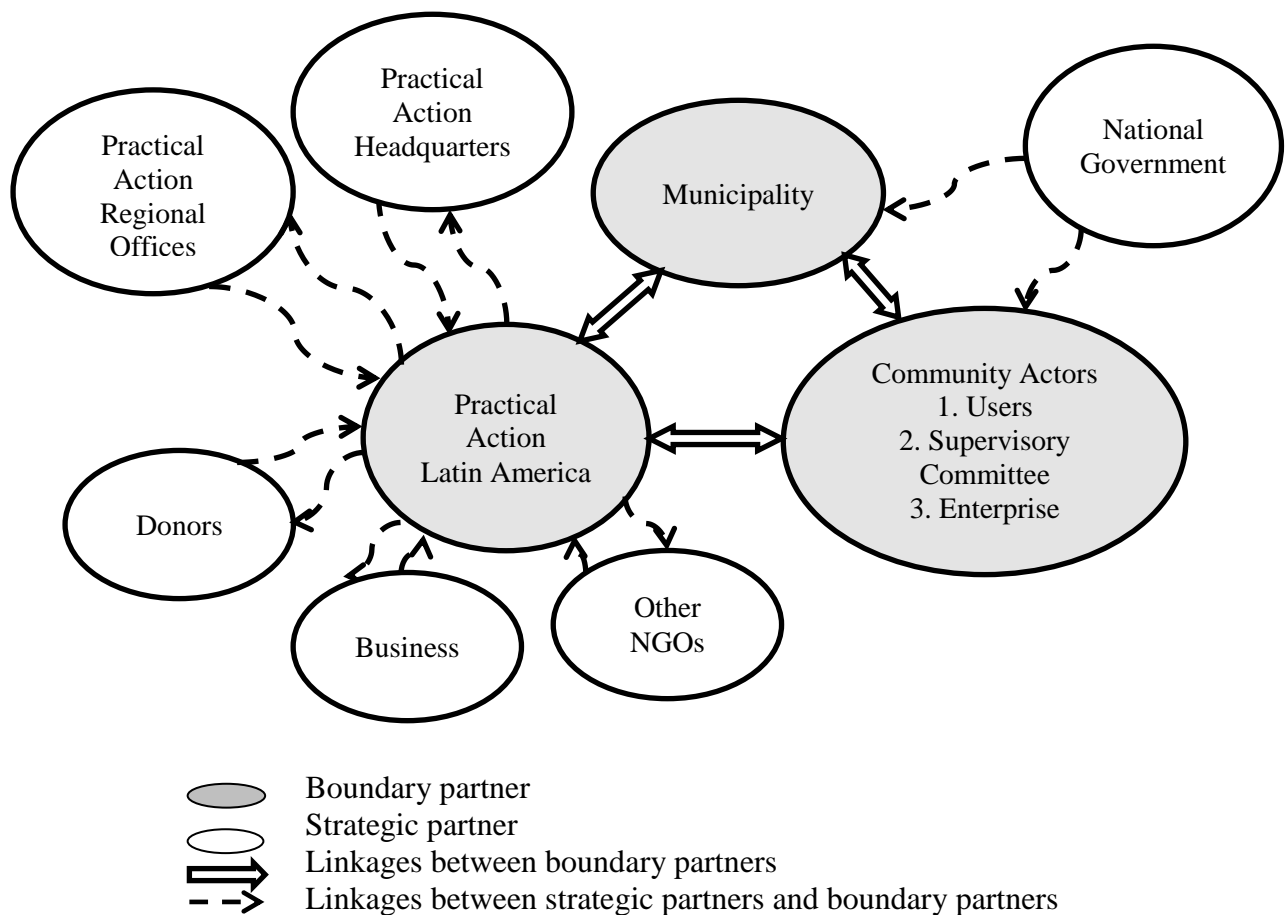
Notes: upper left photo – the view of the village; upper right – hydro-powered carpentry workshop and the owner (source: Platonova (in press)); lower left – hydro-powered computer in the school; lower right – hydro-powered equipment in health clinic.

## Nature of Partnerships

### *Actors and Linkages*

The innovation system approach is applied to map out the actors: the boundary partners that constitute the development partnership and strategic partners, and their linkages (Figure 9).

Figure 9: Map of Actors and Linkages in Development Partnerships in Cajamarca, Peru



Source: Platonova (in press)

Practical Action, an international NGO, is imbedded locally through a regional office based in Peru. Practical Action Latin America is registered under the Peruvian laws and enjoys a great degree of independence from the headquarters in the UK. According Rafael Escobar, Head of Energy, Infrastructure and Basic Services for Practical Action Latin America, the Lima office raises about 70% of its income through their own efforts from bilateral, multilateral and other donors in Peru and outside who are identified as strategic partners in the partnership map (Figure 9) (R. Escobar, personal communication, September 1, 2011). Other strategic partners include

businesses who supply technology and components for the projects. As revealed during the documentation review and interviews with Practical Action representatives in the UK and Peru offices, the headquarters play a supportive role in areas of strategic planning, international exchange and learning, policy influence, and fundraising. There are other regional offices highlighted in Figure 9 with whom Practical Action Latin America engages in sharing and exchange of learning. Regional offices partner with other NGOs, both international and local, for example, in the Peru case, Green Empowerment (US) and Engineers without Borders (Spain), on specific projects. The regional office in Peru is based in Lima and has local offices in Cajamarca, San Martin, and Cusco.

Having satellite offices enables the organization to be in close proximity to the target communities and local partners to better manage the projects. Based on interviews and observations during the field trip, it appears that the character of interventions required for the sustainable provision of energy services to remote rural communities is such that it necessitates the presence of a locally embedded champion, like the Practical Action local office in Cajamarca, that is recognized and trusted by the local communities and other local partners and who understands well the local context for technological innovation and its diffusion. Furthermore, as indicated by Practical Action Latin America representatives, capacity building and other project related activities require regular trips to and interactions with local communities, which would be too costly, time consuming and logistically challenging to perform from the Lima office and even more so from overseas. Thus, Mr. Walter Mantilla Silva, who is managing Practical Action energy projects in Cajamarca, explains:

It [working from outside Cajamarca and Peru] is complicated, because Peru is geographically and culturally very diverse. When you live in the place it is different. People that live and work here know better the realities of people here. It can be more expensive to implement projects from outside. (W. Mantilla Silva, personal communication, September 9, 2011, translated from Spanish)

Practical Action's boundary partners are community actors, which include users of services, a supervisory or oversight committee and an enterprise, which is created at the community level to operate, maintain and service the energy system. According to interviews with representatives from Practical Action Latin America, in most community-based projects the organization works closely with municipalities, however, not all projects include local government actors. It was pointed out that involvement of a municipality depended among others on the relationships between the given municipality and its constituents, and municipality's willingness to engage in the projects. Mr. Escobar also notes that there are cases where Practical Action will work with the individual entrepreneurs directly and without municipality's involvement (R. Escobar, personal communication, September 1, 2011). The projects studied were community-based and included a municipality. The partnership model involving municipalities was the focus of this study.

National government actors are not directly involved in the studied partnerships, however through the policies and regulations they influence the environment in which partnerships operate. They work closely with municipalities. As indicated by the boundary partners, there is potential for yet more collaboration with and involvement from the national government side. They also note that there is demand for policies, which will promote provision of sustainable energy services to rural Peru. For example,

Teodoro Sanchez, the Energy Adviser with the UK office of Practical Action with extensive prior experience in the Peru office, points out that there are energy cross-subsidies for consumers; however, they are not available to poor consumers in the villages relying on the decentralized energy systems, such as, micro-hydro, solar or wind systems installed in the communities visited during the study (T. Sanchez, personal communication, September 22, 2011). He explains that this is because subsidies only reach the regulated sector, whereas community initiatives are not regulated through a public agency.

Based on documentation review<sup>26</sup> and interviews with the respective partnering organizations, each boundary partner in the studied partnership model in Cajamarca, Peru is presented below.

**Practical Action** uses a well developed methodology to evaluate the resources in the community and determine the most suitable energy options. This methodology includes an in-depth socio-economic assessment (diagnostic study) of the communities, which focuses on their geography, natural resources, local economy, current energy use, and social structures. The organization provides technical expertise and financial resources for the projects. It builds human capacities in technology, administration and management of the energy systems at three levels: leaders of the community, users and technicians. The organization is actively engaged in the community from the outset and throughout the design and implementation stages of the project. Practical Action remains the owner of the system until the formal transfer of the ownership to the

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<sup>26</sup> Documentation sources consisted of Practical Action diagnostic studies: Soluciones Prácticas (2010), Soluciones Prácticas (2009), and Soluciones Prácticas (2008); and copies of agreements between the partnering organizations.

municipality takes place. After the transfer, Practical Action continues in an advisory role and can be consulted when needed. The organization signs agreements with both the community actors (presented below) and the municipality. These agreements clearly spell out roles and responsibilities of the involved partners.

**The Municipality** at first participates by co-financing the project. The amount varies from case to case. In the studied projects the contribution was about 20%. Sometimes it can be more, as high as 80%, sometimes less or even zero. After the implementation and the transfer of ownership, the municipality becomes the legal owner of the energy systems and signs a contract to supervise the system management. To do the oversight, the municipality creates a technical unit to conduct the monitoring of the systems. In the studied projects, the municipality of Tumbaden was involved.

**The Supervisory Committee** oversees the energy service delivery in the community. It is formed by the representatives from the community authorities, the enterprise and the users. The committee ensures that the responsibilities and obligations are met by all actors involved in the service provision. It also deals with the complaints from the users or conflicts between parties, if such complaints and conflicts are to happen.

**The Rural Electrical Services Enterprise** (hereafter, “the enterprise”) will usually include two people from the community: an operator and an administrator, who are trained by Practical Action local office in Cajamarca to operate, maintain and administer the energy systems. These people are chosen by an evaluation committee composed of the community authorities, a representative of the municipality, and a service user chosen at a meeting of users. Practical Action can also participate in the

selection process, but ultimately the community endorses the candidates. The enterprise collects the payments from the users for energy service in the form of a tariff, which is deposited in a bank account. A portion of the payments covers the salary of the operator and administrator and the rest is kept in the fund for repairs and maintenance of the system. The enterprise signs the contract with each user, in which the enterprise commits to deliver a renewable energy service. The contract also specifies the billing process. The electricity service contract is standard and is applied equally to all users. The enterprise also signs the contract with the municipality, which clearly stipulates responsibilities and roles of all parties involved. Samples of the above-mentioned contracts translated into English can be found in Sanchez (2006).

### ***Drivers***

As indicated during interviews with Practical Action, the community enterprise members, and the municipality, the primary driver for the partnering organizations is the provision of energy for community development. There are clearly government and market failures to address the energy needs of the rural villages in Cajamarca. The communities are very remote, dispersed and poor, which makes grid extension either very difficult or in some cases not feasible. Rafael Escobar, Head of Energy, Infrastructure and Basic Services for Practical Action Latin America, points out:

There are approximately 6 million rural people with no energy. [...] In theory, 4 million could be reached by the grid, but there are 2 million so far in the jungle or in the mountains that it will be impossible to reach them through the grid and they will need some local renewable energy. (R. Escobar, personal communication, September 1, 2011, translated from Spanish)

As revealed during interviews and observations, there is a significant amount of technological, human and financial resources that go into renewable energy based rural electrification projects, which necessitate involvement of organizations that complement each other by bringing needed skills and resources. Practical Action brings technical and financial resources and builds necessary capacities to ensure sustainability of the interventions. As indicated earlier, capacity building and a participatory approach are at the core of Practical Action work, which drive the relationship with the community actors and other partners. According to interviews with Practical Action staff, enterprise members and beneficiaries, community actors are actively involved through all stages of the project starting with its planning. They bring in-kind support through labour and materials, financial contributions, and human resources. The municipality provides financial and institutional support and, with the transfer of the ownership of the systems, eventually becomes fully responsible for the project.

Walter Mantilla Silva explains that, at first, Practical Action worked more directly with the communities (W. Mantilla Silva, personal communication, September 9, 2011). He notes that the municipalities became involved a decade ago and the relationship intensified about four years ago. The reason for that is, as part of the Peruvian decentralisation policy, municipalities received more responsibilities with their constituents and budget to attend to their needs and, therefore, it became possible to engage with the municipalities more intensely (T. Sanchez, personal communication, February 12, 2012). There was also a shift within Practical Action Latin America from demand-driven individual projects scattered around the country to concentrating projects geographically and involving municipalities in these geographic regions (R.



Escobar, personal communication, September 1, 2011). Mr. Escobar explains that such concentration or clustering allows for larger impact and scale to take place. He says that it is also a more affordable approach for both the communities and implementing organizations, easier to measure impacts, allows for more rapid changes to take place and creates more political influence and visibility (R. Escobar, personal communication, September 1, 2011).

Why involve municipalities? Mr. Mantilla Silva gives three main reasons for involving municipalities (W. Mantilla Silva, personal communication, September 9, 2011). First, municipalities are the principal and permanent institutions involved with the communities. They not only provide needed financial and institutional support, but can also facilitate policy changes that can promote renewable energy based rural electrification in isolated off-grid communities. Secondly, the municipalities' goal is community development, and energy work allows them to meet this goal. Thirdly, involvement of municipalities is likely to increase the profile of projects and attract other organizations, for example, other NGOs, and private companies.

### ***Challenges***

As observed during field work and based on interviews with Practical Action, the community enterprise members, and the municipality, rural electrification work is a very complex undertaking and participating actors face numerous challenges. First of all, there are financial constraints. As Teodoro Sanchez explains, even though international attention to energy poverty is growing, there is insufficient funding available to provide energy to the poor (T. Sanchez, personal communication, September 22, 2011). There is a lack of public funding for rural energy as well, as rural

people are not on the country's priority list. He considers it the biggest challenge to providing universal energy access. Gilberto Villanueva Vigo, who is leading Practical Action's Cajamarca office, echoes this sentiment by saying:

It is difficult to find financing. We are getting funding through external resources, now we have more financing through local government. But getting financing through national government is very difficult. (G. Villanueva Vigo, personal communication, September 6, 2011, translated from Spanish)

Also, as pointed out during interviews, the external funding the organization relies on is declining. It is noted that external help is decreasing, because Peru's economic indicators are improving. However, the situation in many rural communities is worsening, which is not reflected in macroeconomic indicators.

Then, there is a range of issues related to the operational and logistical complexities surrounding energy provision in the remote rural communities. As observed during my field work, the geography is very challenging. Communities are remote and dispersed, and due to lack of basic roads, access is difficult. Furthermore, you cannot simply parachute technology into the community and leave. As Teodoro Sanchez points out, "You need to build an environment of sustainability" (T. Sanchez, personal communication, September 22, 2011). It is important to bring the technology, but what is also important is to build local capacity, engage community, train people, and create institutions. It is critical, as Mr. Sanchez puts it, "to embed the knowledge and [...] really establish sustainability, not only in the project itself, but in the surroundings" (T. Sanchez, personal communication, September 22, 2011).

As indicated during interviews, this takes time and effort. Community needs to be educated about energy and how to operate and maintain the system. Institutions in the community need to be built to manage, operate and maintain these energy systems. The difficulty is that often a mindset change needs to take place for people to embrace the project and make it work. Benito Rafael Ramirez Ocas, who coordinates Practical Action energy projects in Cajamarca, explains that people in rural communities in Peru are not used to paying for services (B. R. Ramirez Ocas, personal communication, September 6, 2011). They have never been in the situation of paying monthly bills for energy or water. According to Ocas, some people will say: “Why should I pay for water if it is given by God?” (B. R. Ramirez Ocas, personal communication, September 6, 2011, translated from Spanish). People need to have it explained to them that they can save money with the new technology and that it offers clear benefits over candles and other energy sources they used before.

As for working with the municipality, one of the challenges is the frequent turnover of elected officials every four years. The transition impacts the ongoing partnership with the municipality as it takes time and effort to build trust with newly elected officials. Mr. Mantilla Silva describes the effects of the turnover due to election:

For example, a year ago we had elections. That stopped the work. With new people coming to power, we needed to start over again, making presentations etc. – building trust. (W. Mantilla Silva, personal communication, September 9, 2011, translated from Spanish)

However, the positive legacy of Practical Action in the region helps with this process. Mr. Mantilla Silva explains: “The new people coming see the successes of our work. So it makes it easier for us to show our work to new officials” (W. Mantilla Silva,

personal communication, September 9, 2011, translated from Spanish). As indicated during interviews, community changes, for example, of community leaders, also influence the dynamics of the partnership and so will any existing or past tensions between community and municipality unrelated to the energy project.

Uncertain grid extension plans also can negatively impact the outcomes of the partnerships. Each project is a significant investment in money, time, and effort; “then the grid arrives and kills the project” (G. Villanueva Vigo, personal communication, September 6, 2011, translated from Spanish). Therefore, involving a municipality and also working closer with other levels of the government can be important as the grid extension plans can be clarified earlier and if the grid arrives, the renewable energy systems can be moved to some other off-grid communities in their jurisdictions.

There are also technological challenges. The respondents from Practical Action note that, while they have done a lot of work with small wind turbines, this technology is still not entirely reliable based on their experiences in different developing countries. They emphasize the need for more technological research to make these turbines work better, however, it is getting a lot harder to do it as the funding in this area is declining. The problems with wind technology were also mentioned during my visit to Alto Peru. Furthermore, the hydro system in the village was temporarily not working as there was not enough water to run the system over the period of several months. This was an unprecedented occurrence as there was always sufficient and regular water supply through the stream in the past. Some respondents related this occurrence to climatic changes in the region.

## Partnership Effectiveness

As in the case of Costa Rica, the analysis of the Practical Action partnership effectiveness in Cajamarca utilized the effectiveness measures of partnership dynamics and partnership outcomes presented in Chapter 2. In contrast to the Costa Rica study where different partnerships were compared, in Peru, the focus was on the development partnership model developed by Practical Action Latin America and applied in the projects in Cajamarca. The Practical Action partnership model scored high on all measures and presented as a well-developed and functional model to deliver sustainable renewable energy services in the communities (Table 5).

Table 5. Effectiveness of Development Partnership Model in Cajamarca

<i>Effectiveness Measures</i>	<i>Practical Action Initiatives in Cajamarca</i>
PARTNERSHIP DYNAMICS	
Partner satisfaction with the goal achievement	+++
Partner satisfaction with the relationship	+++
Financial benefits	+++
Reputational benefits	+++
Technological benefits	+++
PARTNERSHIP OUTCOMES	
Goal achievement	+++
Development reach	+++
Benefits to users	+++
Project sustainability	+++

Notes: +++ High; ++ Moderate; + Low

Despite the many challenges that energy provision work faces in these difficult geographic and economic contexts, overall, partnering organizations expressed high satisfaction with their joint efforts. More projects are on the go and, as indicated during interviews with the new mayor and the managers in the municipality of Tumbaden, the municipality is satisfied with this partnership and is committed to support and accept responsibility for these projects. Community actors indicate that they are satisfied with the partnership and are committed to the success of the projects. Interventions are undertaken to build sustainability around those projects. Through the creation of institutions and training of the community leaders, technicians and users, capacities are built in the community to operate, maintain and manage the renewable energy system.

According to the Practical Action's documentation on installations and the number of the users that signed up for and continued paying for the renewable energy service, the sustained use of the technology after the initial adoption and up to the time of my field work was close to 100%, which means that almost all users who initially signed up for the renewable energy service continued using it. With regard to the studied projects, as explained later in this section, it was too early in the process to talk about the long-term sustained use. However, the external evaluations of other Practical Action projects in Peru reviewed during this research provided evidence of the long-term sustained use of the technology in other communities that received renewable energy services over a decade ago. The development reach of Practical Action in Peru is very high, around 30,000 beneficiaries. In this case, we can also talk about the high scalability of the work since it has been replicated in numerous communities in Peru and beyond.

The benefits to users in the three communities I visited are already becoming apparent. First of all, beneficiaries point to the improvements in quality of light they get, which enables studying. Teachers in schools are able to better prepare for classes and better teach aided by the audio-visual equipment, TV and computers. As a teacher in the Suro Antivo school stated:

We are very happy because we can prepare better for classes and also boys and girls are happier because recently we bought a new computer and we can prepare better for students. (Local teacher in Suro Antivo, personal communication, September 8, 2011, translated from Spanish)

A high school teacher in El Regalado points out:

Usually houses are very dark, not very good for studying by children or students. With the light they can study better. We see increase in studying. The classrooms are with small windows. So we are happy to have light. We also use light during the day as it increases visibility. [...] The students learn how to use computers, DVD, TV. They can elaborate different diagrams, they can study better in the evening. (High school teacher in El Regalado, September 8, 2011, translated from Spanish)

Providing energy to health clinics invariably improves the ability of the medical staff to provide health care services. A doctor working in the Alto Peru health clinic explains:

Before, when we did not have energy, we worked six hours in the mornings. Now we have it [energy] all day. Before the energy arrived, technician told me that there were big problems. If they needed to produce documents it would take a lot of time because there was no computer. Now it is better, because we can use the computer and we can do everything easily. If there was an emergency in the evening they needed to use candles or kerosene. Now we have lights and we can do better examination. (Doctor in Alto Peru, September 7, 2011, translated from Spanish)

The doctor also adds that having access to energy allows the clinic to obtain other necessary electric equipment from the Ministry of Health – “When you have energy, you can open more doors”, she concludes.

Beneficiaries emphasize that they can communicate better because they can charge their cell phones, some people bought TVs, music players and other household electric appliances (e.g., refrigerator, iron). People are satisfied with the new energy service and even save money, as often they pay less for the renewable energy service than what they used to pay for inferior energy services by using candles, kerosene and batteries.

The energy service also boosts local businesses. In El Regalado, a local carpenter describes the arrival of hydro as “a total change of life” (Carpenter in El Regalado, personal communication, September 8, 2011, translated from Spanish). He used to spend about 150 PEN (equivalent of around \$54 CAD) per month on both a generator for his carpentry and energy for the house and now, with the hydro system, he pays only 25 PEN (or \$9 CAD) per month. Even when he needs to supplement his energy needs with his generator, the savings with the new system are considerable. He also notes that before he had to work more with his hands, now he has bought additional electrical equipment, for example, for polishing, and makes more money overall.

The projects this research focused on were only a few years old and at different stages of completion, thus, it is early to evaluate the full impact on the community and determine how sustainable the work will be in the long run. Previously, the partnership model applied in the studied cases was used in other communities in Peru with positive



and lasting impacts on wellbeing of the recipient communities over time as documented by the external evaluations reviewed during the study.

### ***Partnership Dynamics***

The factors affecting effectiveness of working together among partners that were identified in the Costa Rica study (propositions 1a - g) and those found in the partnership management and development literature as discussed in Chapter 2 were the probes used during data collection and analysis on partnership effectiveness factors in the Peru case. The analysis of partnerships dynamics in Cajamarca confirmed a set of factors from the Costa Rica study (propositions 1a - g) that contribute to an effective partnership, such as: shared values and goals, complementary expertise and capacities, confidence and trust, clear roles and responsibilities, regular and open communication, personality match and continuity of staff.

The partners confirm that improving access to basic energy services for community development is the common cause that unites and drives them. As revealed during interviews, each partner brings the resources and skills that are complementary and necessary to bring the projects to their successful fruition. The importance of effective communication among partners cannot be overemphasized. Practical Action reports that it is in regular and open communication with both community partners and the municipality throughout the various project stages. Thus, Percy Tafur Herrera, Municipal Manager with the municipality of Tumbaden, who is responsible for renewable energy projects, talks about the relationship between the municipality and Practical Action:

I think at the moment it is a very good communication, understanding. Practical Action has very well prepared personnel to help people. [...] We coordinated a lot, because now we have many agreements with Practical Action for the past year. Therefore, we continue the work [after election] that was developed by Practical Action and municipality here. (P. Tafur Herrera, personal communication, September 9, 2011, translated from Spanish)

Eli Roger Coba Herrera, Operator from the Suro Antivo enterprise, comments on communication with his partners: “I have no problems in communication with the municipality and Practical Action. The three of us [the enterprise, the municipality and Practical Action] work so well together” (E. R. Coba Herrera, personal communication, September 8, 2011, translated from Spanish).

Partners trust and can rely on each other. The long history of development work in the region by Practical Action, being committed and delivering on promises, help in building trustful relationships with partners. The second governor in Alto Peru points out:

At first we knew that there was an organization, Practical Action, helping people with energy, and then we went to a mayor in Tumbaden and spoke to him about needing help in this area. Practical Action came and studied the area and identified the best energy options for the community. [...] We also call Practical Action if there are problems. They always come if we need them. (Second governor in Alto Peru, personal communication, September 7, 2011, translated from Spanish)

Beneficiaries also point out that they like the fact that the community-based partners, such as the enterprise and the Supervisory Committee are from the community and are being selected with the involvement of the community. Beneficiaries regularly pay for the service, which also shows their confidence in the enterprise responsible for managing the renewable energy system and providing adequate services.

The participatory approach, which is promoted by Practical Action, helps to build the confidence and trust with the community and among community partners. Community is involved from the beginning of the projects. Theo Schilderman, the Head of Infrastructure Program, Practical Action, UK office, points out:

The other thing [in addition to capacity building] that is very important to us is participatory approach. We like to think in terms of planning projects with the beneficiaries, prioritizing with them. They [regional offices] do it in a slightly different ways in different projects and certainly in different countries, but the principle of it, that you need to do it to build good partnerships, is there. How you implement it then, there is some local variance in it. (T. Schilderman, personal communication, September 23, 2011)

Benito Rafael Ramirez Ocas from Practical Action explains the process of engaging the community members in Cajamarca:

After we identified the community and conducted evaluations, we engage the community. We need to work together with the people. We do not have results if we work without people. At the beginning we talk to the community and build their capacity and understanding of renewable energy. First thing is training. We make contact with leaders in the community. We need to stay within the community for several days to identify leaders. We balance social and technical aspects. The sociologists work with the community. Women are more open than men to work on the project. After, we meet to establish the objectives. Usually, when we have a meeting, we have a book where we write down all the agreements and, at the end, all of the community signs. We help the community, but also ask them to help us, not with money, but in-kind contributions: labour and materials. We work together. (B. R. Ramirez Ocas, personal communication, September 6, 2011, translated from Spanish)

Respondents also note that personal dynamics impacts the partnerships and as established contacts from partnering organizations leave, it affects the dynamics of the partnership. As stated earlier, the most significant impact related to the staff turnover was indicated in relation to the election turnover in the municipality. Hugo Eduardo

Saldana Cubas, from Practical Action in Cajamarca, who is responsible for projects in Alto Peru and Suro Antivo explains:

The last period [before election] was OK, we were working with the [outgoing] mayor. At this moment, because there is a new mayor, we need more work to build relationships. Elections were in October last year, and in January this year the new mayor came in. (H. E. Saldana Cubas, September 5, 2011, translated from Spanish)

### ***Partnership Outcomes***

The set of factors identified under partnership outcomes in the Costa Rica study (propositions 2 a - i) served as probes in the Peru study. Attention was paid to any new factors that were specific to this case. The Peru study showed that it was critical to have an established, committed and locally embedded organization taking a lead with the projects. Practical Action's Cajamarca office is such a champion. It is different from the Costa Rica study, where the role of a local champion is played by a local organization, with which the international NGOs partner. In the case of Peru, by virtue of its model, the international NGO's local office in Peru is the local champion. Opened over two decades ago, the Cajamarca office built a reputation in energy for development in the area. The documentation review<sup>27</sup> shows that the organization has been involved in almost 50 projects in Cajamarca region. It has built strong organizational structures. Mr Schilderman points out, "I would say, probably, Latin America Peru office is one of the most advanced [...]. They have got good systems in the offices in terms of planning, accounting and so on. It works well" (T. Schilderman, personal communication, September 23, 2011). The organization developed technical and managerial expertise and skills related to the renewable energy service provision, which has been recognized

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<sup>27</sup> The documentation sources consisted of project documents, including the list of projects in Cajamarca.

by the international awards mentioned earlier. Based on interviews, committed leadership and dedicated staff appear to be important to success of the initiatives. The respondents from Practical Action also note that learning from the experiences and incorporating the learning into the practices is important. As indicated during interviews with the boundary partners and other key informants in the study, the organization is well known by local communities, governments at different levels, other NGOs and private companies and has built trust and confidence with key actors in the field.

The implementation model employed by Practical Action emphasizes sustainability. As indicated during interviews with Practical Action, at the core of it are capacity building, a participatory approach and appropriate technologies that meet people's needs. The presence of a capable local champion is critical in building "the environment for sustainability", which requires human-to-human interactions that are essential in capacity building and participatory activities (T. Sanchez, personal communication, September 22, 2011).

Practical Action representatives also note that it is important in the success of their projects that community members embrace the projects; they actively participate in the projects; and have strong sense of ownership. According to them, introducing the renewable energy technologies and setting up the management system requires a great degree of community involvement and trust in local implementing organization and the project. The review of the documentation and interviews show that Practical Action spends considerable time and effort identifying community social structures and building technical, administrative and leadership capacities at the level of community authorities, users and enterprise members. For example, in the case of Alto Peru,

Practical Action spent over a year on identifying the social structures and building needed capacities through training.

Understanding natural environment, socio-economic profile and energy situation of the community is critical to Practical Action's success. Practical Action has adopted the practice of conducting detailed socio-economic diagnostic studies mentioned before of the target communities at the project design stage, which helps them to develop an appropriate project delivery strategy and choose the most suitable technological solutions of those that they can offer. For example, while in Cajamarca many projects involve micro-hydro systems, in Alto Peru three types of energy systems: wind, solar and hydro, were implemented. These choices were directly influenced by the assessment of geography and availability of renewable energy sources in the community. The review of the social structures of the community helps identify the leaders, social dynamics in the community and potential members of the Supervisory Committee. The economic analysis focuses on current income levels, and the expenditures on traditional energy sources. The service fee paid by beneficiaries is formulated based on this information. The idea is to make sure beneficiaries can afford the service.

Based on interviews and a review of the organization's diagnostic studies<sup>28</sup>, technological solutions appear to be appropriate to the needs of the users, their geography and socio-economic characteristics. These solutions are developed in a participatory way with the local people and using local resources as much as possible. The tariff for the service system is applied where people pay a fee for the service. In

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<sup>28</sup> The following diagnostic studies were reviewed: Soluciones Prácticas (2010), Soluciones Prácticas (2009), and Soluciones Prácticas (2008).

Alto Peru people pay 13 PEN (around \$4.7 CAD) per month for energy service, in Suro Antivo – from 10 to 15 PEN (approximately between \$3.6 – \$5.4 CAD) depending on the use, which in many cases is the same or less than what people were spending on candles, kerosene and batteries combined before the project. The tariff was deemed reasonable by the interviewed beneficiaries. Through training and creation of the enterprise and supervising committee, capacities are built in the community to manage, operate and maintain the energy system. Renewable energy offers obvious and significant advantages over candles, kerosene and batteries, which the community used before to meet energy needs.

The Practical Action respondents indicated that by learning from its own mistakes and successes, the organization developed a functional partnership-based model for delivering energy service to poor communities. At the core of the model are capacity building and knowledge, participatory approach and appropriate technology. As Mr. Escobar asserts:

The ultimate objective is to have powerful and knowledgeable enough communities to be able to run their own projects without our supervision. I feel this is the only way to create development. (R. Escobar, personal communication, September 1, 2011, translated from Spanish)

The research participants from the partnering organizations indicated it was a viable model that works and has been replicated in many communities with positive results, which have been documented by the external evaluations that were reviewed as part of this research.

This Chapter presented the Peru study outlining the context of the studied partnerships and describing the actors involved in these partnerships, their roles and linkages. Partnership drivers and challenges were presented as well. The discussion focused on indentifying factors that improve partnership dynamics and outcomes. The next Chapter presents the research findings from the studies and puts forward a revised set of theoretical propositions on factors that contribute to partnership effectiveness.



## CHAPTER SIX: KEY FINDINGS AND THEORETICAL PROPOSITIONS

This Chapter compares and synthesizes the research findings from the studies in Costa Rica and Peru focusing on the two main research questions related to: 1) the nature of partnerships; and 2) the effectiveness of partnerships. Based on these studies a revised set of theoretical propositions on factors associated with partnership effectiveness is put forward.

### Nature of Partnerships

#### *Actors and Linkages*

In terms of the structure of the development partnerships observed in the two cases, they share some similarities, but also have several distinctive features (Table 6).

Table 6. Summary of Boundary and Strategic Partners in Costa Rica and Peru

<b>Actors and Linkages</b>	<i>Costa Rica Case</i>	<i>Peru Case</i>
<b><u>Boundary partners</u></b> <i>Directly involved in projects</i> <i>Close linkages</i> <i>Regular communication</i> <i>Learning exchange</i> <i>Knowledge flow</i>	1. International NGOs 2 (a) Local NGO (b) Cooperative 3. Users	1. Regional office of International NGO 2. Community Supervisory Committee 3. Community Enterprise 4. Municipality 5. Users
<b><u>Strategic partners</u></b> <i>Not directly involved in projects</i> <i>Supportive functions (e.g., finance, regulatory, policy, fundraising, other)</i>	1. Donors 2. Business 3. National government 4. Local government	1. International NGO head office 2. Other regional offices of international NGO 3. Donors 4. Business 5. Other NGOs 6. National government

In the Costa Rica study, the international NGOs play an important catalytic role, while their local partners, in one case, a local educational NGO and, in another, an organic producers' cooperative, play a central role in the solar lighting projects and are closely linked with the beneficiaries. The community, that is the target beneficiaries/users, is another important boundary partner. Government actors are not involved directly in the partnerships. In the Peru case, the international NGO is embedded locally through regional and local offices, which works directly with the community and municipality. At the community level there are several actors, some created by the project, which become important boundary partners: the Supervisory Committee, the enterprise and users.

In addition to boundary partners, which constitute the development partnership domain, strategic partners are distinguished as well (Earl et al., 2001). In both cases, there are donors, which provide needed funding for the international NGOs and, in the Costa Rica case, to the local NGO as well. Other strategic partners include businesses who supply technology and components for the projects. In both cases, national government, through policies and regulations, impacts the environment in which the development partnerships operate. The Peru case has additional actors that provide supportive functions, such as the head office in the UK, other regional offices of the organization and other NGOs.

In comparison to the partnerships in Costa Rica, the partnership model in the Peru case is more diverse, including more actors both as boundary partners and strategic partners. There are several possible explanations for this difference that relate to the project implementation and the technology. Studied partnerships reflect the

implementation strategy of the international NGOs in question. In the Costa Rica case, LUTW's and Y Service Club's strategy is to partner with local organizations that are close to the communities and can take the lead role in project implementation. Neither of the organizations has a local presence through a regional or local office in the country. Practical Action works in Peru through its regional and local offices, which enjoy a high degree of independence from the main office in the UK. The local office in Cajamarca takes the lead role in project implementation, which in the case of Costa Rica is performed by local organizations (ACEM and APPTA). With the transfer of responsibilities from Practical Action to municipalities, the municipalities take over the lead role in supervising the management of the renewable energy systems.

The implementation strategy differed in the studied cases partly due to the type of technological solutions used. The projects in Peru are technologically more complex and more expensive mostly due to the type of technology used and associated equipment costs. In Talamanca, Costa Rica, individual 10 W solar lighting systems are installed providing energy for lighting and for charging cell phones. In Cajamarca, Peru, renewable energy systems are providing energy for household use (lighting, electric appliances) and productive use. In most cases micro-hydro systems ranging from 1 kW up to 200 kW provide energy for the entire village. In some cases a wind system and/or solar technology are used. The energy systems in Cajamarca have a larger capacity (provide more energy) and have higher up-front costs than the solar systems employed in Costa Rica. These systems are also more complex and require a designated partner based in the community, which is responsible for the regular management of the energy systems, their maintenance and servicing. This designated partner is the enterprise

created in the community. Mr. Escobar from the Practical Action office in Lima notes that, early in its history, Practical Action used to create community committees to perform the functions of the current enterprise, but such committees lacked legal status and proved to be less effective (R. Escobar, personal communication, September 1, 2011). The enterprise is a legal entity, which has formal relationships with the community leaders, users and municipality through contracts, as discussed in Chapter 5.

In the case of Costa Rica, the technology is decentralized and less complex. Some basic maintenance is performed by the users, while more difficult tasks are handled by the technicians from a local NGO in one partnership, and in another, by a cooperative. Basically, the maintenance and servicing functions are centralized at the moment; however, as the program expands its reach, there might be a need to decentralize some of these functions either to the individual communities or clusters of the communities.

The institutional and contextual factors have an impact as well. For example, in the Peru case, the municipalities became more involved in projects due to the decentralization, which gave them more responsibility towards their constituents and the financial resources to respond to their needs. The implementation and partnering strategies started to include municipalities as important partners due to these changes in the political context.

Based on the Costa Rica and Peru studies, several observations can be made with regard to the nature of development partnerships involved in the diffusion of renewable energy technologies in off-grid communities:

**i) Different partnership models can be equally effective.**

**ii) The less local capacity the international NGO has in place (e.g., regional and/or local offices), the more likely a local organization (e.g., a local NGO or cooperative) will take a lead role in project implementation.**

**iii) The more complex the technology, the greater the number and diversity of actors involved in the partnership.**

**iv) The more decentralized the political system and the higher the institutional capacity of the local government, the more likely that the local government actors will be involved.**

### ***Drivers***

The analysis of the case studies identified the drivers behind development partnerships involved in the diffusion of renewable energy technologies in remote rural communities. This section discusses these drivers and contrasts the findings with the existing theories that explain partnership formation (Table 7). No one theoretical framework fully explains the formation of partnerships; rather a combination of several is needed. Institutional, resource dependence, reciprocity, transaction cost, resource-based view, strategic management and social network theories were all found to be relevant.

The institutional factors provide important explanations why an organization enters into a partnership with one another. Institutional theory (DiMaggio, 1988; Mayer & Rowan, 1977; Scott, 1987) argues that the institutional environments strongly influence formal structures in an organization and its processes. Organizations enter into a collaborative arrangement in order to enhance their legitimacy by confirming with the

norms, rules and belief systems prevailing in the environment (Oliver, 1990). Luoma and Goodstein (1999) distinguish among three levels of institutional influences: the societal level (legal influence), the industry level (industry regulation), and the organizational level (organizational size and public visibility). Organizations increase their legitimacy by responding to the legal mandates and regulations, which influence organizational policies, structures and practices (Oliver, 1990). Informal institutions such as taboos, customs, traditions, code of conduct also affect organizations (North, 1991). Some societal effects are most evident at the industry level of institutional influence. Industry influences can be more pronounced in the case of organizations with high level of public and governmental scrutiny (Scott, 1995). Organizational influences, such as size of organizations, play a role. Larger organizations are more visible, tend to attract more attention from other stakeholders and need to respond to their demands (Waddock & Graves, 1997).

Table 7. Partnerships Drivers in Costa Rica and Peru and Existing Theory

<i><b>Partnership Drivers</b></i>	<i><b>Existing theory</b></i>
Responding to government and market failures	Institutional theory (Mayer & Rowan, 1977; Scott, 1987)
Resource (inter-) dependency in technology, capacity and financing	Resource dependence (Pfeffer & Salancik, 1978); Reciprocity models (Molnar, 1978; Paulson, 1976)
Efficiency gains	Transaction cost theory (Williamson, 1975, 1991); Resource-based view (Barney, 1991; Barney & Clark, 2007)
Implementation strategy, which emphasizes local capacity building	Strategic management theory (Grey & Wood, 1991)
Prior relationships	Social network theory (Burt, 1992; Scott, 2000; Wasserman & Faust, 1994)

The institutional factors provide important explanations of drivers in the studied partnerships. Energy services are generally provided by the government, however many remote rural communities in the studied countries were off the radar for public electrification policies and interventions. There were clear failures of government and market to address the energy needs of the remote rural villages and the studied partnerships were formed to respond to these failures. The organizations in the case studies were joining their efforts voluntarily and were not forced by specific legal mandates and regulations in their environment. Rather, driven by a common goal of energy provision for community development, the partners in both case studies were influencing their institutional environment by bringing attention of government, private sector and other actors to the issues of rural renewable energy and development and, as noted in the case of Peru, promoting policy changes in this area.

However, changes in institutional environment, including legal influences, can enable these partnerships. Thus, in the Peru case, as the result of the decentralisation policy, municipalities received more responsibilities with their constituents and budget to attend to their needs. The conditions became favourable for municipalities to engage in the studied development partnerships.

Another set of drivers can be explained through the lens of the resource dependency theory, which is deemed as one of the most popular perspectives in the non-profit collaboration research (Guo & Acar, 2005). The main premise of the theory is that organizations depend on resources that are in the hands of other organizations and that these resources can become the basis of power struggles and uncertainty (Pfeffer & Salancik, 1978). Collaborations can help reduce uncertainty by facilitating coordination,

balancing dependence and promoting joint action (Parmigiani & Rivera-Santos, 2011). However, collaborations also come at cost, such as the loss of autonomy (Provan, 1984). Some argue that smaller organizations lacking resources can be more prone to lose their autonomy and enter into formal collaborations in order to access vital resources; however, other studies find the opposite (Guo & Acar, 2005).

In the studied partnerships, there is a high degree of resource dependencies in technology, capacity and financing required for providing energy access, which necessitate involvement of the organizations that can deliver such resources. The NGOs in these partnerships often struggle due to a lack of financial sustainability and reliance on short-term funding from donors. The international NGOs in the Costa Rica case require additional resources and knowledge of local communities and local environment. The local partners in this case lack specific technological expertise and access to technology. Capacities at the user level need to be built for them to adopt new technologies as found in the studied cases. Development partnerships allowed the partnering organizations to gain access to financial resources, technology, technical and management expertise, reach communities and build needed capacities. There was no observation made related to the relationship between the size of the organization and the loss of autonomy due to the resource attainment. However, it was noted that in both case studies partners were able to strike a balance between accessing resources and sustaining organizational autonomy. The larger organizations were not looking to exert power and control over small ones by providing resources. This can be explained by the fact that (i) the relationships emphasized mutual trust and respect; (ii) partners shared



values and goals; and (iii) the roles and responsibilities were clearly defined in formal contracts and mutually agreed upon.

Another important aspect of these partnerships is that there was a great degree of interdependence where organizations complemented each other in terms of expertise, financial resources and capacities. The relationships were very reciprocal and in no way coercive and dominating. Reciprocal models of interorganizational relationships (Oliver, 1990), which emphasize cooperation, collaboration and coordination as motives over domination, control and power can be useful in explaining the formation of studied partnerships.

Another critical motivation for a partnership is the efficiency gains, which is consistent with the transaction cost theory (Williamson, 1975, 1991) and the resource-based view (Barney, 1991). According to these perspectives, partnerships “are formed when it is more efficient for a firm to conduct an activity through a close partner relationship than either on its own or through the market” (Parmigiani & Rivera-Santos, 2011, p. 1114). Williamson (1975, 1991) argues that asset specificity, uncertainty, and frequency of transactions impact the type of the governance structure of the transaction, whether it is within an organization, the intermediate structures or marketplace. In order to reduce the rising transaction costs, the organizations will move to the intermediate structures (interorganizational relationships) if the market mediation is less efficient (Oliver, 1990). From a resource-based view perspective, organizations enter into a partnership to access complementary resources (Barney & Clark, 2007).

The efficiency argument can explain the formation of the studied development partnerships. These partnerships helped to minimize the transaction costs and the costs

associated with providing the energy service in remote areas and helped to gain value by accessing complementary resources. The logistical and infrastructural challenges associated with providing energy in remote rural areas translated into high costs. These costs were balanced when being shared by participating organizations. For the international NGOs in the studies, it was critical to work either through a local partner or local office close to the target communities in order to reduce the implementation costs. Beneficiaries shared some of these costs by providing financial contribution towards installations and/or in-kind contributions (labour, materials). Field operations can cost much more if the organization is based, for example, in Canada or the UK and has to fly its staff from overseas regularly. As shown in the studies, the international NGOs tend to rely more on local partners (the case of Costa Rica) or regional and local offices (the case of Peru) to increase efficiencies. The work in Cajamarca is managed by the local office of Practical Action Latin America and not from the Lima office to minimize the costs. However, this is not the only reason.

The organization's implementation strategy emphasizes local capacity building at the community level, which requires close involvement and continuous interaction with the community, which in turn necessitates involvement of locally embedded actors. Strategic management theory (Gray & Wood, 1991) can explain this motivation. It focuses on how organizations work with other actors and improve competitive advantage. In some cases collaboration is a way to advance organizational objectives and improve provided services, in other cases it helps improve the reputation of the organization and improve the visibility of its work (Sowa, 2009).

Social network theorists (Burt, 1992; Scott, 2000; Wasserman & Faust, 1994) focus on the relationships of the interacting units. These units consist of a collection of individuals and the linkages among them. The research in this area looks at dyads (two actors and their ties), triads (three actors and their ties), or larger systems (subgroups of individuals or entire networks). Similar to institutional theory, social network research also looks at how social structures impact the relationship. Rules and norms and their knowledge and interpretations by the actors drive the development of networks (Provan, Fish & Sydow, 2007). Prior relationships and history of these relationships matter (Gulati & Garguilo, 1999). Similarly, such a pattern is seen in the case studies. Working with previously known partners or partners of one's partners is a driver in these cases as having prior positive experience boosts trust, which is necessary to make the partnerships effective. However, past tensions among actors that had a prior relationship can present challenges in a new partnership.

This discussion shows that multiple drivers motivate organizations to enter into a development partnership to provide energy services to the poor and no single theory aimed at explaining the formation of partnerships is sufficient to understand these motivations. In fact, partnership scholars increasingly acknowledge that single theories are not sufficient to explain the formation of partnerships and call for an application of multi-theory approaches. Thus, Guo and Acar (2005) combine resource dependence, institutional, and networks perspective to study collaboration among non-profit organizations focusing on urban charitable organizations in the United States. Sowa (2009) integrates resource dependency, institutional, strategic management theories in examining collaboration decisions in American non-profit organizations in the policy

field of early care and education. Laing et al. (2009) approached the partnerships between protected area organizations and the tourism industry through the lens of eight perspectives, including social exchange theories, environmental dispute resolution, network, social capital, institutional analysis and development theories among others.

In a similar fashion, **this research encourages a multi-theoretical design to be applied in order to understand the drivers of the development partnerships in rural renewable energy. Institutional theory, resource dependence, reciprocity models, transaction cost theory, resource-based view, strategic management theory, and social network theory are among the theoretical frameworks that were particularly useful in explaining the multiple drivers in the studied partnerships.**

### ***Challenges***

As revealed in the case studies, providing energy access to remote rural communities was a complex undertaking that faced numerous challenges that had an impact on the nature and effectiveness of operations of the partnerships. The constraints were related to financial, economic, operational, social, policy, and technological domains. Some barriers were related to the actors themselves and their capacities; other challenges originated in their environment. There were also challenges specific to the provision of renewable energy services in the remote rural communities that impacted the studied partnerships.

In terms of financial constraints, the international NGOs in both case studies and the local NGO partner in the Costa Rica case were often vulnerable due to their reliance on external funding, which was limited and uncertain. This situation was exacerbated by financial crises and economic slowdowns where affected governments were more likely

to cut foreign aid spending that particularly affected the international development NGOs. Some private donors, mainly in developed countries, were also turning their support towards their domestic communities. Securing funding for international development projects was, therefore, difficult. Financial sustainability remained a key constraint to the studied development partnerships.

Economic problems are related to the high cost of providing renewable energy systems to dispersed populations, low income levels of users and lack of financial instruments to support decentralized renewable energy systems (such as reduced taxes on imports, subsidies, other incentives for renewable energy technologies). Adopting the microfinance mechanism (the Costa Rica case) and the tariff system (the Peru case) were some ways to mitigate the high investment costs for energy systems and make them affordable for poor users. However, policy mechanisms needed to respond to these challenges as well and the partnerships were raising awareness of these issues and promoting them to policy levels.

Then, there were the significant operational barriers of working in geographically challenging environments where these remote and dispersed communities reside. Coupled with the difficult terrain, lack of basic infrastructure, such as roads and communications, limited access to communities and made it even impossible at certain times of the year, for example, in the case of Talamanca communities during the flood periods. These factors constrained the ability of the local organizations in the studies to engage effectively and efficiently with the communities and for the international NGOs to provide necessary resources for projects. Lack of access to communication technologies in the communities made long-distance

engagement of the international NGOs (the case of Costa Rica) very difficult and sometimes ineffective.

Remote rural communities had low education levels and lacked technical capacity and skills to operate, administer and maintain the decentralized energy systems. In both case studies, to build such capacities required significant investment of money, time and effort. Users needed to be educated about renewable energy and learn how to operate and maintain the system. As seen in the Peru case, these activities were difficult sometimes to implement as people's attitudes needed to be changed. These users had never been in the situation where they had to pay regularly for a service, for example, energy or water service. As seen in the case of Peru, the community-based legal institutions to manage, operate and maintain these energy systems needed to be created, which required substantial capacity building effort. Changes in the community leadership as well as turnover of individuals responsible for the partnership-based projects presented further problems.

Another type of policy that particularly impacted the partnerships in question was rural electrification plans. There were instances in the studies when uncertain grid extension plans negatively influenced the outcomes of the partnerships. As indicated in the Peru case, significant investments in a renewable energy service provision could be wasted with the unexpected arrival of the grid. There were also technological challenges that were pointed in the case studies, some of which were related to the battery replacement and functioning of small wind turbines.

In sum, a myriad of financial, economic, operational, social, policy, and technological constraints specific to the provision of rural renewable energy and those

related to the types of the organizations involved and their institutional environments challenged the work of the development partnerships in question. The next sections discuss what factors influenced the effectiveness of the partnerships and helped to address these challenges.

## **Partnership Effectiveness**

### ***Partnership Dynamics***

Partnership dynamics addresses the question of how well the partners work together in achieving joint objectives and focuses on the relationship between the partners, the management of the partnership, the decision making process, and communication. Based on the Costa Rica and Peru studies, the analysis of partnerships' dynamics identified the following effectiveness criteria: shared values and goals, complementary expertise and capacities, confidence and trust, clear roles and responsibilities, effective communication, personality match and continuity of staff. These findings confirm much of the general understanding of what makes a partnership successful coming from the partnership management literature and development studies discussed in Chapter 2. International development research also emphasizes equality, trust, shared commitment, agreed division of tasks and responsibilities, compatible objectives, mutual agreement, transparency, shared contributions, shared rewards, win-win benefits, accountability, and flexibility as some of the success factors (Ashman, 2001a, 2001b; Clarke-Okah, 2004; Lewis, 1998). Partnership management studies highlight as success criteria: mutual trust, resource dependency, commitment symmetry, shared common goals, converging cultures, leadership, resource exchange, schedule, communication, transparency, accountability, representation, and participation (Austin,

2000; Brinkerhoff, 2002; Dorado et al., 2009; Jamali & Keshishian, 2009; Kolk et al., 2008; Morse & McNamara, 2006; Tennyson, 2003). These factors largely coincide with those identified through the case studies.

In addition, factors were identified that are less researched in the literature and require further attention. First, the partnerships in question were influenced a lot by individual dynamics. Yet, human factors often receive less attention in the partnership literature. To explain the role of human factors in the dynamics of partnerships, partnership literature can benefit from insights on these aspects from personal and organizational psychology. Continuity of staff was another important factor identified through this research, which is not addressed in the pertinent literature. This factor is important in itself, but it also interacts with other factors. For example, as discussed in the Peru case, the turnover in the municipality affects trust and confidence among partners, impacts communication and partners' ability to establish clear roles and responsibilities.

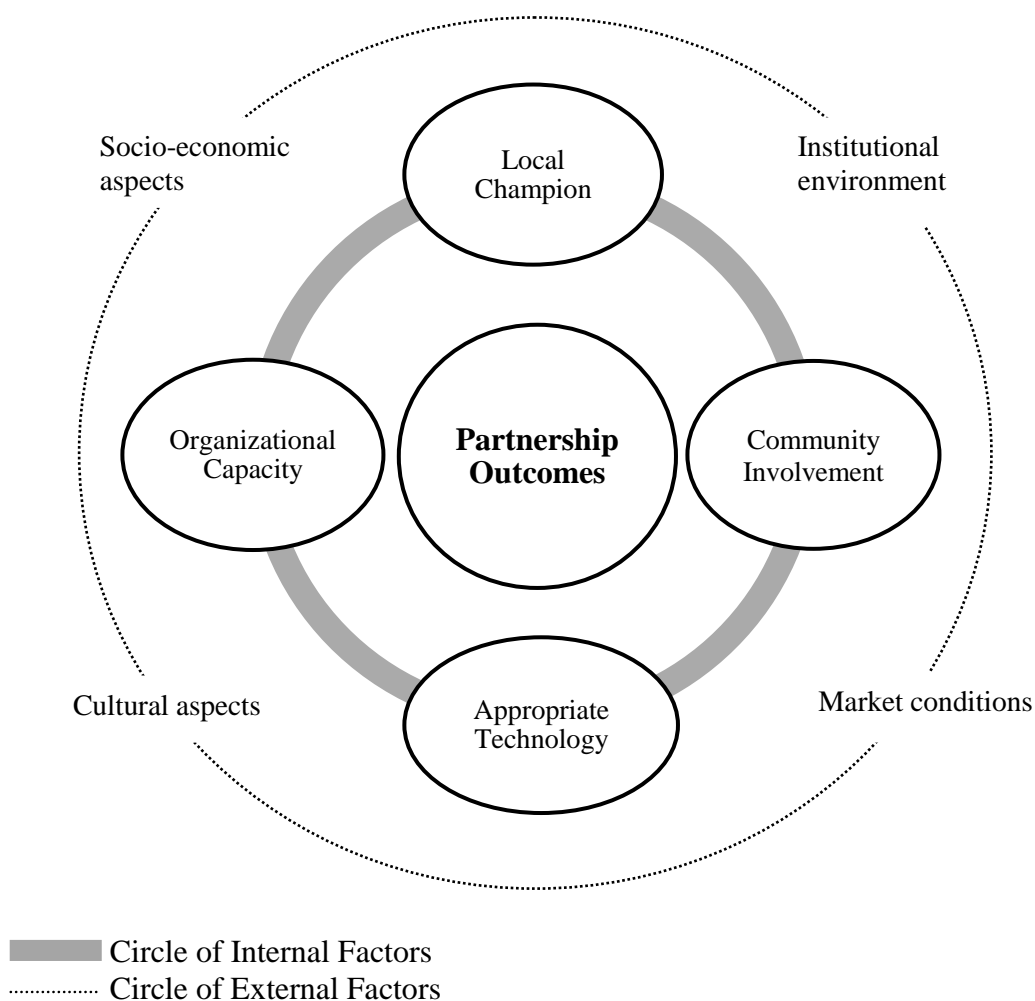
### ***Partnership Outcomes***

Partnership outcomes are about whether and to what extent partners achieve development outcomes. The research adopted several specific measures for the outcomes of the partnership in the context of the diffusion of renewable energy technologies in remote rural communities, which were introduced in Chapter 2 and applied in the case studies (Chapters 4 and 5). The analysis of the partnerships in the case studies showed that their ability to achieve development outcomes was primarily dependent on four sets of factors: a local champion, organizational capacity, community involvement, and appropriate technology (Figure 10). As explained earlier, these factors



directly influence the outcomes of partnerships and are within the control of partnerships (i.e., internal factors). There is also a range of influences in the context, including institutional environment, socio-economic and cultural aspects, and market conditions, which are external factors that influence the partnerships (Figure 10).

Figure 10. Factors Influencing Partnership Outcomes



Theoretical propositions on the relationship between the factors and partnership effectiveness are put forward. Each set of factors and the related propositions are introduced in the following sections. These factors provide new insights into partnership effectiveness and are filling the gap in the literature on partnership effectiveness in

terms of the outcome view, which has been discussed earlier in the thesis. However, while these factors are new to partnership effectiveness literature, some of them are discussed in other literature that provided a starting point for this research, namely, technology diffusion and development studies, and the following analysis contrasts research findings with this literature.

Based on the Costa Rica study, an initial set of theoretical propositions about effectiveness factors that impact the outcomes of the partnership was put forward. These proposed factors served as probes during the data collection and analysis of the Peru case. Table 8 compares findings of the Peru study with the propositions from the Costa Rica study, which are further discussed in this section. All propositions developed based on the Costa Rica study, except one, proposition 2b, were confirmed in the Peru study, however, with some differentiation in how these factors play out in practice. The discussion follows in Table 8.

Table 8. Partnership Outcomes Effectiveness Factors: Comparison of Findings

<i>Category</i>	<i>Costa Rica Case</i>	<i>Peru Case</i>	<i>Notes</i>
<b>LOCAL CHAMPION</b>	Proposition 2a. Partnering with an established local organization that is trusted by the community is associated with successful partnership outcomes.	Importance of having a local champion trusted by the community was emphasized.	In both cases, the notion of having a local champion trusted by the community came out very strongly. However, the difference was in the type of actor taking on this role.
	Proposition 2b. Partnering with an established local organization with an established community network is associated with successful partnership outcomes.	The implementation model included the creation of the enterprise in the community to be responsible for the maintenance and operation of the energy system rather than relying on the community network of a local champion as in the case of Costa Rica.	Differences in the implementation model influenced by the technological choices and the type of actors involved in the partnership explain why proposition 2b was not observed in the Peru case.
<b>ORGANIZATIONAL CAPACITY</b>	Proposition 2c. Partnering with an established local organization that has human resources, finances and skills to train and educate the community about the merits, use and maintenance of the renewable energy system is associated with successful partnership outcomes.	Having an established, committed and locally embedded organization with human, financial resources and skills to train and educate the beneficiaries about renewable energy was critical.	In both cases, the notion of capacity building in the community through training and education around the renewable energy technologies came out very strongly.

	Proposition 2d. Partnering with an established local organization that is capable of building technological capacity to install, repair and maintain the chosen renewable energy system is associated with successful partnership outcomes.	Building technological capacity to manage, operate and maintain the renewable energy system was central.	Both cases confirmed the proposition 2d. Differences were noted in the approaches to capacity building in technology management.
	Proposition 2e. Partnering with a local organization that institutionalized learning from doing is associated with successful partnership outcomes.	The mechanisms were in place to learn from the experiences and incorporate this learning into practice.	In both cases continuous learning and incorporation of the learning into the practice was critical.
<b>COMMUNITY INVOLVEMENT</b>	Proposition 2f: Having community participation throughout the course of a renewable energy project is associated with successful partnership outcomes.	Community participation was one of the key factors in the Peru case.	Community participation played an important role in the effectiveness of partnerships in both cases. However, there were differences in the modalities to engage with the community.
<b>APPROPRIATE TECHNOLOGY</b>	Proposition 2g: Providing technology that meets users' needs and is appropriate to their context is associated with successful partnership outcomes.	The choice of the most suitable technological solutions was directly influenced by the needs of the beneficiaries, availability of potential renewable energy resources in their natural environment, socio-economic profile and energy situation of the community.	Both cases confirmed the proposition 2g.

	<p>Proposition 2h: Providing technology priced or financed at the same level or below the alternatives available to the community is associated with successful partnership outcomes.</p>	<p>The tariff for the energy service was at the same level or below the monthly expenditures on previous energy sources, such as candles, kerosene and dry cell batteries.</p>	<p>Both cases confirmed the proposition 2h.</p>
	<p>Proposition 2i: Providing technology that provides visible and superior quality and benefits over the alternatives available to the community is associated with successful partnership outcomes.</p>	<p>Renewable energy systems were providing superior quality of energy service and benefits in comparison to the energy sources previously used by the beneficiaries.</p>	<p>Both cases confirmed the proposition 2i.</p>

### *Local Champion*

The first set of effectiveness factors is related to a local champion. In the case of Costa Rica, in one partnership, the role of a local champion is played by ACEM, a locally embedded NGO, and in another partnership – by APPTA, an organic producers' cooperative. Both organizations are boundary partners of the international NGOs. In the case of Peru, the leadership of the partnership changes over the course of the project. Practical Action Latin America, Cajamarca office is the initial champion for the most part of the projects and then with the transfer of responsibilities, a municipality takes the lead. Practical Action Latin America is an international NGO regional office and is a strategic partner with the UK office of the organization, which is not directly involved in the operations on ground and in the studied development partnerships. Thus, there is a clear differentiation in the type of actor taking on a role of a local champion, which reflects the diversity of partnerships in the studied cases and their variation in composition.

In both cases, organizations that play a role of a local champion, such as ACEM and APPTA in the Costa Rica study and Practical Action, local office in Cajamarca in the Peru case, enjoy a high degree of community trust. These organizations gained community trust through their previous successful community development activities in the area over the period of time. Furthermore, organizations' staff included local people – this was noted as another source of community trust in these organizations. For a foreign organization trying to do community-based renewable energy projects directly with the community without having a locally established presence or a locally embedded partner to lead the work,

gaining community trust can prove difficult and may take considerable time. This leads us to the following proposition in the local champion category, which confirms the initial respective proposition from the Costa Rica study:

**Proposition 3a: Partnering with an established local organization that is trusted by the community is associated with successful partnership outcomes.**

The idea of a local champion relates to the notion of partnership leadership, which with some exceptions remains under-researched (Selsky & Parker, 2005). Proposition 3a advances the partnership literature by acknowledging as a factor the importance of having a local champion trusted by the community in achieving successful partnership outcomes.

#### *Organizational Capacity*

Organizational capacity as a set of factors influencing the outcomes of the studied partnerships can be understood in terms of i) educating beneficiaries about the renewable energy technology and its merits, and training them on how to use this technology; ii) building technological capacity to manage, operate and maintain the renewable energy system; and iii) ability to institutionalize learning from doing. In both case studies, organizational capacity factors played a central role in achieving successful partnership outcomes.

However, the modalities to build needed capacities for the provision of renewable energy services in the community and to train and educate the beneficiaries differed. For example, in the Costa Rica case, ACEM educated beneficiaries directly before and during

installations. In addition, the beneficiaries, who were part of the ACEM educational program, were also educated about the merits of renewable energy and how it can be used during the program classes. In the case of Practical Action in Peru, training and education activities were conducted directly with the community during the early stages of the projects. As per technological capacities, in the Costa Rica study, organizations relied upon their established networks in the community for managing, maintaining and servicing the solar systems. In the Peru case, specific institutions were created at each community to manage, operate and maintain the energy system.

As explained in the section on Actors and Linkages in this Chapter, the differences in modalities have to do, in part, with the type of technologies used. In Costa Rica, individual solar lighting systems were used. In Peru, the technology was more complex. In many cases a larger renewable energy system was installed to serve the entire community and provide energy for a wide range of uses in addition to lighting. This system required creation of the local entities to operate technology and manage the associated financial matters. In all studied partnerships, the ability to learn throughout the project cycle and incorporate learning into practice was essential. The subsequent findings lead us to accept the initial propositions in the organizational capacity category from the Costa Rica study:

**Proposition 3 (b - d): Successful partnership outcomes are associated with:**

**b. Partnering with an established local organization that has human resources, finances and skills to train and educate the**



**community about the merits, use and maintenance of the renewable energy system;**

**c. Partnering with an established local organization that is capable of building technological capacities to install, repair and maintain the chosen renewable energy system;**

**d. Partnering with a local organization that institutionalized learning from doing.**

A lack of local technical capacity and skills to operate and maintain rural renewable energy systems is widely acknowledged in the literature as one of the key barriers to the successful implementation of renewable energy technologies for rural electrification (Niez, 2010; Martinot et al., 2002; Sanchez, 2010). Similarly, this research emphasizes the importance of educating the users about renewable energy technology and its merits and building technological capacity in achieving successful partnership outcomes. This research also emphasizes the importance of institutionalizing learning from doing, which is explored in the innovation studies (Lundvall et al., 2009), but is not acknowledged as a specific factor of partnership effectiveness in rural renewable energy.

### *Community Involvement*

Both cases confirmed the importance of community participation throughout the course of interventions. In fact, participatory approach was at the core of the implementation model in all studied partnerships. Community involvement was critical in achieving successful outcomes of capacity building activities at the community level. As

discussed before, community members were also providing contribution to the projects via financial contribution and/or in-kind contributions, like labour and materials. In order to enhance the chances of successful adoption of the technology, community members needed to learn about renewable energy and its merits and learn about how to operate, maintain and use it. The synthesis leads us to accept the initial proposition on community involvement.

**Proposition 3e: Having community participation throughout the course of a renewable energy project is associated with successful partnership outcomes.**

Community participation is also acknowledged as an important factor in the effectiveness of development initiatives by development scholars and as a success factor in the diffusion of technologies. Proposition 3e echoes the idea of people-centred technology, where community influences the level of technology, which is at the core of appropriate technology philosophy (Akubue, 2000; Schumacher, 1973). Community involvement in the planning and delivery of the projects is also emphasized as a critical factor for sustainability of rural renewable energy schemes in the literature that specifically looks at the diffusion of renewable energy technologies in rural areas in developing countries (Barnes, 2007; Sanchez, 2006).

*Appropriate Technology*

Technological solutions need to be affordable and appropriate to the needs of the users, their geography and socio-economic characteristics. In both case studies partners spend considerable time and other resources to learn about communities in order to develop

the project implementation model and choose the technologies that are best suited for a given population. The system design has been changing as the projects progressed, which directly accounted for the user-specific needs and suggestions.

Better technology choices were made when developed in a participatory way with local people. The renewable energy technologies provided significant and obvious advantages to users compared to the alternative energy sources available to the community. For example, in the Costa Rica case, solar lighting systems provided significant advantages in terms of quality of light in comparison to kerosene lamps and candles. The systems were easy to use and potential users could observe the benefits from using the new technology. The technology was affordable as people would rely on microfinance to pay it off and the payments were comparable to what they were spending before on energy sources. In the Peru case, the tariff for the service system was applied to make energy service affordable to the users. The new energy system allowed the beneficiary communities to employ equipment that could not be run (or could not be run affordably) on the previous energy sources, which improved the quality of education, health and economic production in the community. Based on this analysis, the initial propositions in the appropriate technology category have been confirmed.

**Proposition 3 (f - h): Successful partnership outcomes are associated with:**

**f. Providing technology that meets users' needs and is appropriate to their context;**

- g. Providing technology that is priced or financed at the same level or below the alternatives available to the community;**
- h. Providing technology that provides tangible advantages in quality and benefits over the alternatives available to the community.**

These findings, while less known in the partnership effectiveness literature, echo some factors found to impact the adoption of technologies by users that are well explored in the diffusion literature. This research not only incorporates perspectives from the diffusion literature, it also identifies which factors have relevance for partnership effectiveness from the myriad of factors that impact the diffusion of technologies, which were presented in Chapter 2.

For example, Rogers (1962, 2003) in his theory of diffusion of innovations also emphasizes that for technology to be successfully adopted it has to provide relative advantage over the previous generation of technologies (proposition 3h). Such an advantage can relate, for example, to economic gains, convenience, and/or social prestige. Rogers also indicates that technology has to be compatible with the users' way of life, their needs, past experiences, habits and values (proposition 3f). Proposition 3f also resonates with the appropriate technology philosophy, which emphasizes the importance of developing technologies that meet people's needs (Schumacher, 1973). While the literature on the diffusion of rural renewable energy covers widely the factor of affordability of the technologies in question (Karekezi & Kithyoma, 2002; Mabuza et al., 2007; Martinot et al.,

2002), which has been discussed earlier, this research (proposition 3g) adds to the literature by providing a more specific view of what affordability implies in the studied cases in terms of pricing and financing of renewable energy technology in relation to the alternatives available to the community.

This Chapter further analyzed and synthesized the findings from the case studies in Costa Rica and Peru focusing on similarities and differences in the partnership models employed in these cases, the actors involved and linkages between them, drivers of the partnerships and the challenges that constrain their performance. The Chapter put forward the revised set of theoretical propositions regarding the factors that influence dynamics and outcomes of the studied partnerships. The next Chapter discusses how this research contributes to the body of knowledge and the practice. The revised conceptual framework is outlined and the future research directions are highlighted.

## **CHAPTER SEVEN: CONCLUSIONS**

### **Research Contributions to Theory**

This study of the nature of development partnerships in the Costa Rica and Peru case studies has shown that development partnerships driven by international NGOs may differ in structure, size and diversity of actors as a result of the differentiation in the implementation strategies of the lead organization, complexities of the projects including technological complexity, and contextual factors. Multiple drivers motivated the organizations studied to enter into a development partnership to provide energy services to the poor, including: responding to government and market failures; resource (inter-) dependency in technology, capacity and financing; efficiency gains; local capacity building; and prior relationships. Contrary to most of the literature, these findings suggest that no single theory aimed at explaining formation of the partnerships is sufficient to understand the motivations behind the partnerships in question and a multi-theoretical design should be applied in order to understand the drivers of the development partnerships in rural renewable energy. Such a design should integrate, among others, institutional, resource dependency, reciprocity, transaction cost, resource-based view, strategic management and social network perspectives.

Financial, economic, operational, social, policy, and technological constraints specific to the provision of rural renewable energy and those related to the types of the organizations involved in the cases and their institutional environments were highlighted in this study. In terms of financial constraints, the NGOs in the studied cases (both

international and local) were often vulnerable due to their reliance on external funding. Economic challenges were related to the high cost of providing renewable energy systems to remote communities, low income levels of users, and lack of financing for rural renewable energy systems. The difficult terrain and lack of basic infrastructure posed significant operational barriers for partnerships. Further challenges were related to the low education levels of users and lack of technical capacity and skills to operate and maintain the decentralized renewable energy systems. Uncertain grid extension plans negatively impacted the outcomes of the partnerships. Reported technological challenges were related to battery replacement and the functioning of small wind turbines.

The effectiveness question focused on identifying factors that are associated with successful partnership dynamics and outcomes in the studied cases. Shared values and goals, complementary expertise and capacities, confidence and trust, clear roles and responsibilities, effective communication, personality match, and continuity of staff were identified as key effectiveness criteria associated with successful partnership dynamics, confirming much of the previous research on partnerships. The last two factors, however, are new to the literature and possibly specific to this type of partnership. This finding emphasizes the importance of human factors in the dynamics of the studied partnerships and the need for greater cross-fertilization between partnership literature and personal and organizational psychology that can provide further insights into these aspects.

The partnership outcomes analysis of the cases identified factors that have not been adequately acknowledged nor addressed in the literature on development partnership

effectiveness in general, nor in studies specifically related to partnerships involved in the diffusion of rural renewable energy technologies. As discussed earlier, some of these factors echo the factors associated with successful development initiatives in general, and those in rural renewable energy discussed in development studies and technology diffusion literature, but which had been previously ignored in partnership studies. This research identifies which of the myriad factors identified within these other research realms had an impact on partnership effectiveness.

The findings highlight the importance of a local champion trusted by the community who has technological, organizational and management resources and skills to engage the community and other partners to build needed capacities in the community and with the partners for the sustainable provision of energy services. While local technical capacity and skills to operate and maintain rural renewable energy systems are acknowledged as critical factors to the successful implementation of renewable energy technologies for rural electrification, articulating the role of particular types of partners in building such capacities as a partnership effectiveness factor is new. Success was also associated with a local champion who institutionalized its learning processes. The importance of institutionalizing learning from doing is not generally acknowledged as a specific partnership effectiveness factor in rural renewable energy.

Community participation throughout the project cycle was critical, which is also widely acknowledged as a success factor by development and technology diffusion scholars. Understanding the natural environment, socio-economic profile and energy

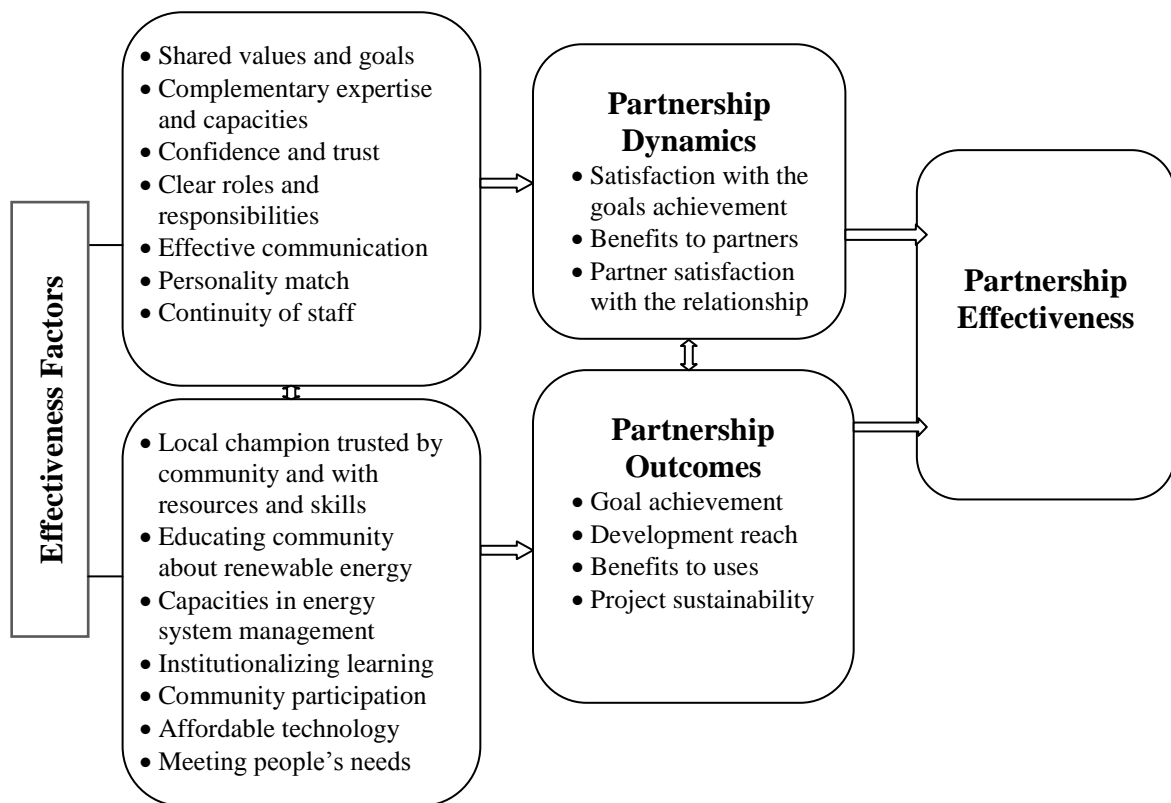


situation of the community was important as it informed the implementation model and technological choices. Successful outcomes were also associated with the provision of technological solutions that were affordable and appropriate to the needs of the users, their geography and socio-economic characteristics. In addition, successful outcomes were related to the renewable energy technologies being priced or financed at the same level or below the alternative energy sources available to the community and providing significant and obvious advantages to users compared to previous energy sources. The factors related to appropriate technology similarly echo factors found to impact the adoption of technologies studied in the diffusion literature. Local capacities with the local implementing organizations and beneficiaries needed to be built to manage, operate and maintain the energy system in order to sustain the benefits. This factor is also acknowledged as one of the key factors to the successful implementation of renewable energy technologies in the technology diffusion literature. Thus, among the myriad of factors coming from the diffusion literature as discussed in Chapter 2, community involvement; affordable technology, which is appropriate to peoples' needs and context; and local capacities for management and maintenance of the chosen renewable energy system, were found by this research to be the most relevant diffusion theory factors to successful partnership outcomes.

These findings allow us to revise of the conceptual framework presented in Chapter 2. Because the effectiveness factors were initially speculative or unknown, they were left unspecified in the conceptual framework illustrated in Figure 4. In Figure 11, the factors

and the measures of partnerships' effectiveness identified in this research and discussed above are incorporated into the conceptual framework diagram.

Figure 11. Development Partnership Effectiveness in Diffusion of Rural Renewable Energy: Revised Conceptual Framework



These research findings contribute to the literature that provided the conceptual and theoretical underpinnings for the study. This research adds to the partnership and development literature by expanding our understanding of the NGO-driven development partnerships in the diffusion of renewable energy technologies in remote rural communities in developing countries. It further develops and adopts a more holistic conceptualization of partnership effectiveness, which accounts for both the process view and the development

outcome view. In an attempt to advance theory on effectiveness of development partnerships, this research puts forward theoretical propositions on the factors that contribute to partnership effectiveness. Innovation literature benefits from a better understanding of the role of NGOs in technology diffusion processes, in terms of how they are involved in the process, and who they partner with and why. Furthermore, this research explores the role of these actors in the technological diffusion in off-grid communities in developing countries – a context, which is not well explored in the innovation literature.

This research applied an interdisciplinary approach, which was challenging at times given the lack of common analytical framework for partnerships in rural renewable energy and the need to integrate literature from several fields of knowledge. However, the interdisciplinary approach helped to provide a more comprehensive view of the studied phenomenon and deal with its complexity. Ultimately, it provided a more complete set of factors that are associated with effective partnerships. During the case study research, field work was absolutely necessary for data collection, particularly to collect the views of community level actors (the Peru case study), and beneficiaries (in both case studies), which could not have been interviewed from a distance. Triangulating data by using multiple data points and rigorously following the informed consent process<sup>29</sup> approved by the Ethics Board proved to be essential in validating the research findings and reducing researcher, translator, and participant biases. Very thorough preparatory work and planning

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<sup>29</sup> Initially I was concerned that the consent forms would confuse the research participants, who have never been through a formal consent process as part of a research. However, by providing a copy of the consent form in advance, allowing sufficient time for research participants to get familiarized with the consent form and explaining and clarifying the contents of the form when necessary proved to be a useful way to minimize confusion among research participants around the consent process.

helped to collect necessary data within a relatively short period of time. However, more extensive field work would have allowed for additional data sources to be included, e.g., through participant observation, and thus would have further enhanced the validity of the research. In addition, the inclusion of more partnerships in other regions would have improved the ability to generalize the findings across a variety of contexts.

### **Research Contributions to Practice**

To the extent that the case study findings can be generalized to other NGO-based partnerships working on renewable energy technologies in remote rural communities in developing countries, the insights from this research have important practical implications for international NGOs operating in Costa Rica or Peru, or in other countries with similar contexts. The studied international NGOs noted that the core factors of effective partnership that they had adopted were applicable in other developing countries in which they worked, though the specifics of a particular project and partnership implementation could vary depending on the local context.

This research signals the importance of international NGOs as intermediaries within the technological supply chains, and local organizations as the intermediaries between the technology and the community. For international NGOs, it suggests that it is essential to partner with local organizations that are close to the community, or to embed locally through regional or local offices. It is important that these local organizations are capable of delivering energy services. For local organizations the key to achieving successful outcomes is educating communities about the merits and use of renewable

energy technologies, building local capacities to operate and maintain the chosen renewable energy systems, and institutionalizing their learning. This research shows that with regard to the qualities of the local partnering organizations, it is the prior experience of working with the communities on development initiatives, (e.g., ACEM working in education and APPTA, in organic agriculture), and the established social capital with the communities emerging from those efforts, which mattered most, rather than having initial expertise in renewable energy.

Clearly defining roles and responsibilities in contracts that use clear language, clearly spell out roles and responsibilities, and allow for flexibility, and revisited regularly, as necessary, is an effective way of dealing with uncertainties associated with the provision of rural renewable energy. It also helps to manage expectations and establish an open and transparent environment for a partnership. Local organizations can benefit by utilizing some techniques that helped organizations in the case studies to institutionalize incorporation of learning into practice, such as, conducting regular reflection meetings, having established spaces for regular discussions and sharing of experience from the field, and documenting these experiences in a written format.

The research also provides insights into ways to engage communities in the project process through training; encouraging involvement through in-kind and/or material contributions to the project; and where appropriate, creating institutions at the community level that are responsible for the management of the chosen renewable energy system. As shown in the case studies, organizations are more likely to have successful outcomes of

their partnerships if chosen technological solutions meet users' needs and preferences, are affordable and provide superior quality and significant advantages in comparison to the alternative sources available to the community. Securing stable sources of financing for operations is important for both international NGOs and local community-based organizations. These organizations will benefit from diversifying their donor funding and identifying medium- and long-term funding opportunities, which would allow them to finance not only the technological aspects of their work, but also their organizational development and capacity building activities. Developing fundraising capacities through the hiring of designated staff for resource development and developing relevant skills, e.g., proposal writing, remains important in improving the chances of NGOs, especially those that are less experienced in approaching foundations and/or other donors, to secure donor funding. In addition to donor funding, the community (as seen in the cases) can provide financial contributions as well and pay for the energy service, which is important to partnership effectiveness.

National governments struggling to address the energy needs of some communities that are difficult to reach by the grid due to their geographic isolation need to start thinking of alternative ways to deliver services to these communities and could rely on NGO-driven partnerships similar to those discussed in the case studies. There are unrealized opportunities for national government involvement, which can be a win-win scenario for energy regulators and providers, NGOs and communities.

Donors that support this work need to realize that short-term funding does not advance the objectives of providing universal energy access to the poor as capacity building for sustainability takes time, which is beyond the average timeframe of grants. Long-term funding of proven models balanced with short- to medium-term funding for further experimentation with technologies and implementation approaches is encouraged. Furthermore, donors continue to emphasize technology funding. Such funding needs to be supplemented with funding for organizational development and capacity building, which are critical in building effective partnerships that deliver the development outcomes sought by all these actors.

### **Future Research**

This exploratory research provided rich insights into the phenomenon of development partnerships focusing on renewable energy in remote rural communities. These insights present interesting avenues for further research into the phenomenon. The research presented a set of theoretical propositions that need to be tested across a larger set of cases. In addition, further research can focus in depth on individual factors, on clusters of factors of effectiveness, or on the relationship between different factors identified through this research. In particular, learning processes in the partnership can be explored further focusing on the questions: who is learning, how are they learning, and how does this learning impact partnership effectiveness? Further qualitative and/or quantitative research in this area can enrich our knowledge of development partnerships and their roles in addressing development challenges. More extensive field work in terms of timing is

recommended to allow for data collection from multiple sources in order to enhance the validity of the research and to strengthen its findings. Studies looking at the partnerships in different contexts, or involved in addressing a variety of other development challenges, such as access to clean water, or health services, would be an interesting and welcome addition to the literature. Given the logistical challenges of conducting such research individually, research teams based in the contexts under investigation might be better suited to research aiming at producing more generalizable findings by covering a larger variety of contexts and a larger sample of partnerships. Such data collection can be also done by participating local organizations. Further cross-referencing and cross-fertilization among different disciplines and areas of knowledge that often deal with the phenomenon of partnerships in isolation is strongly encouraged.



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## APPENDIX A: A Copy of the Written Consent Form, Costa Rica Study

### WRITTEN CONSENT FORM

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#### Name of Researcher, Faculty, Department, Telephone & Email:

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#### Supervisor:

Dr. Larissa Muller

#### Title of Project:

**International Development Partnerships and Diffusion of Renewable Energy Technologies in Developing Countries**

#### Sponsor:

Field work is funded by the International Development Research Centre

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The University of Calgary Conjoint Faculties Research Ethics Board has approved this research study.

#### Purpose of the Study:

*This research focuses on development partnerships between international and local NGOs involved in the introduction and diffusion of off-grid renewable energy lighting innovations. It aims to understand the nature of these partnerships and determine when and how such partnerships can be effective. As part of this research I am conducting an in-depth exploratory case study of partnerships between international NGOs and Costa Rican NGOs working in off-grid communities. This research will be integrated into my PhD dissertation, and the results will be disseminated through academic and professional publications and presentations.*

#### What Will I Be Asked To Do?

*I am going to interview you asking about experiences of your organization with off-grid energy lighting project and of working with partners on this project. The interview will last about 1.5 hours. The interview will be audio recorded to ensure valid and reliable transcription. Your participation is completely voluntary and you are free to discontinue participation at any time during the study. In cases of your withdrawal from the study, the data obtained before the withdrawal will be retained and used by me.*

### **What Type of Personal Information Will Be Collected?**

*I will ask your name and the position within the organization. All responses will be aggregated by type of organization and involvement. The information about the type of the organizations, types of activities and interactions with other organizations and beneficiaries, geographical locations will be public and cited. Please advise if you wish to remain confidential and anonymous and/or you wish the name of your organization to be confidential and anonymous. Please advise if and what pseudonym can be used. Please be advised that absolute anonymity or confidentiality will not be possible if permission is provided to include photographs in the final report.*

*Please put a check mark on the corresponding line(s) that grants me your permission to:*

*I grant permission to have my organization's name used: Yes: \_\_\_\_ No: \_\_\_\_*

*I wish my organization to be anonymous, but you may refer to the organization by a pseudonym  
Yes: \_\_\_\_ No: \_\_\_\_*

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*I wish to remain anonymous, but you may refer to me by a pseudonym: Yes: \_\_\_\_ No: \_\_\_\_*

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*You may quote me and use my name: Yes: \_\_\_\_ No: \_\_\_\_*

*I grant permission to be photographed: Yes: \_\_\_\_ No: \_\_\_\_*

*In case of the photos, please note, if permission to be photographed is granted, the images may be used during my academic and professional presentations, might be published on the web and appear in printed materials. I have no control and responsibility over further use of the photos after their initial dissemination.*

### **Are there Risks or Benefits if I Participate?**

*There are no risks and harms associated with this project. Some participants might feel emotional talking about challenges and barriers to their projects and partnerships.*

*This research will help enhance tremendously the understanding by the researcher of the phenomenon being studied, advance the knowledge and contribute to the practice in the area of pro-poor innovations and development partnerships with the goal of improving their efforts in*



*serving the world's poor. Potentially this knowledge can help your organization build more effective partnerships and projects.*

### **What Happens to the Information I Provide?**

*All electronic copies of interview data, including audio files and transcripts, will be kept on a password protected computer, and all hard copies of the data will be kept in a locked cabinet. Access to data in both hard and electronic form will be restricted to me and my supervisor. The data will be archived indefinitely.*

---

### ***Signatures (written consent)***

Your signature on this form indicates that you 1) understand to your satisfaction the information provided to you about your participation in this research project, and 2) agree to participate as a research subject.

In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from this research project at any time. You should feel free to ask for clarification or new information throughout your participation.

Participant's Name: (please print) \_\_\_\_\_

Participant's Signature \_\_\_\_\_ Date: \_\_\_\_\_

Researcher's Name: (please print) \_\_\_\_\_

Researcher's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### **Questions/Concerns**

If you have any further questions or want clarification regarding this research and/or your participation, please contact:

Mrs. Inna Platonova, PhD Candidate  
Faculty of Environmental Design  
Tel: 613-696-2227 E-mail: [iplatono@ucalgary.ca](mailto:iplatono@ucalgary.ca)  
And  
Dr. Larissa Muller, Supervisor  
Faculty of Environmental Design  
Tel: 403-220-3626 E-mail: [lmuller@ucalgary.ca](mailto:lmuller@ucalgary.ca)

If you have any concerns about the way you've been treated as a participant, please contact the Senior Ethics Resource Officer, Research Services Office, University of Calgary at (403) 220-3782; email [rburrows@ucalgary.ca](mailto:rburrows@ucalgary.ca).

A copy of this consent form has been given to you to keep for your records and reference. The investigator has kept a copy of the consent form.

## **APPENDIX B: A Copy of the Simplified Consent Form, Costa Rica Study**

### **CONSENT FORM FOR BENEFICIARIES**

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**Name of Researcher, Faculty, Department, Telephone & Email:**

*Inna Platonova, PhD Candidate, Faculty of Environmental Design, 613-696-2227,  
[iplatono@ucalgary.ca](mailto:iplatono@ucalgary.ca)*

***Supervisor:***

*Dr. Larissa Muller*

**Title of Project:**

***International Development Partnerships and Diffusion of Renewable Energy Technologies in Developing Countries***

***Sponsor:***

*The field work is funded by the International Development Research Centre.*

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The University of Calgary Conjoint Faculties Research Ethics Board has approved this research study.

**Purpose of the Study:**

*This research focuses on development partnerships between international and local NGOs involved in the introduction and diffusion of off-grid renewable energy lighting innovations to people who initially had no access to electricity. This research will be integrated into my PhD dissertation, academic and professional publications and presentations.*

**What Will I Be Asked To Do?**

*I will ask questions about your participation with the lighting project and your interaction with the implementing organizations. The interview will last about 20 minutes. The interview will be audio recorded to ensure valid and reliable transcription. Your participation is fully voluntary and you are free to discontinue participation at any time during the study. In case of your withdrawal from the*

*study, the data obtained before your withdrawal will be retained and used by me. Please be advised that the decision to participate or not, or to withdraw, will in no way affect your relationships with any of the NGOs or agencies involved in the sustainable energy project.*

### **What Type of Personal Information Will Be Collected?**

*No personal information will be collected. Please note the responses will be aggregated by the village and the name of the village will be revealed. Please be advised that absolute anonymity or confidentiality will not be possible if permission is provided to include photographs in the final report.*

*I grant permission to be photographed:*

Yes: \_\_\_\_ No: \_\_\_\_

*In case of the photos, please note, if permission to be photographed is granted, the images may be used during my academic and professional presentations, might be published on the web and appear in printed materials. I have no control and responsibility over further use of the photos after their initial dissemination.*

### **Are there Risks or Benefits if I Participate?**

*There are no risks and harms associated with this project. Some participants might feel emotional talking about experiences associated with the projects and implementing organizations.*

*You may potentially benefit from this research if the knowledge obtained through this research will enable organizations that serve you improve their projects and partnerships.*

### **What Happens to the Information I Provide?**

*All electronic copies of interview data, including audio files and transcripts, will be kept on a password protected computer, and all hard copies of the data will be kept in a locked cabinet. Access to data in both hard and electronic form will be restricted to me and my supervisor. The data will be archived indefinitely.*

### **Questions/Concerns**

If you have any further questions or want clarification regarding this research and/or your participation, please contact:

*Mrs. Inna Platonova, PhD Candidate*  
*Faculty of Environmental Design*  
Tel: 613-696-2227 E-mail: [iplatono@ucalgary.ca](mailto:iplatono@ucalgary.ca)

*And*

*Dr. Larissa Muller, Supervisor*  
*Faculty of Environmental Design*  
Tel: 403-220-3626 E-mail: [lmuller@ucalgary.ca](mailto:lmuller@ucalgary.ca)

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Recognizing the fact that you might not have communication means to contact Senior Ethics Resource Officer, Research Services Office, University of Calgary, alternative contacts are provided to you. If you have any concerns about the way you have been treated as a participant, please contact the following people:

Beneficiaries in Amubri: Contact person(s): Luis Dumani of ACEM Tel: 011 506 2296 8554

Beneficiaries in Bribri: Contact person(s): Walter Rodriguez of APPTA Tel: 011 506 8882 6037 or Luis Dumani of ACEM Tel: 011 506 2296 8554

## APPENDIX C: A Copy of the Written Consent Form, Peru Study

### WRITTEN CONSENT FORM

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#### Name of Researcher, Faculty, Department, Telephone & Email:

Inna Platonova, PhD Candidate, Faculty of Environmental Design, 613-696-2227,  
[iplatono@ucalgary.ca](mailto:iplatono@ucalgary.ca)

#### Supervisor:

Dr. Larissa Muller

#### Title of Project:

**International Development Partnerships and Diffusion of Renewable Energy Technologies in Developing Countries**

**Sponsor:** Field work is funded by the International Development Research Centre

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#### What Will I Be Asked To Do?

*I am going to interview you asking about experiences of your organization with off-grid renewable energy project and of working with partners on this project. The interview will last about 1.5 hours. The interview will be audio recorded to ensure valid and reliable transcription. Your participation is completely voluntary and you are free to discontinue participation at any time during the study. In*

cases of your withdrawal from the study, the data obtained before the withdrawal will be retained and used by me.

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Participant's Signature \_\_\_\_\_ Date: \_\_\_\_\_

Researcher's Name: (please print) \_\_\_\_\_

Researcher's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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## APPENDIX D: A Copy of the Simplified Consent Form, Peru Study

### CONSENT FORM FOR BENEFICIARIES

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#### **Name of Researcher, Faculty, Department, Telephone & Email:**

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[iplatono@ucalgary.ca](mailto:iplatono@ucalgary.ca)

#### ***Supervisor:***

*Dr. Larissa Muller*

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Sénior Rafael Escobar: Soluciones Practicas, Av Jorge Chaivez 275 - Miraflores, Apartado Postal 18-0620, Lima 18, Peru Tel: (511) 447-5127, 444-7055, 446-7324 Fax: (511) 446-6621 [rescobar@itdg.org.pe](mailto:rescobar@itdg.org.pe)

**APPENDIX E: Partnering Organizations Interview Outline**

1. Organization name:
2. Name of representative:
3. Role within the organization:
4. How long have you been with the organization?
5. How long have you been with the project?
6. What is your organization trying to achieve?
7. How does the project fit into your organization's objectives and mandate?
8. Who are your boundary partners – organizations and individuals you work directly with?
9. Do you differentiate the goals for the project and the partnership?
10. What are the key goals for the project?
11. What are the key goals for the partnership?
12. Why have you chosen this/these partner(s)?
13. How long have you been working with this/these partner(s)?
14. Within partnering organization, whom are you interacting with directly? How often? By what means (e.g., email)?
15. What is your role and responsibility in this partnership?
16. Who are the ultimate beneficiaries? How have they been chosen?
17. How have the beneficiaries been involved in the project and with your organization?
18. How would you evaluate the project progress so far?
  - What are the successes?

- What are the challenges?
19. How would you evaluate the partnership progress so far?
- What are the successes?
  - What are the challenges?
20. Imagine the project is extremely successful in developing and implementing its activities,
- What changes would you like to see the project help to bring about?
  - What would you expect/like/love your partners to be doing?
  - What would you expect/like/love beneficiaries to be doing?
21. What activities are you currently engaged in to bring about the changes you just described?
22. What helps improve your performance as a partner?
23. What hinders your performance as a partner?
24. What helps improve performance of your partners?
25. What hinders performance of your partners?
26. What are the key factors that influence the partnership results? (When things work well with the partnership, what contributes to that, what constraints it?)
- Probes: internal structures and processes; role of intermediaries; role of international NGOs, government, donors, other actors; policy environment; delivery approach; benefits to beneficiaries; financing mechanism; replicability; sustainability; other)

**APPENDIX F: Beneficiaries Interview Outline**

1. Name of the village (community):
2. Why have you chosen to join the project?
3. Have you been involved with the implementing organization before this project?  
How?
4. How have you benefited from the project?
5. Are you satisfied with the product and services provided? What, if anything, would you like to see changed?

## **APPENDIX G: Other Key Informants Interview Outline**

1. Organization/Individual Name:
2. Name of representative (in case of organization):
3. Role within the organization (in case of organization):
4. How long have you been with the organization? /How long you have been in the field?
5. What is/are your organization/you trying to achieve?
6. What organizations/individuals do you partner with? Why?
7. Whom do you consider as your closest partner?
8. Who are the beneficiaries of your projects? How are they chosen?
9. What are the successes in achieving your organization's/your goals so far?
10. What are the challenges in achieving your organization's/your goals so far?
11. What are the key factors that influence the partnership results? (When things work well with the partnership, what contributes to that, what constraints it?)

Probes: internal structures and processes; role of intermediaries; role of international NGOs, government, donors, other actors; policy environment; delivery approach; benefits to beneficiaries; financing mechanism; replicability; sustainability; other)