Working Paper

Field Structuration Around New Issues: Clean Energy Entrepreneurialism in Emerging Economies

Peter Adriaens
Stephen M. Ross School of Business
University of Michigan

Deborah de Lange
Memorial University of Newfoundland
Canada

Ross School of Business Working Paper
Working Paper No. 1180
December 2012

ORGANIZATIONAL FIELD FORMATION AROUND NASCENT INDUSTRIES: CLEAN ENERGY ENTREPRENEURIALISM IN EMERGING ECONOMIES

This research contributes to the literature on emerging industries by examining how an organizational field takes form as a new entrepreneurial venture arises and is legitimized. Clean energy firms face unprecedented challenges, arising in emerging economies where energy infrastructure is inadequate or non-existent. These are local contexts where there are no pre-existing related industries, yet the intent is to diffuse renewable energy widely to an extent that it could spur broader local economic development .This research proposes that in the absence of legitimacy-building mimetic, normative and regulative mechanisms, unique types of endorsements legitimize and enable new firms in nascent industries.

Recent research has argued that entrepreneurial business model and technology innovations applicable to clean energy have the potential to become increasingly driven by developing economies. For example, evidence is emerging that reverse innovation (frugal reinvention of technologies from developed country origin) is scalable and has the potential to offer clean energy solutions for the West (The Economist, 2010; Eyring, Johnson, & Nair, 2011; Talukdar, Horn, Alton, & Christensen, 2010). Energy solutions and the related small and medium sized firms are particularly consequential to local economic development (Allderdice & Rogers, 2000; de Vries, Flink, Kauw, van der Vleuten, & Mulder, 2010; UNDP, 2000). Some emerging market governments have liberalized their energy sectors, allowing small independent power producers (IPPs) to compete alongside large utilities.

However, clean energy entrepreneurs face formidable challenges even though the potential demand for their offerings is high. Barriers, such as perceptions that grid connectivity is preferable over distributed renewable generation can make renewable energy a contested practice among potential adopters. Local organizational fields that form around this energy issue provide uncertain support for new firms, yet, potentially the new firms and local communities are reciprocally critically reliant on each other. Scott (2001: 84) describes the concept of an organizational field as "a community of organizations that partakes of a common meaning system, and whose participants interact more frequently and fatefully with one another than with others outside the field." Additionally, fields may be "…formed around the issues that become important to the interests and objectives of a specific collective of organizations" (Hoffman, 1999: 352). The constellation of the field is also unknown. Since energy becomes part of the local infrastructure, patterns of initiation and decision making reflect interdependencies (Schmitt, 2009) and multiple concerns including climate change, energy security, and local economic development (Martinot, Chaurey, Lew, Moreira, & Wamukonya, 2002; Morey, Milford, Madeira, & Stori, 2011; UNEP, 2011).

Early work in contested practices was developed and tested in the context of the US chemical industry that had a long history of polluting (Hoffman, 1999). Motivating change in that context towards cleaner practices was challenging and occurred slowly over decades. The chemical industry has been resistant to adopting environmental practices and most of the work in the area of contested practices has examined controversial change that resulted in heterogeneity rather than homogeneity in the field, warring factions, and even breakups of firms (Hoffman, 1999; Oliver, 1991; Pache & Santos, 2010; Sanders & Tuschke, 2007;). Other work studied the turbulent online database industry and found that change was affected by path dependence and

constant conflict of opposing forces (Farjoun, 2002). Historical context affects adoption and firms are imprinted by their originations (Katila, Chen, & Piezunka, 2012). Researchers have combined institutional and stakeholder theories to examine the drivers of adoption of environmental management practices beyond those required by regulation (Delmas & Toffel, 2004); coercive and normative forces from various stakeholders were posited. Another study examined uncritical adoption whereby particular actors were very strategic in their approach to convince others of the legitimacy of changes without strong bases of evidence (Kitchener, 2002). The study uncovered the antecedents of myth construction in a qualitative case study of professional services firms when adoption of mergers was desirable by some; thus, actors in the field were convinced of a myth, that mergers are a positive path for firms, without substantial evidence. The research demonstrated how controversy may be avoided around an issue that would otherwise be contested.

Despite many contributions, previous research in contested practices has not examined contexts where an issue does not have a long history of embattlement and instead, has almost no history, but has a high level of uncertainty in its level of controversy. Thus, the early evolution of the organizational field forming around a potentially contested issue has not been considered. Likewise, entrepreneurship studies on early start-ups in emerging economies that lack all of the support systems that a developed nation context offers show that many of these firms focus on solutions that address basic needs, without a growth strategy or considerations for supporting other types of local firms and the related economic development (London & Hart, 2004; McMullen, 2010; Miller, 2012). On the other hand, the flattening of the world has resulted in high growth entrepreneurial business development with focus on exports and FDI, because the entrepreneurs can leverage online services required to scale the company (IT, accounting, billing,

design) (Prahalad & Hammond, 2002; Yamakawa, Peng, & Deeds, 2008). Some conceptual research has generated propositions for new ventures internationalizing via foreign direct investment (FDI) from emerging to developed economies, generally, in unspecified or very generalized industry (high versus low technology) contexts and assuming intense domestic competition and/or high development costs (Yamakawa et al., 2008). This is different from the context of this research that assumes no pre-existing renewable energy industry or real competition in the localities of interest. For example, some populations may have access to very unreliable coal-fired grid-supplied energy, as is often the case in India and will be illustrated later, but this is not real competition for an affordable and reliable supply, such as can be generated by distributed renewables. Other small outlying villages have no electricity supply. The current research considers resource constraints for the entrepreneurs and their firms such that they cannot engage in significant overseas investments, as in FDI (Brush, Greene, Hart & Haller, 2001; Yamakawa et al., 2008). Instead, they may be able to engage in international trade. Therefore, a similar research opportunity arises from the combination of both areas' perspectives, entrepreneurship and institutional theory (contested practices), to investigate the dynamics of field formation given a new firm offering a relatively unknown solution to a pressing problem in an emerging economy that is open to IPPs.

The firms in past studies of contested practices, whether a field level study or one that examined intra-organizational issues, were in mature stages of the organizational lifecycle, i.e., large corporations with established markets, not small entrepreneurial firms as in this research (Delmas & Montes-Sancho, 2010; Delmas & Toffel, 2008; Hoffman, 1999; Sanders & Tuschke, 2007). In accordance with previous research in entrepreneurship, we define entrepreneurial firms as those, "that start from weak market positions with few resources" (Katila et al., 2012, p. 117).

Most studies in contested practices have been in the US context and the occasional study has been European (Kitchener, 2002). In contrast, this study examines new firms that have no other similar local competition and that grow out of a local emerging market community (Martinot et al., 2002). Thus, they are much more embedded in their organizational fields than are large firms and they find it difficult to make unilateral decisions that also affect the community (Martinot et al., 2002; Greenwood & Suddaby, 2006).

We investigate how an organizational field takes form as a new firm arises in a community including the constellation of actors that influences the local adoption of the firm's new offerings. This work contributes to institutional theory (DiMaggio & Powell, 1983; Meyer & Rowan, 1977) by further developing the area of contested practices (Kitchener, 2002; Oliver, 1991; Pache & Santos, 2010; Sanders & Tuschke, 2007) and field level change around issues (Hoffman, 1999). If the solution to the energy issue is the birth of a new clean energy business, how do these firms build legitimacy to support their survival (DiMaggio & Powell, 1983;Meyer & Rowan, 1977)? Legitimacy is defined as, "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman, 1995, p. 574).

Legitimacy helps new firms get over the liabilities of newness and foreignness and is considered a critical facet for a young firm's survival (Stinchcombe, 1965; Turcan, 2011; Zaheer, 1995). Previous literature has considered mechanisms such as conformance, selection, manipulation, creation, and mimicry that support legitimation (DiMaggio & Powell, 1983; Miller, 2012; Oliver, 1991; Suchman, 1995; Turcan, 2011; Zimmerman & Zeitz, 2002) but many are not operative in the remote contexts of this research. For example, conformance to rules when there really are no relevant rules for such a new industry, except that the government has to

allow the entry of the new energy firms, cannot, therefore, build a firm's legitimacy (Suchman, 1995). Also, the entrepreneurs in these types of locations are not usually financially or politically free enough to select their environment, as compared to, for example, Silicon Valley, where they would find a supportive business ecosystem for their innovations (Suchman, 1995). Instead, they choose to improve the environment that they are in. ok Therefore, manipulation is a possible approach that an entrepreneur may use, exemplified by developing relationships with other entities (Oliver, 1991; Suchman, 1995). Manipulation has been discussed as unlikely for new ventures (Yamakawa et al., 2008), but the small village context in an emerging market alters this likelihood since a local entrepreneur can have significant influence in this case. Creating new innovations can also build legitimacy and this is addressed in conjunction with a new firm's involvement in reverse innovation.

Mimetic isomorphism is difficult because there are few or no relevant previous models to copy in this context. After an organizational field emerges, theory suggests that organizations homogenize through mimicry (DiMaggio & Powell, 1983). Organizations adopt the same innovations and as the innovations spread, they gain legitimacy, thus leading to more adoption (DiMaggio & Powell, 1983). The innovations are normatively sanctioned such that higher performance is not necessarily what is legitimized (DiMaggio & Powell, 1983). However, in the locations of interest in this research, there are no previously established renewable energy sources and possibly, no reliable energy sources at all. Very aptly, the entrepreneurship literature characterizes emerging industries as uncertain and full of causal ambiguity (DiMaggio & Powell, 1983; Lippman & Rumelt, 1982; Miller, 2012; Starr & Macmillan, 1990), and in a context where there is no industry at all, these aspects are heightened. However, previous research also suggests that there are benefits in new markets for entrepreneurial technology firms such that they have

more control than if they arise in established markets (Hart & Christensen, 2002; Katila et al., 2012; Morey et al., 2011). In other words, an undeveloped market does not contain competitors and entrenched consumers (Hart & Christensen, 2002; Katila, et al., 2012; Morey et al., 2011). In any case, a new firm's legitimacy develops through other influences, aside from mimetic isomorphism and some of the other mechanisms, as will be illustrated through the cases. Generally, the mechanisms proposed here are endorsements of types unique to the context.

In order to garner endorsements, the local firm may signal its intent to be a good citizen, or socially responsible, within its community (Matten & Crane, 2005). Previous literature has elaborated on symbolic management, behavior that communicates subjective social meanings, used to build legitimacy and ultimately attract resources (Zott & Huy, 2007). However, symbolic actions fall into categories including: building personal credibility, professional organizing, organizational achievement, and stakeholder relationships, as theorized in the British firm context (Zott & Huy, 2007). Although there may be some analogues in the emerging market context within the latter category of stakeholder relationships, the British context is so different that our context calls for additional research. In our context, powerful stakeholders may recognize the value that a new firm offers, whether through its good citizenship or its direct business value and consequently, link or associate with the entrepreneurial firm in various ways. Thus, the new firm gains legitimacy through endorsements and improves its reputation (Rao, 1994; Stuart, Hoang, & Hybels, 1999; Suchman, 1995). This legitimacy and resulting reputation increases the life chances of the young firm (Rao, 1994; Stuart et al., 1999; Suchman, 1995).

RESEARCH CONTEXT: AREAS OF EMERGING AND DEVELOPING ECONOMIES OFF-GRID OR UNDERSUPPLIED BY ELECTRIC UTILITIES

The context for this theory is emerging and developing markets in remote areas where electricity has been undersupplied, not being widely available or reliable (Hart & Christensen, 2002). In these types of regions of rapidly growing populations, also facing damaging impacts of climate change, the energy source issue is more critical and prevalent than in industrialized nations where widely accessible and reliable energy has been a precursor to industrialization. In addition, in underdeveloped regions, many firms are small and young, not having any existing similar local energy firms or models to mimic (de Vries et al., 2010; Hart & Christensen, 2002). Emerging markets are rapidly growing economies, still requiring development, but generally viewed as further along the development path than developing nations. Classifications are not well established, but World Bank gross national income (GNI) classifications tend to be used such that many of the emerging economies fall into the upper middle income category whereas, developing countries fall into lower income categories. Energy supply can be a new issue in areas of both types of countries, but is less likely new in developed nations. Our context offers a reduced history of industry conflict on the subject of energy (Hart & Christensen, 2002). Although these countries have plenty of development history, they are not histories consisting of advanced economic development including firms and the required supporting infrastructure (Martinot et al., 2002; Morey et al., 2011; Perkins, 2003; UNEP, 2011). Therefore, when the local goal transitions from subsistence to economic development, infrastructure issues that affect the growth of firms and the entire local community, such as the choice and provision of energy supply, are relatively new (de Vries et al., 2010; Martinot et al., 2002; Talukdar et al., 2010; UNEP, 2011).

The same issues are not new in the US context where industries are large and established (Sine & David, 2003). Polluting industries have been confronted with policies to change after they have long adopted old habits hard to change (Hoffman, 1999). Theory suggests that larger firms are less often as deeply embedded as small firms are within their local communities (Greenwood & Suddaby, 2006), although this is not a rule. For example, Dow Chemical in Midland and P&G in Cincinnati may be a couple of representative exceptions; they reciprocally rely on each other for an employment pool and tax revenues. The theoretical reasoning behind the former view is that large firms have more resources and clout and will act independently (Greenwood & Suddaby, 2006). This may explain why it is the larger ones that engage in battles with communities to avoid adoption of environmental management systems and the related transparency (Delmas & Montes-Sancho, 2010; Delmas & Toffel, 2008; Hoffman, 1999; Reid & Toffel, 2009). As explained by the following citation, conversion to renewables is not generally such a contentious issue in the South nations as in the industrialized North. Of course, this will vary by the country and local community, but it is generally true according to the excerpt below that explains why.

> …the long-term nature of the renewables option would allow a more gradual and less disruptive transition away from dependency on fossil fuels. Engendering support for renewables was, consequently, somewhat less onerous. The consensus is bolstered by mounting evidence indicating that while fossil fuels will, in the long-term, be exhausted or become uncompetitive in cost (as more costly reserves are exploited), renewables constitute a reliable and ecologically sound long-term alternative for virtually all countries of the South including many of the present oil-

exporting developing nations which have abundant and unexploited solar, wind and hydro resources (Karekezi, 2012).

Climate change will and is disproportionately affecting the South, partly due to dependence on rain-fed agriculture and potable water supply shortages, so these countries expect direct consequences if they do not convert to clean energy (Dutz & Sharma, 2012; Graham & Johnson, 2000; Karekezi, 2012). Air pollution from carbon emissions is another problem (WEC, 2001). These issues have not been lost on the international community and, for example, the US Department of Energy has reserved funds to support early stage radical energy solutions that private investors would find too risky (Dutz & Sharma, 2012). However, the emphasis is on entrepreneurialism and allowing the market to determine technology winners. Moreover, most energy installations will be based on catch-up innovation (Dutz & Sharma, 2012).

Emerging economies offer varying contexts and much uncertainty surrounds organizational field development when the energy supply is off-grid and the government supports an open energy market; more opportunities arise for new entrepreneurial firms to exploit critical needs. For example, in contrast to many developing countries, Brazil has connected or will successfully connect most of the country to grid-supplied electricity and only remote areas in the Amazon will require stand-alone renewable energy sources, providing opportunities for IPPs (Niez, 2010). China is expected to use decentralized supplies to electrify those remaining without power (Cheng, 1997; Edwards et al., 2004; Hawkes, 1986; Niez, 2010). The country is encouraging foreign direct investment (FDI) in renewable energy and has put limitations on future coal-fired plants (Kempener et al., 2010; Niez, 2010;). India has liberalized its energy industry such that state utilities have been unbundled, separating generation, distribution, and transmission (Niez, 2010). Either grid extensions or stand alone systems are

being encouraged with a goal that everyone will have power by 2012 (Niez, 2010). Also, electrification of South Africa in its urban segregated townships, informal settlements, and rural areas is considered a stepping stone towards eliminating historical ethnic inequalities (Niez, 2010). In non-grid areas, the country has enlisted six private solar energy firms to build solar homes (Niez, 2010). Otherwise, the country is reliant on coal for grid electricity and also exports it (WEC, 2001; Niez, 2010). Other countries such as Bolivia and Vietnam are introducing off-grid biogas projects (de Vries et al., 2010). Also, Bolivia, Tanzania, and Uganda are implementing off-grid solar energy.

EMERGING VALUE CHAIN ACTORS AND RENEWABLE ENERGY TECHNOLOGY (RET) ENTERPRISE DEVELOPMENT IN DEVELOPING COUNTRIES

For innovative entrepreneurial ventures that offer non-traditional, clean renewable energy, the power supply model, usually established by governments, must allow entrepreneurial participation. Four power models include: 1) the monopoly model, 2) the single buyer model, 3) the wholesale competition model and, 4) the retail competition model (Deloitte Touche Tomatsu, 2004)[1]. The latter three models offer opportunities for IPPs and, as ordered in the list, they progressively encourage more competition (Deloitte Touche Tomatsu, 2004; UNDP, 2000). The problem with the monopoly model is that all generation is controlled by a single power company. The main goal of power market reforms in emerging economies has been to attract investment to improve service quality, reliability, and geographic coverage. In contrast, the industrialized world has been breaking up monopolies to encourage competition with the hope of reducing consumer prices, and diversifying power generation sources for grid stability. Research

[1] See the The Deloitte Touche Tomatsu (2004) report for descriptive details of each model.

recommends that the South develop decentralized power models that will work better in their contexts of differing institutional and regulatory environments and smaller markets (Deloitte Touche Tomatsu, 2004). India is doing this to promote rural electrification (Niez, 2010). However, even with improved models, the regulators must recognize the independents as legitimate, not encumber them with difficult contractual requirements, and allow them to sell their power at a reasonable price (UNDP, 2000; Karekezi, 2012).

In developing countries, the development of renewable energy resources including biomass, wind, hydropower, solar and geothermal has slowly progressed over the years, although many countries have found ways to promote sustainable technologies and products for cooking, water pumping, lighting, industrial heating and power generation, generally following the energy ladder from biomass-based to renewable technologies (UNDP, 2000). Given the targets set for achieving the Millennium Development Goals (MDGs) by 2015, practical efforts have been initiated to develop programs for deploying renewable energy technologies (RETs) to meet the challenges of increasing energy demand and widening energy access to under-served communities (Thiam, 2011). These programs, however, face major challenges including weak institutions, inadequate capital, low technological development, poor capacity, and poor investment incentives for market-based scale-up (UNDP, 2000). Despite the view that RETs can offer new employment opportunities and create possibilities for local manufacturing of equipment, existing policies and regulatory frameworks have provided limited resources to stimulate market growth. Furthermore, a sizeable proportion of renewable energy projects implemented in Africa, particularly those driven by donor funding and through carbon finance have largely been unsustainable after project funding is exhausted. The absence of enabling policies and financial support to stimulate technological progress and market scale-up has

resulted in further curtailment. In this regard, there is a need for building up technological capacity and investment incentives to meet the challenges of sustainable development in RETs and markets in Africa and other developing economies (OECD, 2010; World Bank, 2010).

Although often commercially available, several RETs in Africa, BRIC (Brazil, Russia, India, and China) countries and the Caribbean are still in transition, with a continuing need for demonstration and validation. Furthermore, except in some niche markets, many climate technologies are more costly than conventional energy sources (Sawin, 2004; UNDP, 2000). As in developed countries, substantial cost reductions can be achieved for most technologies through public investment incentives including low interest loans, micro-finance credits, tax relief, and favorable lending schemes, in which banks guarantee the cash flow of a project thus reducing investor risk (OECD/IEA, 2004). Skilled people are also required to support industrial growth and encourage a culture of market-driven innovation. Therefore, a combination of instruments and effective frameworks are essential for successful RET development, capacity enhancement, research and development (R&D) for market scale-up (Hammond, Darkwah, Obeng, & Kemausuor, 2008).

Although the benefits of alternative energy seem clear from the perspective of economic development and reverse innovation export models, such that emerging market innovations are found useful in developed countries, many barriers to entrepreneurial innovation in energy for developing countries exist. Capital costs and a lack of institutional support still prevent local power at remote locations (Niez, 2010). However, distributed renewable power is cost-competitive (Thiam, 2011). The main problems have been listed as: 1) institutional deficiencies, 2) pricing distortions, and 3) limited information on the renewable energy resource base (WEC, 2001; Thiam, 2011). In Kenya, the ethanol program has experienced government control over

prices, making them so low that the program reports losses (Karekezi, 2012). Also, in Tanzania, they have determined, through a biogas pilot project, that large-scale replication of this type of clean power generation could supply over 10% of Tanzania's total electricity supply needs. However, it is held back by institutional and economic limitations (Global Environment Facility, 1993; Karekezi, 2012). Tanzania has liberalized the power industry, yet there are still blockages and many countries still have power monopolies in place that prevent independents from entering the market. Even when there is market openness including subsidies to promote alternative energy, other barriers to installation include the high cost of end-user devices, end-user connection fees, prohibitive safety regulations, and insufficient skills and information (Karekezi, 2012; Niez, 2010; Stockholm Environment Institute, 1994). For example, in India, skilled labor for solar PV installation maintenance and operation is in short supply (Niez, 2010). When barriers like these arise and power is needed, countries import outdated Western conventional technologies (Karekezi, 2012).

Central to overcoming the market scale-up challenge is the development of microenterprises and entrepreneurial business development along the value chain that enables value creation for all stakeholders (Blackman, 1999; London & Anupindi, 2012). Renewable energy for income generation is an exportable economic development model that has enabled other countries and regions to make leapfrog technology choices, and allowed companies to innovate (Hart & Christensen, 2002; Perkins, 2003). Examples include the widespread adoption of solar technologies, biofuels, microhydropower, and LED lighting. Biofuels for local transport and export in Latin America and Southeast Asia (Brazil, Argentina, Malaysia and Indonesia) are fully integrated as an industry that has become emulated elsewhere, sometimes with environmental tradeoffs (forestry depletion). Small hydro has become an established approach to

power industrial activities in India, Thailand, Nepal and Sri Lanka. Brazil, China and India, have developed significant RET manufacturing capabilities, as well as the design innovations associated with key technologies and processes, and are exporting to the West. China has not only mastered but also scaled hydro, wind (below 750 kW) and solar (70% of world urban PV lighting systems, first in world solar water heaters) technology manufacturing and is a world leader in the fields of design, engineering, management and facilities manufacturing of hydropower. Brazil is the world leader in bio-ethanol while India leads in small-scale modern biomass systems and has significant capabilities in wind and solar. Malaysia and Indonesia are developing their own designs of biofuel technologies and may soon rank in the top echelons of the industry. This has resulted in South-to-North trade opportunities, as well as in increased deployment and scaled adoption of climate technology models locally. Africa is lower on the energy ladder, and thus cooking is where income levels are recognized as a major determinant of progression to modern energy systems (Chambwera & Folmer, 2007; Ouedraogo, 2006). Success in achieving Millenium Development Goals will therefore be closely linked to identifying the value chain actors, and capitalizing on local value creation in the development of climate technology solutions for income generation (Brew-Hammond, 2007).

Few institutional theory studies of adoption have been conducted in an emergent and turbulent context, in the sense that many developing economies are quickly and unpredictably changing. From emerging actors on the microenterprise value chain to the identification of new economic opportunities for revenue generation and export of indigenous innovation, the motivations that influence field formation around renewable energy decisions in developing countries are multifaceted. Illustrations are helpful for demonstrating that emerging collective visions for value-added entrepreneurial solutions, innovative funding and technology

development partnerships, and relationships with influential stakeholders are key enablers towards local energy choices.

THEORETICAL DEVELOPMENT

To address the research question in our context, four propositions are developed (See Figure 1) to advance some answers to the research question in the context of entrepreneurial renewable energy in off-grid or poorly connected (rural) areas of emerging economies. The organizational field is made up of many actors and it could be a leader organization, a dominant coalition, a consensus amongst actors, or some other constellation of actors that emerges to influence a decision on alternative energy adoption.

{Place Figure 1 about here}

Local Collective Vision of a Better Solution

In a case study by Schmitt (2009), "Craft Skills, East Africa Limited", it describes an entrepreneurial start-up in Kenya that builds wind power generation devices from local materials to supply energy to small, dispersed off-grid African villages. This paragraph is a summary description of Schmitt's (2009) case that highlights relevant facts for this research. Schmitt (2009) explains that in some cases, an entire village is wired with electricity by Craft Skills' equipment and in other cases, the electricity is used for water pumps, supplying agricultural irrigation and clean drinking water. The main customers are small stores and community groups. Villages that are powered become part of the global community through mobile communications

(cell phones) and customers' electricity demand grows. When villages have power, constituents can become customers of firms like Safaricom, a telecommunications provider that expands as its customer base grows. This larger firm fills an institutional void (Chung & Luo, 2012), a lack of energy infrastructure that the utility has not provided, as it adds charging stations to cellular base station sites. Craft Skills' wind turbines prove to be successful even in a low trust society; for example, regular bribery is required when dealing with government. In this case, the founder of Craft Skills had experienced the value of electrification under British rule, but lost it with Kenya's independence from Britain. This desire and vision of the founder for the return to a higher standard of living, having some electrical background, started it all for Kenya and other locations on the African continent.

In this case, the organizational field is initiated by a leader with vision, borrowed from previous days when he had electricity except that he has come up with a modern idea for wind power generation. However, he needs friends who will agree to work with him on this vision of wind power so as to build the firm from scratch. Also, the customers are small, not large firms, including communities that must also build a collective vision in order to motivate the accumulation of capital to purchase wind power generation equipment. Without these local customers, the entrepreneurial firm could not survive. Communities must believe that the electricity from the wind power will prove to be a valuable investment as they do not have slack resources to expend on mistakes (Cyert & March, 1992; Thiam, 2011; UNDP, 2000).

Part of a successful entrepreneur's repertoire of skills is relationship building and previous research has outlined quite specifically how "social assets" may be developed (Starr & MacMillan, 1990). For example, by creating opportunities for friends to work to with him, enabling them to demonstrate their skills, the founder of Craft Skills builds social assets (Starr &

MacMillan, 1990); having strong relationships with his co-workers keeps the business together. Moreover, by being part of the local community, the entrepreneur appears to demonstrate his commitment to solve a problem of a lack of electricity for the community. Solving problems is considered another approach to building social assets, so he draws in the small stores and community groups such that they are more likely to trust in and buy-into his vision (Starr & MacMillan, 1990). Having built the local networks, the entrepreneur generates positive sentiments for the venture for future support and tolerance when something goes awry (Starr & MacMillan, 1990).

In contrast to this case, in South Africa electricity users in rural areas do not envision renewable solar energy as a permanent option even though the country has one of the best solar regimes in the world (Niez, 2010). Renewable energy in South Africa is labeled “rural energy” such that all applications are perceived negatively, as second class (Niez, 2010). Convincing rural citizens to accept new technology over a grid connection is a common problem (Wimmer, 2002). Moreover, the International Energy Agency specifically recommends that involving rural community members in decision making substantially enhances the success of electrification efforts (Niez, 2010). If they are involved, they understand and learn the value of the projects, gaining buy-in (Graham & Johnson, 2000). Thus, positive local community beliefs in these projects are crucial for their long term adoption (Thiam, 2011). In South Africa, there is no local entrepreneurial leader to build a symbolic social connection between the people and the new system that would otherwise be associated with the local “hero”. In the successful Craft Skills story, the local entrepreneurial leader provides a trusted personal endorsement of the offering through his association with it.

Also, notice that in the Craft Skills case, it is not large firms or government support, especially noting that the utility seems to have forgotten its function for a large part of the population, that are behind adoption of wind energy. Larger institutions are absent except that the Kenyan government must be supporting a context that allows IPPs. In general, it is widely viewed that economic development is very much driven by new ventures and this case is an illustration of that (Carter, Stearns, Reynolds, & Miller, 1994; UNDP, 2000). The entrepreneurial firm, Craft Skills, fills one void – the supply of mobile, affordable clean energy. Smaller firms seem to be successful at these types of innovative differentiation strategies over cost leadership approaches (Carter et al., 1994).

Aside from this example, other international development organizations supporting the introduction of off-grid renewable energy also view the visionary entrepreneur as necessary (de Vries et al., 2010; Dutz & Sharma, 2012; Graham & Johnson, 2000). In the Craft Skills case, following the entrepreneurial entrant, demand for electricity increases, mobile phones are in demand and a telecommunications firm further fills the institutional void that the utility and government (seem to have forgotten or) cannot fill. In contrast, in South Africa, this chain of events has not happened such that solar rural electrification has not led to further renewable adoption and the related economic development; renewables stop at rural household electrification (Niez, 2010). Thus, the organizational field has not formed to build a vision supportive of renewables. It does not include players such as telecommunications or other firms and organizations to support the vision (Niez, 2010).

Overall, this analysis suggests that although, in the Craft Skills case, renewable adoption required an innovative leader to begin field formation, other local players had to collectively adopt the vision of wind power including scarce employees, having directly related skills, and

small, local customers. They likely adopted the vision because they symbolically connected an influential local leader with the solution, making it a favorable one. The local change maker is influential through a shared identity with the local people combined with demonstrations of personal involvement to improve the community (Bord, 1975). The costly efforts are perceived as commitment to the community as well as a personal endorsement of the solution(s) thus engendering trust in the energy solution (Bord, 1975).

> **Proposition 1:** The stronger the symbolic social connection between the leader (i.e., an entrepreneurial firm) and its local community, built through the combination of a shared identity and demonstrated community commitment, the more likely is the renewable energy solution to be adopted by the community.

Supportive Funding and Development Partnerships

The next case comes from Bihar, India, a city of 80 million people where 85% do not have an electrical grid connection (Norbu, 2011). This context is different from the previous case of small, dispersed African villages; however, rural areas of India are considered low density for the purposes of grid electrification (Niez, 2010). In Bihar, when people have an electricity connection, it is to a dirty, unreliable government run coal-fired plant (Norbu, 2011). Diesel generators have been the only competition (Norbu, 2011). This case of entrepreneurs inventing simple, clean, affordable energy using rice husks is summarized in the following paragraph.

Three students, two from the University of Virginia, and another engineering student in Bihar together with another local from Bihar researched possible renewable energy options. One of the students discovered a way to develop a 100% biomass-based power plant using waste rice husks; the first power plant became operable in the 2007/08 time period with the backing of

Samta Samriddhi Foundation; thus, HPS was an entrepreneurial NGO that became a self-sustaining business (Dichter, 2010; Norbu, 2011). Local farmers provide the rice on contract and three villagers are in charge at each power plant. Farmers' discarded, unused rice husks release methane, but with the new system, the only byproduct is ash that can be used in cement. Via small power grids, the plants power local households and can scale up or down as demand changes. Also, households are given two compact fluorescent light bulbs and unlimited cell phone charges. This system costs less than the dirty alternatives, kerosene lanterns and diesel generators, for off-grid customers.

The firm has found it important to maintain good relationships with local elders who are influential so that the firm can collect payments, reduce fraud as for example, electricity theft is extensive (Niez, 2010; Gadl & Knobloch, 2011; WEC, 2001), and encourage upkeep of the systems. Also, the firm has been building the power plants for free to build good will with the local people. Finally, in 2008, Husk Power Systems (HPS) was able to attract the Acumen Fund and The Shell Foundation to provide additional technical and financial assistance. The case acknowledges that the business environment, including stronger law and order, has improved in Bihar. Moreover, the government is working with HPS to get into the carbon credit market. HPS, by expanding at two plants per week, has improved the standard of living while engaging in other corporate social responsibility (CSR) initiatives such as helping rural women to find jobs, job training, and paying for some children's education through a foundation. What follows is an analysis of organizational field formation.

First, this case illustrates how external non-market partnerships can be supportive, whether they are engineering students from a foreign country, the United States in this case, or charitable and responsible investment funding partnerships that may help a promising social

enterprise expand. Previous entrepreneurship research has considered additional types of partnerships for technology startups such as those with universities or research institutes and participation in venture associations (Lee, Lee, & Pennings, 2001). It does not suggest that these types of ties represent endorsement advantages. Instead, universities provide development knowledge and an employee resource pool whereas venture associations build a founder's network through social capital construction (Lee et al., 2001). In the outback regions of emerging economies, universities may not be accessible or too underdeveloped to assist entrepreneurs, if they exist, and venture associations do not exist since there is little industry. A reliable electrical supply is required infrastructure to prompt industry to develop. Although government may sometimes support and, thereby, endorse small business by, for example, supplying easier access to funding (Lee et al., 2001), off-grid area firms are often not supported this way, as is illustrated in this case.

A recent study on partnerships in development finance and sustainable energy records multiple cases of successful alliances between microfinance and technology firms (Devine, Sheldon, & Smith, 2010). The report defines development finance as funds offered to institutions and projects intending to lessen poverty and provide access to financial and other required services for poor and low-income households (Devine et al., 2010). The funds may be in the form of loans, equity or grants (Devine et al., 2010). Social investors including the public and multilateral investors have provided funds for solar-powered home lighting and bio-energy production facilities, for some examples (Devine et al., 2010). Also, the International Energy Agency reports that secure and dedicated funds are required after initial implementation of stand-alone systems or else there is likely to be de-electrification as has happened in China (Niez,

2010). The report also emphasizes the importance of the private sector in electrifying remote villages when stand-alone systems are required (Niez, 2010).

In the current case, the Samta Samriddhi Foundation, the Acumen Fund, and The Shell Foundation are mentioned as investors in Husk Power Systems. Moreover, extensive CSR initiatives and good will building are offered in parallel with the business solution; the Samta Samriddhi Foundation helped HPS with these initiatives such as children's education. These activities build trust with customers and thus, help to distribute and maintain the energy solution (Zott and Huy, 2007). Thus, the evidence from the Husk Power Systems case and other information presented illustrates the need for technology entrepreneurs as leaders, but also that responsible investment partners are helpful and necessary for wider and longer term adoption.

When an issue arises, such as the need for transformative energy solutions, a leader entrepreneur is at the forefront. However, a small company like HPS will have a hard time obtaining attention from a population of 80 million people and the Indian government that is running coal burning power plants. The company and its power supply only indirectly competes with the power plant – it is reliable, distributed, renewable versus unreliable, centralized and polluting power production. HPS competes with the diesel generators – backup power. Niez (2010) explains that in India the costs of rural electrification, corruption, a lack of political will, and mismanagement have prevented utilities from engaging in rural projects. As the HPS case illustrates, in areas of large off-grid populations, like those of India, funding partners can help scale up the business as a whole so that it has the resources to gain broader attention and acceptance. Engaging in the good will initiatives are costly, but necessary to encourage adoption in more populous areas where direct communication with each household is time consuming, if not impossible. By word-of-mouth, good news of free light bulbs and unlimited cell phone

charging encourages Indians to find HPS rather than HPS having to knock on everyone's door; it is a pull rather than a push marketing strategy.

This discussion illustrates that the development of the organizational field includes a leader firm and a general consensus that the venture is worthwhile. It is not a dominant coalition of powerful players that takes charge in this case. Funding agencies' involvement signals a wider consensus because those like The Shell Foundation are large, international bureaucracies, requiring internal consensuses to release funds on behalf of a small firm like HPS. Each funding agency's version of due diligence is done. This not only enables the small firm in terms of resources, but it also provides it with a legitimating endorsement (Rao, 1994; Suchman, 1995). Although many off-grid Indians may not be motivated by such an endorsement, the Indian government does take notice and this gives the small firm a boost so as to gain the government's support, illustrated in the case with the carbon credit initiative. The government, however important, is a laggard that only responds after a small firm gains notice through significant funding partnerships. Thus, the following proposition recognizes the leadership of the new firm together with the importance of funding partnerships for broader adoption in the Indian context of larger and higher density populations.

> **Proposition 2:** As the local target market increases beyond an entrepreneur's reach, the greater is the requirement for funding agencies' involvement in promoting an entrepreneurial firm's renewable energy solution such that the likelihood of adoption increases.

Local Relationships with Influential Actors

The case of Husk Power Systems is also illustrative of a unique cultural characteristic in many developing economies: the influence of local community elders. In the industrialized

world, our communities are not that tight, or collectivist, so as to recognize and make community elders influential (Hofstede, 1983). Developing countries have local, traditional hierarchies and leadership positions that remain in place even after urbanization impinges and modern capitalistic systems enter, thus these socio-political systems are to be respected and can create barriers for new technological systems otherwise (de Jonge, 1979; Erazo, 2010; Haalboom & Campbell, 2011). Although HPS can offer many material incentives to off-grid Indians to adopt the cleaner energy supply, local individual and group level support is required also for after sales issues.

Particularly, HPS builds and maintains good relationships with local influential elderly villagers so that the power systems will be well cared for by the locals, collections will go more smoothly, and fraud will be reduced (Starr & Macmillan, 1990; WEC, 2001). These relationships are likely fostered by the other CSR initiatives mentioned in the case such as job training and education because they are less directly associated with the business. Thus, the firm does not appear so opportunistic and some trust is built with the local leader and people who know about and/or benefit from the initiatives (Starr & Macmillan, 1990; Zott & Huy, 2007).

LG Electronics is an example of a large firm that has capitalized on CSR to build trust as it has internationalized around the world (Ramaswamy, 2007). LG locates in rural areas, builds schools, health care facilities, and sponsors popular activities like sports, for just a few examples (Ramaswamy, 2007). Ultimately, the positive relationships support increased adoption as they increase the likelihood of the longevity of the firm. The firm cannot continue to attract more customers if its existing customer base does not sustain it.

The elderly villagers act as endorsers from the point of view of the Indian customers (Rao, 1994; Suchman, 1995). In the previous section, the international funding sources were

visible endorsers from the point of view of other bureaucracies, like the Indian government. This type of endorsement is unrecognized and irrelevant to a majority of Indian customers. They trust their village elders. Thus, this is another word-of-mouth approach that endorses HPS to its customers so that they will appreciate the benefits the firm brings to the community. In the long term, customers will care more about the after sales issues because they value the firm (Starr & Macmillan, 1990; Zott & Huy, 2007). Customers adopt this view because of trusted and respected elders' understanding and communication of the value of HPS to their communities. Other research also supports the contention that having village leaders and users' understanding and involvement in the dissemination process more cost-effectively aids the implementation of sustainable solutions (Erazo, 2010; Haalboom & Campbell, 2011; Karekezi, 2012; Wimmer, 2002).

In consideration of how the organizational field takes form, this discussion suggests that there is an alliance of leaders required to build a supportive long term oriented customer consensus. The entrepreneurial firm leads by offering its technology, but to maintain a sustainable base of customers so as to increase adoption over the long term, trusted local leaders – community elders in the case presented – are required allies. As allies, they disseminate information and build consensus with the local community regarding the importance of the continuance of the entrepreneurial firm. Niez (2010) explains that community decision makers may be required to dispel myths that renewable energy is "second class", as in South Africa. Thus, customers will care to pay their bills and see to the maintenance of the equipment, whether they are employees or onlookers who ensure that reckless damage is not done to the equipment and that it is not abandoned when there are malfunctions. A proposition conveying the importance of the influential relationships is offered below.

Proposition 3: As trust increases between an entrepreneurial firm and local leaders and the firm engages in local CSR initiatives, the wider the local adoption of the firm's renewable energy solution.

International Recognition through Reverse Innovation

A recent report by the Clean Energy Group concluded that developing countries will be a new source of technology innovation, such that climate solutions will not only depend on North-to-South technology transfer (Morey et al., 2011). A World Bank report mentions that nine emerging economies (Argentina, Brazil, China, Hungary, India, Malaysia, Mexico, the Russian Federation and South Africa) are standing out for their green-tech innovation capacity, accounting for almost 80 percent of all US green patent grants attributed to developing countries between 2006 and 2010 (Dutz & Sharma, 2012). The developing world context can be more conducive to the invention and scaling of disruptive new climate technologies than developed economies, based on previous learning in economic sectors such as agriculture, mobile communications, and pharmaceuticals. The rationale is that frugal innovations, in the absence of existing infrastructure, result in more rapid adoption at scale, the development of an entrepreneurial ecosystem that sustains it, and strategic corporate investment aimed at reinventing the product for markets of the North (Christensen, 2009; Govindarajan & Ramamurti, 2011). This does not necessarily mean that frugal innovations are of low quality, rather, these products are designed to different price-performance characteristics or the manufacturing process was redesigned to drive down cost. Therefore, technology transfer occurs South-North and South-South, such that South nations have become leading exporters (Brewer, 2008), and this phenomenon is related to reverse innovation (Govindarajan & Ramamurti, 2011).

We define reverse innovation (RI) as the translation of need-based innovations in developing countries into value-added innovations for industrialized countries in need of disruption of legacy practices and products. These products are designed in developing markets for mature markets. For some examples, India has been exporting oil extraction machines for use in refining feedstocks used in biofuels, Mexico exports solar hot water heaters and clean coal technology, and China exports heat pumps, solar and wind power technology and compact fluorescent lamps, Malaysia is also strong in solar energy, and Indonesia exports compact fluorescent lamps (Brewer, 2008; Steenblik, 2006; World Bank, 2007). Young, entrepreneurial firms from the aforementioned and other developing or emerging economies are in a position to offer promising energy products and services (Dutz & Sharma, 2012). Businesses that begin modestly using imported technology and service ideas and concepts in off-grid and other areas may find that business value extraction and scalability increases substantially when they engage in reverse innovation, often in collaboration with a partner in the North. Firms can take a variety of steps to seek out international markets when located in a country in which expansion is difficult for a variety of possible reasons. The lack of energy infrastructure at home is a symptom of difficulties.

Previous theory on reverse innovation is rare since it is a relatively new phenomenon (Govindarajan & Ramamurti, 2011). Selling innovations into developed markets is possible through a variety of routes such as trade, international partnerships, and foreign direct investment (Yamakawa et al., 2008). Recent literature in internationalization of new ventures (INVs) discusses how small firms internationalize (Coviello, 2006; Turcan, 2011). Turcan (2011) focuses on legitimation through manipulation strategies over the dotcom bubble time period (1999 to 2001) in Scotland, linking legitimation to the environment in which the INV operates,

pertinent to our research. Other research by Duschnitzsky and Shaver (2009) examines cases where young firms lack a track record of alliances such that disclosure of their inventions becomes an important issue to potential corporate partners who need reassurance (Duschnitzsky & Shaver, 2009). A new venture may fear imitation, thus preferring a venture capital (VC) partner (Duschnitzsky & Shaver, 2009). Although the intellectual property issue is possible in our context, the very small start-ups considered in this research in developing and emerging markets, are unlikely to be on the radar screens of large investors, whether VCs or corporations (Higgins & Gulati, 2006). Thus, other previous literature in entrepreneurship considering VCs as legitimizing partners is not applicable in this context (Lee et al., 2001; Stuart & Sorenson, 2007; Yamakawa et al., 2008).

Moreover, the new firms of this research are not close to the IPO (initial public offering) stage, as firms are in other literature wherein top management teams (TMT) bestow legitimacy (Higgins & Gulati, 2006). Previous work on TMT in biotechnology entrepreneurship, pre-IPO, suggests several dimensions on which small firms may gain legitimacy through resource, role, and endorsement legitimacy. Resource legitimacy is attained because of management's downstream employment affiliations (i.e., a pharmaceutical firm is downstream from a biotech firm) that may offer access to social and human capital. Role legitimacy is related to other positions that management may hold or have held, related to their current positions in the upcoming firm so as to signal relevant experience (Higgins & Gulati, 2006). These are not possible mechanisms in the context of this paper; the entrepreneurs and their new firms in our cases are largely unknown to the corporate community and essentially, rise from obscurity[2]. The

[2] Many cases of RI also begin with large North corporations partnering with small South firms, reinventing products in the South that were originally from the North, and bringing them back to their industrialized home countries. For example, GE has been in China, Tata Energy has been in Africa, and P&G has been in Latin America; however, we

firms are in their infancy, trying to gain initial buy-in and notice for their products or services. Although this research considers endorsement mechanisms for legitimacy building, it is not the kind in Higgins' and Gulati's (2006) work in which endorsements are from institutional investors and underwriters. Therefore, the situation continues to beg the question of how obscure firms gain legitimacy. Our previous propositions developed some non-market driven answers. What about purely market driven endorsements?

We propose that by seeking international attention, possibly by expanding into a developed country market, thereby, reverse innovating, a young firm gains legitimacy. Although a very small firm may not attract investment, its products or services could be interesting to international buyers. This is illustrated with the Suzlon case. Suzlon is an Indian wind power firm that was started by an entrepreneur, Tulsi Tanti in 1995, who first ran Suzlon as a textile company (Baker, 2007). His firm needed a lower cost and more reliable alternative source of energy compared to the existing problematic power grid and he realized that clean energy would benefit all of India (Karmali, 2006). The firm was relatively unknown, but managed to obtain a contract with DanMar and Associates in Minnesota, USA in 2003, a couple of years after the textile manufacturing was sold (Karmali, 2006; Baker, 2007). In gaining this contract, Suzlon beat out European rivals' offerings through lower price, higher efficiency, and technology that better suited the wind environment of the US Midwest (Karmali, 2006). Repeat orders followed (Karmali, 2006). This lent credibility to Suzlon through an endorsement of its quality and technology, not only because it beat out perceived high quality European products, but also because a US firm, from a most prominent developed nation, chose its products (Yamakawa et al., 2008). Later, Suzlon accumulated greater successes and is today a multi-national corporation,

---

identify the products as belonging to the large corporations rather than the local entrepreneurs and this research is focused on the latter's growth in the interest of underdeveloped nation home-grown development.

but this earlier international support was important for wider adoption of its wind energy products in India. Previous theory has proposed that FDI entry into a developed country rather than another emerging economy builds legitimacy for a new venture at home through a perception of higher quality and credibility (Yamakawa et al., 2008). FDI is too ambitious for a very small firm, but trade is quite viable and this helped Suzlon. If a US firm buys Suzlon's products then the products are perceived as world-class and thus, local Indian adoption increases. By 2006, Suzlon had 35% of the Indian market, representing 90% of its sales (Karmali, 2006).

> **Proposition 4:** Developed country endorsement through reverse innovation by way of international trade of renewable energy technologies increases the likelihood of its local emerging economy adoption.

CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH

Through an examination of a recent issue - alternative energy adoption in areas where there is no reliable electricity supply in emerging economies, this work has proposed various constellations of actors who influence the success of a new energy firm by adoption of its unfamiliar offerings. These descriptions explain how the field takes form around very new ventures attempting to introduce unconventional solutions, extending previous literature that has recognized that fields form around issues (Hoffman, 1999) and literature in emerging industries. This contribution to explaining transformative change, from an institutional theory perspective, is proposed under different circumstances compared to previous research in contested practices that has primarily considered large firms in the industrialized world (Kitchener, 2002; Oliver, 1991; Pache & Santos, 2010; Sanders & Tuschke, 2007). Here, firms are small, entrepreneurial

start-ups in developing contexts. Thus, the context is turbulent and uncertain, but also open to change (Dosi, 1982; Tushman & Anderson, 1986).

This paper suggests that the field forms so as to support the adoption of a particular decision through initial entrepreneurial leadership together with endorsements related to the emerging market context including: 1) a positive local collective vision built through a personal endorsement, 2) prominent funders engaging in responsible or charitable investment, 3) alliances with leaders trusted by the locals, and 4) international recognition through reverse innovation. This theory has been applied in a particular context, but remote areas of the developing world are large spaces that offer multiple and varied locations for entrepreneurial experiments. Openness to entrepreneurial competition is crucial because it produces possibilities for transformative change.

This theorizing is useful to policy makers in influencing energy supply decisions so that clean alternative energy may be an early outcome decision. Emerging economies such as Brazil, Russia, India, and China, South Africa and many others are growing rapidly with large populations to satisfy. In that process of growth, all types of actors including individuals, households, and organizations are using polluting energy sources that result in carbon emissions causing climate change. After polluting utilities are entrenched and firms that supply them with fossil fuels reach a mature stage, it is very hard to change legitimized institutionalized myths and taken-for-granted habits, as we have seen in the West (DiMaggio & Powell, 1983; Meyer & Rowan, 1977). In countries that do not have powerful established energy players, entrepreneurial firms may experiment to discover viable cleaner, alternative energy technologies that match particular local environmental conditions. Some of these successful experiments could be scaled up to become large scale energy supplies that gain legitimacy early on so as to become permanent before other polluting power can make inroads. First-mover advantages are won, as

long as the new systems are sustained with funding and upkeep. As power monopolies are broken down and other barriers to entrepreneurs are removed, this optimistic scenario could become realistic. Moreover, reverse innovation could mean additional economic development and broader adoption of alternative energy through exports.

Understanding the process of field formation and the moderating mechanisms influencing decisions can enlighten strategies for motivating technological transformations. If a renewable energy choice is desirable from the point of view of a national policy maker, support for the development of an entrepreneurial ecosystem is important. Broader consensus-building is also required and governments can support information dissemination to all stakeholders so that they may understand and accept a vision of clean alternative energy. Experts have suggested that long-term renewable energy government programs, training, financing mechanisms, and innovative dissemination strategies are needed (Dutz & Sharma, 2012; Karekezi, 2012).

Future research should emphasize case studies that examine the beginnings of firms in their organizational fields, and their evolution as legitimation occurs, to support empirical testing of hypotheses. Also, future research could consider how organizational fields evolve over longer periods of time, following an initial start of an entrepreneurial firm. For example, studies could examine the long term sustainability of renewable power installations and how they are maintained, altered, or replaced. An additional line of research is how, after sustainable technologies are adopted, they can evolve into broader adoption markets and technology platforms. For example, Broad Group integrated an air pollution meter into a mobile phone, thus acting like an education mechanism building collective awareness among citizens, leading to grass roots change (Wood, 2012). Thus, the organizational field is stabilized with strong and

multiple structures - social, technological, institutional, and otherwise, to maintain a clean energy direction.

This paper has examined off-grid adoption of renewable energy in the developing world, where utilities are rarely offering clean energy. Brazil is a case where hydro is a major source for grid electrification (Niez, 2010). In contrast, in South Africa, the stand-alone solar program is viewed as temporary and second class even though it is a viable alternative to provide a major portion of its power needs. It is currently using coal for grid electrification (Niez, 2010). The question then is whether, after demonstrative successes of renewable generation in rural off-grid areas and viable cases of scalability through reverse innovation, mature markets in the developed world can be disrupted to shift value towards distributed low emission technologies.

REFERENCES

Allderdice, A. & Rogers, J. H. (2000). Renewable energy for microenterprise. *National Renewable Energy Laboratory*, November.

Baker, A. (2007). Tulsi Tanti. Time, October 17.

Bord, R. J. (1975).Toward a social-psychological theory of charismatic social influence processes. *Social Forces*, 53(3): 485-497.

Blackman, A. (1999). The economics of technology diffusion: Implications for climate policy in developing countries. *Resources for the future*. Discussion Paper, 99-42, June.

Boston Consulting Group (BCG). (2011). Redefining the future of growth: The new sustainability champions. *World Economic Forum*, 1-56.

Brew-Hammond, A. (2007). Challenges to increasing access to modern energy services in Africa. Forum of energy ministers of Africa (FEMA) conference on energy security and sustainability.

Brewer, T.L. (2008). Climate change technology transfer: a new paradigm and policy agenda. *Climate Policy*, 8, 516–526.

Brush, C. G., Greene, P. G., Hart, M. M., & Haller, H. S. (2001). From initial idea to unique advantage: The entrepreneurial challenge of constructing a resource base. *Academy of Management Executive*, 15(1), 64-80

Carter, N.M., Stearns, T. M. Reynolds, P. D., & Miller, B. A. (1994). New venture strategies: Theory development with an empirical base. *Strategic Management Journal*, 15, 21-41.

Chambwera, M., & Folmer, H. (2007). Fuel switching in Harare: An almost ideal demand system approach. *Energy Policy*, 35, 2538–2548.

Cheng, R. (1997). Lifestock-biogas-fruit systems in South China. *Ecological Engineering*, 8,19–29.

Chung, C.N., & Luo, X. R. (2012). Leadership succession and firm performance in an emerging economy: Successor origin, relational embeddedness, and legitimacy. *Strategic Management Journal (Forthcoming)*.

Coviello, N.E. (2006). The network dynamics of international new ventures. *Journal of Intenational Business Studies*, 37(5), 713-731.

Cyert, R., & March, J. G. (1992). A behavioral theory of the firm (2nd ed.). New Jersey: Wiley-Blackwell.

de Jonge, K. (1979). Peasant fishermen and capitalists: Development in Senegal. *Review of African Political Economy*, 15/16, 105-123.

de Vries, M., Flink, T., Kauw, K., van der Vleuten, F., & Mulder, T. (2010). Business models for energy access. ETC Foundation.

Delmas, M.A., & Montes-Sancho, M. (2010). Voluntary agreements to improve environmental quality: Symbolic and substantive cooperation. *Strategic Management Journal*, 31, 575–601.

Delmas, M., & Toffel, M. W. (2004). Stakeholders and environmental management practices: an institutional framework. *Business Strategy and the Environment*, 13, 209–222.

Delmas, M., & Toffel, M. W. (2008). Organizational responses to environmental demands: opening the black box. *Strategic Management Journal*, 29, 1027–1055.

Deloitte Touche Tomatsu. (2004). Sustainable power sector reform in emerging markets – financial issues and options. *Joint World Bank/USAID Policy Paper*, 1-188.

Devine, G., Sheldon, T., & Smith, S. (2010). Program on social enterprise: Making the connection: Partnerships in development finance and sustainable energy. Yale School of Management.

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48, 147-160.

Dichter, S. (2010). Dispatch from Padrauna, India (Part 3). *Acumen Fund Blog*, September 10. [Accessed online at http://blog.acumenfund.org/2010/09/15/dispatch-from-padrauna-india_-part-3/ on April 5, 2012.]

Dosi, G. (1982). Technological paradigms and technological trajectories. A suggested interpretation of the determinants and directions of technical change. *Research Policy*, 11(3), 147-162.

Duschnitzsky, G., & Shaver, J. M. (2009). Limitations to interorganizational knowledge acquisition: the paradox of corporate venture capital. *Strategic Management Journal*, 30, 1045–1064.

Dutz, M.A., & Sharma, S. (2012). Green growth, technology and innovation. Policy research paper no. 5932. The World Bank Poverty Reduction and Economic Management Network Economic Policy and Debt Department, January.

Edwards, R.D., Smith, K. R., Zhang, J., & Ma, Y. (2004). Implications of changes in household stoves and fuel use in China. *Energy Policy*, 32, 395–411.

Erazo, J. (2010). Constructing indigenous subjectivities: Economic collectivism and identity in the Ecuadorian Amazon. *Development and* Change, 41(6): 1017–1039.

Eyring, M.J., Johnson, M. W., & Nair, H. (2011). New business models in emerging markets. *Harvard Business Review*, January-February.

Farjoun, M. (2002). The dialectics of institutional development in emerging and turbulent fields: The history of pricing conventions in the on-line database industry. *Academy of Management Journal*, 45(5), 848-874.

Gadl, C., & Knobloch, C. (2011). Energize the BoP! Energy business model generator for low-income markets, a practioners' guide. *Enterprise Solutions for Development*.

Global Environment Facility. (1993). Report by the chairman to the May 1993 participants' meeting - part two: Tranche work program. Washington: GEF.

Govindarajan, V., & Ramamurti, R. (2011). Reverse innovation, emerging markets, and global strategy. *Global Strategy Journal*, 1, 191–205.

Graham, S., & Johnson, E. (2000). A case study and an emerging model: Renewable energy for rural community water supply in the Dominican Republic. Enersol Associates, Inc.

Greenwood, R., & Suddaby, R. (2006). Institutional entrepreneurship and the dynamics of field transformation. *Academy of Management Journal*, 49, 27-48.

Haalboom, B. J. & Campbell, L. M. (2011). Scale, networks, and information strategies: Exploring indigenous peoples' refusal of a protected area in Suriname. *Global Networks*, 12(3), 375–394.

Hammond, A.B., Darkwah, L., Obeng, G., & Kemausuor, L. (2008). Renewable energy technology, capacity and R&D in Africa. *Thematic Background Paper for the International Conference on Renewable Energy in Africa*. Dakar, Senegal.

Hart, S.L., & Christensen, C. M. (2002). The great leap: Driving innovation from the base of the pyramid. *MIT Sloan Management Review*, Fall, 51-56.

Hawkes, D. L. (1986). Review of full-scale anaerobic digestion in China. *Agricultural Wastes*, 18,197-205.

Higgins, M., & Gulati, R. (2006). Stacking the deck: The effects of top management backgrounds on investor decisions. *Strategic Management Journal*, 27, 1-25.

Hoffman, A.J. (1999). Institutional evolution and change: Environmentalism and the US chemical industry. *Academy of Management Journal*, 42, 351-371.

Hofstede, G. (1983). The cultural relativity of organizational practices and theories. *Journal of International Business Studies*, 14(2), 75-89.

Karekezi, S. (2012). Renewable energy technologies as an option for a low-carbon energy future for developing countries: Case examples from Eastern and Southern Africa. *African Energy Policy Research Network*, accessed online March 13, 2012 at http://uneprisoe.org/copenhagenconf/karekezi.htm.

Karmali, N. (2006). Wind man. *Forbes.com*, June 19.

Katila, R., Chen, E. L., & Piezunka, H. (2012). All the right moves: How entrepreneurial firms compete effectively. *Strategic Entrepreneurship Journal*, 6, 116–132.

Kempener, R., Anadon, L. D., & Condor, J. (2010). Governmental energy innovation investments, policies, and institutions in the major emerging economies: Brazil, Russia, India, Mexico, China, and South Africa." Discussion Paper #2010-16 Energy Technology Innovation Policy Discussion Paper Series, Harvard Kennedy School.

Kitchener, M. (2002). Mobilizing the logic of managerialism in professional fields: The case of academic health centre mergers. *Organization Studies*, 23(3), 391-420.

Lee, C., Lee, C. K., & Pennings, J. M. (2010). Internal capabilities, external networks, and performance: A study on technology-based ventures. *Strategic Management Journal*, 22 (6/7): 615-640.

Lippman, S.A., & Rumelt, R. P. (1982). Uncertain imitability: An analysis of interfirm differences in efficiency under competition. *Bell Journal of Economics*, 13(2), 418–438.

London, T., & Anupindi, R. (2012). Using the base-of-the-pyramid perspective to catalyze interdependence-based collaborations. *Proceedings of the National Academy of Science*, 109 (31), 12338-12343.

London, T. & Hart, S. L. (2004). Reinventing strategies for emerging markets: Beyond the transnational model. *Journal of International Business Studies*, 35(5), 350-370.

Martinot, E., Chaurey, A., Lew, D., Moreira, J. R., & Wamukonya, N. (2002). Renewable energy markets in developing countries. *Annual Review of Energy and the Environment*, 27, 309–48.

Matten, D., & Crane, A. (2005). Corporate citizenship: Toward an extended theoretical conceptualization. *Academy of Management Review*, 30(1), 166-179.

McMullen, J. S. (2010). Delineating the domain of development entrepreneurship: A market-based approach to facilitating inclusive economic growth. *Entrepreneurship Theory and Practice*, 35(1), 185-215.

Meyer, J. W., & Rowan, B. (1977). Institutionalized organizations: Formal structures as myth and ceremony. *American Journal of Sociology*, 83(2), 340–363.

Miller, J. I. (2012). The mortality problem of learning and mimetic practice in emerging industries: Dying to be legitimate. *Strategic Entrepreneurship Journal*, 6, 59–88.

Morey, J., Milford, L., Madeira, L. & Stori, V. (2011). Moving climate innovation into the 21st Century: Emerging lessons from other sectors and options for a new climate innovation initiative. *Clean Energy Group*, Washington, DC.

Niez, A. (2010). Comparative study on rural electrification policies in emerging economies. *International Energy Agency*, 1-118.

Norbu, U. (2011). Husk Power Systems. In T. J. Dean & M. D. M. Birnbaum (Eds.), *Cases with a conscience: Entrepreneurial solutions to global challenges* (p. 83-89). USA: Sustainable Venturing Press.

OECD/IEA. (2004). Renewable energy. Market and policy trends in IEA countries. OECD/ IEA Publication: France.

OECD. (2010). Enhancing developing country access to eco-innovation: the case of technology transfer and climate change in a post-2012 policy framework. OECD Publication: France.

Oliver, C. (1991). Strategic responses to institutional processes. *Academy of Management Review*, 16(1), 145-179.

Ouedraogo, B. (2006). Household energy preferences for cooking in urban Ouagadougou, Burkina Faso. *Energy Policy*, 34, 3787–3795.

Pache, A., & Santos, F. (2010). When worlds collide: The internal dynamics of organizational responses to conflicting institutional demands. *Academy of Management Review*, 35(3), 455-476.

Perkins, R. (2003). Environmental leapfrogging in developing countries: A critical assessment and reconstruction. *Natural Resources Forum*, 27 (3), 177–188.

Prahalad, C. K., Hammond, A.(2002). Serving the world's poor, profitably. *Harvard Business Review*, RO209C.

Ramaswamy, K. (2007). LG electronics: Global strategy in emerging markets. *Thunderbird School of Global Management*, 1-12.

Rao, H. (1994). The social construction of reputation: certification contests, legitimation, and the survival of organizations in the American automobile industry: 1895-1912. *Strategic Management Journal*, 15, 29-44.

Reid, E.M., & Toffel, M. W. (2009). Responding to public and private politics: corporate disclosure of climate change strategies. *Strategic Management Journal*, 30, 1157–1178.

Sanders, W. G., & Tuschke, A. (2007). The adoption of institutionally contested organizational practices: The emergence of stock option pay in Germany. *Academy of Management Journal*, 50 (1), 33-56.

Sawin, J. L. (2004). National policy instruments. Policy lessons for the advancement and diffusion of renewable energy technologies around the world. Thematic Background Paper. International Renewable Energy Conference, Bonn, Germany.

Schmidt, J. (2009). Craft Skills East Africa Limited. In T. J. Dean & M. D. M. Birnbaum (Eds.), *Cases with a conscience: Entrepreneurial solutions to global challenges* (p. 83-89). USA: Sustainable Venturing Press.

Scott, W. R. (2001). Organizations: Rational, natural, and open systems. Englewood Cliffs, N.J.: Prentice Hall.

Sine, W. D., & David, R. J. (2003). Environmental jolts, institutional change, and the creation of entrepreneurial opportunity in the U.S. electric power industry. *Research Policy*, 32, 185–207.

Starr, J. A., & MacMillan, I. C.(1990) Resource cooptation via social contracting: Resource acquisition strategies for new ventures. *Strategic Management Journal*, 11, 79-92.

Steenblik, R. (2006). Liberalisation of trade in renewable energy and associated technologies: Biodiesel, solar thermal and geothermal energy. OECD, Paris.

Stinchcombe, A. L. (1965). Social structure and organizations. In J. G. March (Ed.). *Handbook of organizations* (p.142-193). Chicago, IL: Rand McNally.

Stockholm Environment Institute. (1994). Community electrification, improved customer service and demand-side management ~ A note to SIDA. Stockholm: Stockholm Environment Institute.

Stuart, T. E., Hoang, H. & Hybels, R. C.(1999) Interorganizational endorsements and the performance of entrepreneurial ventures. *Administrative Science Quarterly*, 44(2), 315–349.

Suchman, M. C. (1995). Managing legitimacy: strategic and institutional approaches. *Academy of Management Review*, 20, 571-610.

Tabuchi, H. (2012). A confused nuclear cleanup. *New York Times*, February 10.

Talukdar, S., Horn, M. B., Alton, R., & Christensen, C. M. (2010).Winning and losing bets on green technologies. SSRN: http://dx.doi.org/10.2139/ssrn.1597315.

The Economist. (2010). First break all the rules: The charms of frugal innovation, April. Accessed online at http://www.economist.com/node/15879359 November 2, 2012.

Thiam, D. R. (2011).An energy pricing scheme for the diffusion of decentralized renewable technology investment in developing countries. *Energy Policy*, 39, 4284–4297.

Turcan, R.V. (2011). Toward a theory of international new venture survivability. *Journal of International Entrepreneurship*, 9, 213–232.

Tushman, M. L., & Anderson, P. (1986). Technological discontinuties and organizational environments. *Administrative Science Quarterly*, 31, 439-65.

UNDP. (2000). Energy and the challenge of sustainability. World Energy Assessment, New York: UNDP.

United Nations Environment Programme (UNEP). (2011). Introduction: Setting the stage for a green economy transition. Towards a Green Economy.

Wimmer, N. (2002). Successful solar business - A model for policy in developing countries. Presentation at the World Renewable Energy Policy and Strategy Forum, Berlin.

Wood, A. (2012). Inside the China Broad Group. Council on Tall Buildings and Urban Habitat August [Accessed online November 1, 2012 at: http://www.ctbuh.org/Events/ToursVisits/2012TourArchive/InsidetheChinaBroadGroup/tabid/3455/language/en-US/Default.aspx]

World Bank. (2007). Warming up to trade: harnessing international trade to support climate change objectives. World Bank: Washington, DC.

World Bank. (2010). Modernizing energy services for the poor: A world bank investment review– fiscal 2000-08. World Bank: Washington, DC.

World Energy Council (WEC). (2001). Pricing energy in developing countries. World Energy Council, June.

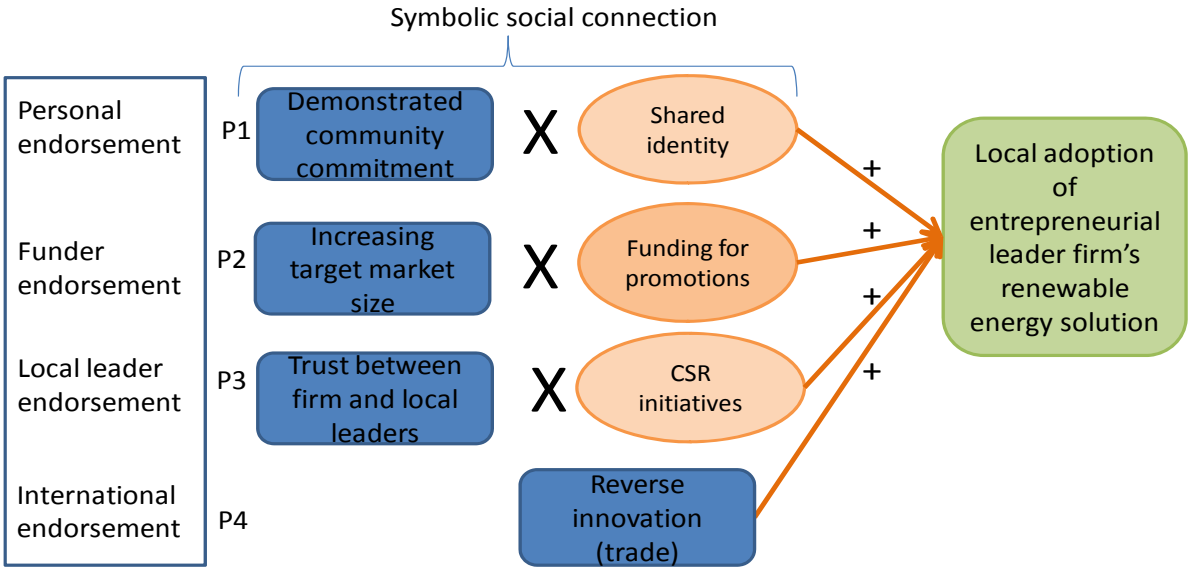
Yamakawa, Y., Peng, M. W., Deeds, D. L. (2008). What drives new ventures to internationalize from emerging to developed economies? *Entrepreneurship Theory and Practice*, January, 59-82.

Zaheer, S. (1995). Overcoming the liability of foreignness. *Academy of Management Journal*, 8(2), 341-363.

Zimmerman, M. A., & Zeitz, G. J. (2002). Beyond survival: Achieving new venture growth by building legitimacy. *Academy of Management Review*, 27(3), 414-431.

Zott, C., & Huy, Q. N. (2007). How entrepreneurs use symbolic management to acquire resources. *Administrative Science Quarterly*, 52(1), 70-105.

Figure 1: Endorsement Mechanisms for Adoption of IPP Solutions in Emerging Markets



An entrepreneurial firm must innovate a locally viable solution but the solution cannot advance without other support within the organizational field. Depending on the local conditions, a constellation of supporting actors coalesces to form the field that promotes and enables adoption of the entrepreneurial solution.