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Touching the invisible : Exploring the nexus of energy access, entrepreneurship, and solar homes systems in India

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Key Words: *Solar Home Systems (SHS); rural Bottom of the Pyramid (BoP); social entrepreneurship; narrative analysis.*

1 Introduction

The Sustainable Development Goals (SDGs) underscore the importance of electrification as an indicator for development [1]. Most of those without energy access live in rural areas. The International Energy Agency (IEA) estimates that, world-wide, roughly 860 million people continue to live without electricity; and that achieving universal energy access by 2030 will require an average investment of \$40 billion per year [2]. Given the limitations of public sector investments [3], entrepreneurial ventures could facilitate energy access to dispersed rural inhabitants [4], where decentralized solutions, like SHS, are a viable alternative to other forms of electrification. Solar Home Systems (SHS) have become a means of equalizing energy access [5], particularly in geographically dispersed areas with Bottom of the Pyramid (BoP) market conditions [6]. Currently, however, there are a number of obstacles that blunt the competitive edge of decentralized renewable energy solutions, such as SHS, in rural BoP markets [7]. As such, the goal of this article is to analyse and understand the key activities of two for-profit social enterprises operating in rural India: Selco and Boond. Both of these enterprises use system-integrated SHS in order to meet the energy needs of rural BoP consumers.

The goal of this article is to illuminate entrepreneurial activities in India's rural BoP market, using a case study methodology utilising narrative analysis of interviews with company personnel. The benefit of employing a case study methodology is that it allows us to explore and understand complex issues that require an in-depth explanation of social behaviours [8]. Further, this methodology enables us to track the development of entrepreneurial activities through time, connecting theoretical with empirical business models [9]. Most importantly, case studies allow in-depth investigation of one or more subjects within contextual conditions [10]. Throughout this paper, we analyse practitioners' experiences, in the form of semi-structured interviews, in order to understand organizational processes and practices that are often blindspots. As we situate these processes and practices within the grand narratives of energy access, we acknowledge that the policy implications of those organizational structures are beyond the scope of this study.

In order to understand entrepreneurial interventions in rural BoP markets, we draw inputs from Austin et al.'s [11] framework on how social entrepreneurship creates social value for customers by focusing on processes, which facilitates a comparative analysis of commercial entrepreneurship. Austin et al.'s social entrepreneurship framework enables us to bridge the gap between off-grid solar and social entrepreneurship literature. Alongside that framework, we draw inferences from another business framework, listed in Scott's (2017) review on off-grid solar BoP businesses [12]. This particular framework considers the socio-economic backgrounds and related obstacles facing consumers within rural BoP markets. Our interview analysis employs narrative analysis methodology, which enables us to unpack the micro-dynamics of organizational activities and record the nuances of multiple perspectives. This method reveals various entrepreneurial perceptions of the complex reality that is operating in rural BoP markets. To that end, we reference Riessman's [13] and Boje's [14] work on organizations and narratives [15].

This article has two main research objectives: the first is to identify the key activities coordinated by social enterprises and their associated risks, in rural BoP markets; the second is to enhance our understanding of how business model frameworks are conceptualised and disseminated, on a grass-roots level. It is hoped that this research will contribute, more broadly, to the conceptualization and dissemination of practitioners' experiences that can help meet the energy needs of rural BoP markets. The article is subdivided into sections: first, we discuss the case studies, source materials, and methodology used for this study; second, we report our main findings from the interviews, each of which is subdivided by theme. Our final section draws lessons from the research and concludes the article.

2 Case Study: Setting, context, and definitions

In 2011, only 55.3% of households used electricity for lighting in India [16], underscoring how institutionally created gaps in energy access demand further attention. At that time, the majority of rural households relied on kerosene lamps, while businesses relied on old diesel generators. In response to this social challenge, social entrepreneurs, such as Selco and Boond, stepped in to cater to the needs of rural BoP markets, using SHS. Although national and state-level policies do play a role in addressing energy access issues, the focus of this article is on contextual details relating to the case studies. Plutsck et. al. [17] and Kummitha [18] contextualize how social enterprises provide energy access alternatives in rural India, and Sengupta et al. [19] provide

additional information on social entrepreneurship in India. From a policy perspective, a study on fourteen off-grid social enterprises concludes that the policy landscape in India is unfavourable, due to the higher stakes and limited resources [17]. Understanding risk is, therefore, central to our study.

Selco began its operations in 1995 and works primarily out of the southern Indian state of Karnataka. Founded in 2010, Boond operated initially in Uttar Pradesh and Rajasthan. As described in [20], both enterprises established branch offices within the vicinity of their customers, with the head offices located in a major city. There are two ways in which Selco is a unique player, within the domain of rural BoP markets for SHS. First, Selco is one of only a few companies that have been able to meet long-term sustainability goals, while navigating changing policy landscapes [17,21]. This is a significant achievement, considering the many challenges and complexities inherent in rural BoP market environments [22]. Second, since its inception, Selco has worked to reduce poverty and increase the wellbeing of those living in rural BoP markets. Within the context of rural electrification, Boond differs in two ways: to begin with, Boond operates in Rajasthan and Uttar Pradesh, which had rural electrification rates of 58.3% and 23.8%, respectively, in the latest Indian government census from 2011 [16]. This means that both regions have energy access problems that could be addressed through entrepreneurial interventions. Secondly, Rajasthan and Uttar Pradesh are part of BIMARU states [23], meaning that they fall within what is commonly considered the socio-economically underdeveloped regions of India. Thus, both Selco and Boond are working under comparable BoP market conditions, making them excellent comparators for a study of key activities in rural BoP markets.

2.1 Defining Bottom of the Pyramid (BoP)

This article takes its definition of BoP from Prahalad [24], which considers the BoP market to be the lowest economic pyramid in the world [25], characterised by a lack of legal frameworks, an absence of key infrastructure, an annual income of under \$3000, and a shortage of skilled labour [12, 26]. As stated succinctly by Scott, BoP markets rely “on informal institutions, including relationships and networks, rather than formal economic structures and institutional governance” [12]. Within BoP market segments, rural markets are considered more challenging, compared with other business environments, due to their unique socio-economic characteristics [26]. Therefore, in order to be successful, entrepreneurs operating in rural areas

need to be willing to adopt innovative business models. The fundamental obstacle to innovating a traditional business model is having to break free of established business mindsets, systems, and metrics; as well as partnering with unconventional actors through social contracts, as opposed to legal contracts [27].

2.2 Social Entrepreneurship

While we acknowledge that there are competing definitions of social entrepreneurship, within the constraints of this article we consider social entrepreneurship to be the process through which “innovative, social value creating activity that can occur within or across the non-profit, business, or government sectors” [11]. In other words, social entrepreneurship is concerned with value creation for the benefit of society, in addition to profits. The procedural framework of this particular definition is useful to understand entrepreneurial processes in rural BoP markets. Further, resource constraints almost always characterize the operating environments of social enterprises. In order to function in such high-risk environment, three behavioural characteristics are essential: innovativeness, proactiveness, and risk-management skills [28]. These three characteristics enable social enterprises to manage financial and human resources and deliver services efficiently, by building social trust to manage the risk. That social trust, which is a subset of social capital, facilitates coordination and cooperation between different stakeholders [29]. Further, social trust is necessary to increase participation of other stakeholders in social entrepreneurship initiatives and creates stronger link with the target community[30].

2.3 Overview of Off-grid Solar Markets

Business model	Product design	Capital	Market outreach	Differentiators
Retail	Proprietary plug and use devices and does not require electrical wiring	High	Distribution channels	Product innovation and branding
PAYGo	Proprietary SHS and integrated pre-paid mechanism	High	Distribution channels	Product innovation, branding, and payment platform

System-integrator	Separately procures and integrates components of SHS and requires electrical wiring	Low	Direct	Low production cost
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Table 1 Categorization of SHS business models

Off-grid solar business models vary significantly in terms of revenue models, business and marketing strategies, operating environment, and end-user payments. One article on BoP markets discusses these variable characteristics and presents an extensive typology of business models for off-grid solar [31]. Another recent market report, on the other hand, classifies off-grid solar business models into three segments, by focusing on wattage, product design, product delivery and functionality: pico, plug-and-play SHS and component-based SHS [32]. However, to index the business models, the typologies listed in [31, 32] do not consider the required initial capital. For the purposes of this article, taking cues from the two aforementioned typologies, we classify BoP market SHS into three categories which take into account the required capital cost, as seen in Table 1. This categorization of SHS business models is based on initial capital, product design, market outreach, and differentiator which are the basic tenants of any business design.

The sparsity of rural BoP markets presents distributional challenges [33] for retail business models in contrast to urban and semi-urban markets. Alternatively, Pay-As-You-Go (PAYGo) proprietary solutions are often limited to areas with strong mobile banking ecosystems and require costly go-market strategies [34]. Further, retail and PAYGo models have higher capital costs, which create barriers to entry for would-be entrepreneurs. On the other hand, the reduced need for up-front capital and low production costs lower barriers to entry and encourages new entrepreneurs to enter the market, for the system-integrator model. As a business model, system-integrated SHS has the potential to be the most inclusive approach to energy access, as it offers the potential for local employment, as well as the ability to customize solutions that cater to a variety of consumer needs. Further, low production costs could encourage the establishment and growth of sustainable off-grid solar markets, as in the Burkina Faso case [35]. Again, the focus of this article is limited to system-integrators, unlike companies such as Tata power solar and Veddis Solaris, which are commercial enterprises.

2.4 Data Collection

To collect data on the activities of Boond and Selco, this study relied on semi-structured interviews with company personnel. Interview questions were focused on organizational activities, marketing strategies, installation and maintenance, financing, and human resource management. One aim of the questionnaire was to understand how individuals within organizations contextualised and storified their experiences, to reflect on organizational processes, which often have blind spots. We chose to conduct a narrative analysis of the interview material, based on the advantages that Moezzi et al. list in their study [36]. In their simplest form, organization members' responses are stories relayed to others, enabling the speaker to make sense of the world [15,37,38]. More complexly, the narratives are “verbal everyday modes of reality construction”, which revolve around the business setting, the individual telling the story, and the cultural context in which that story is being told [39]. For our purposes, when Selco and Boond interviewees recount their experiences, successes, and failures, they are contributing to the broader social narrative about social entrepreneurship in rural BoP markets: specifically, how actors operate within the constraints of different business contexts. These stories have the capacity to reveal the blind spots that remain, otherwise, invisible within procedural frameworks [39].

During these interviews, each respondent is assigned a unique letter and the interviewer asks a standard set of questions, including: “what was your experience with business operations in rural areas”; “how do you describe marketing of SHS”; “what were the challenges you have encountered”; and “what were the operational challenges related to human resources”? After asking these questions, the interviews snowballed in different directions, leading to a semi-structured interview structure. In addition to these interviews, our secondary data is comprised of public domain information on business activities, including reports, articles, and video material.

Table 2 features detailed information on these semi-structured interviews. All of the interviews, with the exception of Respondent G's, were conducted during a field trip to India between June and July, 2016. Respondent G was interviewed in July, 2019. Typically, interviews lasted between 45 and 60 minutes. In order to make natural observations of the interviews and operational realities of rural BoP markets, the first author travelled, as a non-participant observer, with company personnel to the Udaipur, Unnao, and Udupi districts. The first

author's observations stem from events relating to the identification of customers, maintenance, promotional programs, and stakeholder meetings.

Respondent	Occupation	Organization	Location	Language
A	Area General Manager	Selco	Manipal	English
B	Operations Manager	Selco	Bangalore	English
C	Program Manager	Selco foundation	Bangalore	English
D	Program Manager	Selco foundation	Bangalore	English
E	Chief Technology Officer	Boond	Udaipur	English
F	Marketing Head	Boond	Unnao	English
G	Program Manager	Boond	Udaipur	Hindi
H	Employee	Boond	Udaipur	Hindi
I	Employee	Boond	Unnao	Hindi

Table 2 Interviews

3 Materials and Methods

This section reviews and synthesizes the source material, in order to derive both a methodological framework and analysis method. It draws on literature from multiple fields, with the goal of integrating concepts related to energy access, off-grid solar, rural BoP markets, social entrepreneurship, and qualitative research methods. This survey is an exploratory attempt at identifying the appropriate theoretical frameworks for analysing and reflecting upon the research context of this article. As a method, this exploratory approach allows for some interdisciplinary conceptual overlap, as part of a quest for new theories and concepts in this subject area [40]. First, this section provides a brief overview of current off-grid solar and entrepreneurship literature; second, it reviews our methodological framework for analysing

social entrepreneurship; and third, it justifies the methodological reasoning behind our use of narrative analysis.

3.1 Off-grid Solar and Entrepreneurship

This section presents a limited literature survey of articles focusing on off-grid solar in the entrepreneurial context, with an exploratory approach. The objective of this survey is to identify a framework that allows for the systematic analysis of interviews. Previous research on off-grid solar programs has established a macro-level analysis of success, or lack thereof (see for example [41,42,43]), while business-related literature is limited in scope. Contemporary literature on off-grid solar mainly focuses on the applicability of SHS technology to rural areas, and identifies a series of obstacles. Those obstacles include financial, institutional, and policy factors [44,45,46,47,48,49,50]. The remainder of this section presents the most relevant studies from a limited literature survey. These studies fall within three different categories, in terms of entrepreneurial efforts: theoretical level studies, practical studies, and holistic approaches.

Theoretically speaking, market participation is supposed to unlock the potential for off-grid solar to address energy access problems. However, market participation requires supportive regulatory and political frameworks [51]. This implies that a conducive framework or environment enables active market participation. Moreover, in rural BoP environments, practical realities make market participation challenging [52]. Despite attempts to address those realities, an off-grid flagship program in India was unable to guarantee viable business models [53]. Further, publicly-supported market development programs offer limited entrepreneurial flexibility, thereby creating additional challenges for entrepreneurs [54]. Off-grid practitioners often work in inflexible policy environments, most of which are developed with traditional grid regimes in mind [55]. To conclude, on a theoretical level, clear institutional arrangements, targeted funding and subsidies, and end-user finance are essential for market participation [56]. Therefore, a synthesis of the aforementioned literature implies that off-grid solar can only solve energy scarcity in rural BoP markets, if those markets offer favourable conditions to would-be entrepreneurs.

On a practical level, a number of obstacles prevent off-grid solar market participation. To begin with, off-grid market interventions operate mainly in unsustainable environments – mainly

due to grid extensions and irregular customer payments, as well as the overall cost of doing business [57]. It is worth noting that market interventions themselves have limitations, when it comes to the complex socio-political dynamics that underlie energy access [58]. In order to create a sustainable business model that can address energy access challenges, adopting a user-centric approach is essential [59]. Adaptive partnerships between the state, enterprise, and civil society organizations are also integral to SHS-driven energy service provision for disadvantaged communities [60]. Within the off-grid solar context, market intervention can be challenging, due to limited financial access and supply-side constraints [61], as backed by another study [62]. Further, during entrepreneurial interventions, it is often difficult to scale operations because of the nature of energy access entrepreneurship [63]. Experience suggests that adequate user training and local technician training are critical to sustaining outcomes of electrification interventions through SHS [64]. Taken together, entrepreneurs in the off-grid solar domain must clear a number of hurdles in order to secure temporal sustainability, something which both Boond and Selco have attempted.

Theme	Summary
Community interaction	For ultimate success, the local community ought to be involved, as a partner, in order to address institutional voids, participate in educational campaigns and product development, and collaborate with community leaders. This increases market knowledge and establishes trust.
Partnerships	The BoP context requires entrepreneurs to work in partnership with “public institutions, non-market actors, community members, NGOs, commercial firms, and social enterprises”. Further, pairing commercial entities with socially oriented firms is mutually beneficial, as these groups can provide managerial and financial support to social enterprises.
Local capacity building	Firms ought to address institutional supply chain gaps, conduct sales and distribution, and provide marketing, post-sale services, and repairs, in order to operate successfully.
Barriers that must be addressed	Business models ought to provide financial incentives and product financing support, product information, marketing and education,

	distribution networks, and proactively address other potential market barriers.
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Table 3 Business framework for off-grid solar in BoP markets, an adopted and summarized version [12].

Few articles have simultaneously considered SHS, social entrepreneurship, and BoP. Social entrepreneurs are the main diffusers of off-grid solar in BoP markets [65]. Entrepreneurs should understand two key factors, in order to operate successfully in BoP markets: the consumer setting and market conditions [66]. Here, *market conditions* refer to the factors affecting consumers working in informal and unorganised sectors, whereas *consumer setting* refers to the socio-economic conditions. Business innovations – such as learning to work within uncertain policy frameworks and business model customization – are the main determinants of business sustainability in these contexts [31]. Beyond innovation, another important prerequisite is to gain social acceptability from customers, by offering needs-based, customized, end-to-end solutions for them [67]. These prerequisites, together with the aforementioned studies, reflect the principal entrepreneurial characteristics of off-grid solar businesses operating in rural BoP markets. This view is supported by Scott [12], whose work captures the current literature on the business models of enterprises serving the BoP with off-grid solar. Scott’s [12] framework includes four themes, each of which has a detailed explanation: community interaction, partnerships, local capacity building, and barriers to success. In order to understand the key activities of social enterprises targeting the energy needs of rural populations, we build on this framework using our narrative analysis of interviews. The four elements of Scott’s framework are included in Table 3, with brief explanations alongside. Scott’s framework guides our analysis of the interview material, and helps form the social entrepreneurship framework of the subsequent section.

3.2 Social Entrepreneurship for BoP

This section presents a limited literature survey of articles focusing on social entrepreneurship literature and BoP markets, using an exploratory approach. The objective of this survey is to identify a framework that aligns with Scott’s [12] framework, and that facilitates the systematic use of the social entrepreneurship theory in rural BoP contexts. This, in turn, enables us to categorize the narrative experiences of interviewees and the resulting qualitative data in a meaningful way. Moreover, this new framework must enable the sociological dimensions of business practices, within rural BoP markets, to shine through.

Our framework identification process began with a literature survey, which quickly revealed that the multidisciplinary nature of social entrepreneurship studies incorporates a wide range of frameworks [68]. As such, it was initially quite challenging to identify a framework, for this article, that suits our research context. Ultimately, two articles guided our initial search: Mair and Marti and Goyal et al. [69,70], both of which survey the theoretical constructs of social entrepreneurship. Mair and Marti [70] focus on social entrepreneurship literature, whereas Goyal et al. [69] focus on social entrepreneurship within BoP markets. Both articles tabulate different conceptual definitions of social entrepreneurship. We examined this material in search of a framework that allows for a description of organizational activities within the bounds of BoP markets. Through careful examination of available definitions, we chose a framework created by Austin et al. [11], based on how it defines the social entrepreneurship process. This procedurally based approach considers the people, the context, the deal, and the opportunity (PCDO framework) [71]. The framework itself includes three components: social value creation, organizational alignment, and collaboration across organizational boundaries.

The first aspect of the framework is *social value creation*. Social value creation, within the context of social entrepreneurship, focuses on addressing societal challenges using market interventions [70]. It includes three main approaches to stakeholder participation: a) the creation of a new market or the provision of a new service, where none existed beforehand; b) using discarded, disused, or unwanted resources; and c) using untapped local resources [72]. As such, in order to create social value, stakeholder participation must encourage collaboration across organizational boundaries, with key players addressing the limitations of organizational capabilities [73].

The second aspect of this framework is *stakeholder collaboration*. Stakeholder collaboration is key in addressing the societal challenges that are the focus of social entrepreneurs. These entrepreneurs use motivation, capability, and opportunity to identify the relevant stakeholders [74]. Simply put, social entrepreneurs want to collaborate with stakeholders who share a common goal and are willing to supplement their efforts. In practice, social enterprises use stakeholder collaboration to balance commercial and social objectives [75]. This collaboration provides the requisite social capital for navigating resource constraints that would otherwise prevent the resolution of multifaceted societal problems [76]. In the absence of competing commercial organizations, social enterprises have to forge partnerships with both the public

and private sectors – particularly, with local entities that can mitigate the high-risk market nature of BoP [77,78]. Collaborating with a variety of stakeholders can enable companies to leverage limited resources.

The third aspect of this framework is *organizational alignment*. Organizational alignment is a strategic choice that deals with the long-term survival and growth of an organization, through learning, unlearning, and relearning, in order to manage people and capital [79]. In practice, organizational alignment relates to how an organization deploys people and capital, in order to take advantage of available opportunities in a given context: this is what creates organizational capacity. Building organizational capacity in order to achieve a desired outcome requires a strategic management of inputs: knowledge, financial resources, personnel, and collaboration with stakeholders [80]. In the case of social enterprises, organizational capacity building, coupled with the strategic management of inputs, supports social value creation. Overall, organizations are expected to secure technical and managerial know-how for social value creation and establish social trust with communities and stakeholders.

3.3 Narrative Analysis and Organizational Dynamics

In order to analyse the interview material, we first referred to Austin et al. [11] and Scott's frameworks [12] on social enterprises and rural BoP markets, assessing how the interviews fit within those frameworks. There are numerous qualitative data analysis methods, such as grounded theory [81,82,83], thematic analysis [84,85], and discourse analysis [86], from which we could have chosen. We selected narrative analysis for its ability to capture the *naturalistic* – defined here as the 'real-world situation' that unfolds naturally – nature of the interviews. Narrative analysis is essential for our source material, since all of the interview responses were relayed in a narrative format. As researchers, we were intrigued by both the temporal and spatial dimensions of those interviews, as well as by the perspectives of the respondents, or narrators. Each of the respondents' stories is an event with internal sequences and consequences. All of those events are "selected, organized, connected and evaluated as meaningful" to the audience – which, in this case, is the interviewer and the interviewee's otherwise perceived audience [13]. Narratives are connected to personal experiences, and it is those personal experiences, within the organization, to which we hoped to gain access. By reconceptualizing our interviews as narratives, we illuminate how rural BoP SHS businesses operate, at a grass-roots level, in the face of inherent risk. The limitations of the narrative analysis method, however, include taking the interviewee's narrative at face-value; and

remaining conscious that the narrative “may be constructed already earlier, influenced by the setting and who [the narrator is] talking to” [87] (p 180). Being mindful of these limitations, we can only extrapolate on the qualitative data and support it or refute our findings with reference to other secondary, eye-witness sources.

What did become readily apparent was that the narratives of those working in social enterprises often conflict with the grander, organizational narrative. For this reason, we moved to Boje’s theory of organisations as storytelling systems [14]. Based on that theory, organizations construct stories in a non-linear fashion, becoming their own literary genre [14,15]. We analysed the narratives from a *microstoria* analysis, in view of reconstructing and interrogating the gap between practitioners and elite preconceptions. *Microstoria* is the Italian term for *microhistory*, which considers the stories of everyday people within the context of the grander narratives of history. As with microhistory narratives, *macrostoria* – from an organizational perspective – is concerned with the “micropolitics of power, the middle ground between local and grand” [14], with an inherent trust in the truthfulness or credibility of the material. From a *microstoria* perspective, narrative analysis allows us to examine the interplay between the macro, the social, the political, and the economic forces of the grand narrative; and, at the microlevel, people and their lives. Here, organizational endeavours are considered and studied as the central narrative, with people within the organization telling that story. These organizational narratives have the potential to highlight the “self-reinforcing mechanisms and blind spots” of an organization’s efforts [39].

Our research considers Boond and Selco as the organizational microlevel, where the organization is made up of people. Beginning with the interviews, our narrative analysis accentuates what was, otherwise, an invisible tension point: it shows how stories of success and failure become part of an organization’s storytelling and, therefore, provide a kind of core subjectivity. These stories are seldom featured in SHS literature, which focuses mostly on grand narratives. Taken together, with the support of narrative analysis, the aforementioned frameworks allow us to move fluidly between top-down and bottom-up approaches, underlining the subjectivities of interview participants, organizational blind-spots, and operational realities.

3.4 Summary

To summarize, through an exploratory approach, we identified Austin et al. [11] and Scott [12] as the most viable frameworks to enable the identification of themes and processes, as expressed in the Boond and Selco interviews. Further, we identified narrative analysis as the appropriate qualitative data analysis method, since the interview material includes narrativized stories and memories about organizational activities [13,14].

4 Narrative Analysis in SHS literature

The literature on SHS businesses, which uses interview data, rarely employs narrative theory or other narrative analysis tools in the analysis. However, studies focused on the societal actors of the energy system have most often employed some type of narrative analysis in their methodologies. Heynen et al. [88] interview local stakeholders and firms to analyse rural solar BoP business practices in India, but do not use any particular methodology to categorize their material. They do not include the interview responses in the article, but instead categorize them as either ‘high’, ‘moderate’, or ‘low’ motivation. Shidore and Busby [89] focus on understanding India’s interest in solar power through interviews. They appear to use grounded theory, since they “coded what each interviewee identified” as significant. However, they reference no singular methodology and no interview responses appear in the article, apart from the statistical renditions of those responses.

Indeed, only a few studies have endeavoured to identify the best methodology for analysing interviews. Sunikka-Blank et al. [90] is one of the few research teams to identify a method, using Strauss’s grounded theory to categorize interview responses. In Yadav et al. [91], the authors conduct interviews with stakeholders and list grounded theory as their method. However, the interviewees’ own reflections and analyses are excluded and are, for the most part, left uncited. In Yenneti and Day [92], the authors use interviews with locals and company stakeholders on the topic of social energy justice, in order to support their own positions. Most likely, Yenneti and Day applied narrative theory, but their methodology is neither assessed nor discussed extensively. In Mohan and Topp [93], the authors consider different actors in Indian society and their renewable energy goals, alongside the development of Indian energy policy. They use narratives to consider how the “different narratives translate into policy options”, acknowledging that techno-economic modelling cannot account for changing individual

prognosis, which ultimately determines social and political change. Even there, there is no extended discussion about the interview analysis methodology.

In contrast, we have identified the methods most suited for our research context and goals. In order to better understand SHS business processes in India, with reference to Boond and Selco, and in order to be able to contextualize the practices of those enterprises, this next section identifies related conceptual categories and patterns.

5 Analysis and Results

Based on our analysis of the interviews, we conclude that social enterprises engage in three key activities: community management, stakeholder engagement, and organizational capacity building. In order to operate in rural BoP markets, enterprises ought to coordinate these three activities. Those activities require the concentration of a considerable amount of effort and resources into household electrification, through SHS, for rural BoP households; this creates social value for the community and economic value for the social enterprise. These organizations have to tackle continuously high-risk propositions in order to sustain themselves in rural BoP markets. Our analysis suggests that the degree of risk varies across each of these three activities; we have ranked these from manageable to detrimental. Our scale reveals that partnering with financial institutions is the most detrimental to social value creation.

5.1 Community Engagement

Community engagement is not only the first step in the process of social value creation, but also is an important rural BoP market stimulant [94,95]. To create those incentives and social value, Boond and Selco target communities, rather than individual customers. Targeting communities is more financially viable and potentially more lucrative. However, community engagement processes are lengthy and resource-intensive, based on our interview source material. Boond and Selco rely primarily on community engagement to identify potential customers and extend their market reach. As it turns out, market reach has a lot to do with identifying potential customers and building social trust. Both organizations use last-mile personnel to build social trust and extend that reach. As Respondent H explains, it is “about trust”, trust has “more effect” than any other factor in “engaging the local villagers”. Both organizations approach potential customers in a similar fashion. Perhaps more importantly, both organizations’ main intentions behind community engagement is to gain social trust and

build customized solutions that ensure affordability. Boond and Selco both view community engagement as a manageable risk proposition, despite the fact that it is a time-consuming and costly process.

In both cases, community engagement typically begins with the identification of either non-electrified villages or electrified villages with an unreliable supply of electricity. Both companies target groups of customers, rather than individuals, in order to mitigate costs. These costs typically arise due to last-mile personnel visits, which are often recurring and motivated by a desire to understand the social context of a market and perform demonstrations of the technologies on-offer. For example, Respondent E describes how Boond first began its operations in Khajuri, a village in the Udaipur district of Rajasthan, stating:

Khajuri was one of the first villages where we did bank finance systems. So we have not worked in that area before. It was the first intervention which implied that as a company we were not known in the region. We did not have any network within the villages. So overall the cost of marketing and awareness were quite high.

This statement illustrates that, without social connections to the villages, making last-mile community engagement can be costly and present a greater risk. Another Boond representative, Respondent H, discusses travelling to the village for repeated visits, leading to a collaboration with two villagers, both of whom enabled a more meaningful engagement between Respondent H and their community. This demonstrates the importance of creating a network for rural engagement, in order to build and gain social trust. Respondent H describes the activity as follows: “The first time when I visited I did not understand what to do, as all villagers are strangers”. Such a statement suggests either a lack of social cohesion, or that Respondent H has trouble identifying with the locals, being as much as a stranger to the villagers, as they are to him. “The next time I went with [Respondent E and others]. Then we met [two villagers with local influence]”. Respondent H goes on to state how local contacts are essential to gaining social trust: “they [the villagers] believe locals”. This quote underlines the necessity of building social trust in any community engagement initiative. Once upper management visits the village, Respondent H is able to achieve the levels of trust and engagement necessary for last-mile community engagement. Ultimately, once a company has identified potential customers requiring electrification, last-mile community engagement is critical to gaining and building social trust.

By showcasing their SHS to the villagers through technological demonstrations, both companies are able to capitalize on social trust. Interviews with Selco personnel reveal a comparable market reach strategy, focused on building social trust through public demonstrations. Selco Respondent A describes initial attempts at engaging communities of villagers in the 1990s:

Initially people were not aware about the technology. The most critical situation in old days was that people were not ready to accept the technology and [company representatives]. Most of the times new electronic products or new concepts come to city first and then it goes to town. In case of solar, it was opposite. It first came to village and then it came to city [*sic*].

They continue by stating, “We used to go to villages to create awareness...to show how it [SHS] works...through demonstration of technology...after multiple visits customers agree [to buy the system]”. Similarly, Boond Respondent H describes how, with the help of a local contact, technological demonstrations were held during the evening plays of Lord Rama – based on the Ramayana, locally known as Ramlila:

During that time Ramlila was being shown in the village. They [villagers] did not have any light or TV at home. So, we joined them to watch Ramlila and in between [performances], we used to give them a demo of the system.

Demonstrating these technologies within the cultural context of local communities is especially powerful, since:

We had got the light and battery and showed them the glowing light in the dark, so this visual effect was seen by villagers in reality as proof. After that, I showed a few villagers the systems we had installed in a nearby village. This made a good impression on the villagers.

Staging demonstrations that coincide with existing public events enables companies to showcase products and product effectiveness to all potential customers, simultaneously. Therefore, technological demonstrations of SHS build social trust; the support of the local villagers persuades local decision-makers to invest, allowing companies to make the sale.

Community engagement activities are pivotal for building social trust and designing customized financial solutions that ensure affordability, based on our analysis. Currently, in rural BoP markets, end-user affordability is impeding the commercialization of SHS because

established financial institutions consider low-income groups to be high-risk customers. There are three principal reasons for this: working in the informal job sector, requiring smaller loans, and incurring higher administrative costs [96]. However, by presenting the socio-economic benefits of SHS, both Selco and Boond have managed to convince banks to finance SHS for high-risk customers, as explained in the following sub-section. Both organizations use customer engagement to minimize the administrative costs incurred by financial institutions, thereby financing their SHS. Respondent H, from Boond, described the relationship between community engagement and the reduction of financial institution administrative costs as follows: “When the loan process was initiated in January...we started filling loan forms” to reduce the administrative burden on the bank. Further, the Boond ground team “helped them [customers] to open bank accounts” and “when some [customers] did not repay the loan, the bank informed us [Boond team] and gave a list of 10 customers”. Respondent H continues, “we [Boond ground team] will visit the customer and encourage them to pay the loan”. Respondent I echoes something similar: “We used to visit the bank along with customers and introduce them to the bank as our [new] customers. We make sure they get a loan”. Selco’s approach is comparable to Boond’s, in that it works to reduce the administrative costs of banks, with the end goal of building social trust with established financial institutions. As Respondent A describes the SHS financing process: “This type of project, you need to closely monitor” loan repayments. He continues,

We have to react as per [customer] requirements, minute issues we have to give importance...banks work on weekdays, that is their (customers) working time, and they (low income-group customers) do not want to visit the bank...we will [help customers] open zero balance account.

In other words, companies may be operating in an environment where customers cannot go to the bank during weekdays – since most inhabitants of rural BoP communities work long hours. Only substantial market research can make companies aware of that reality. By catering to market-specific needs, SHS enterprises can build trust not only between themselves and rural BoP villages, but also with financial institutions.

Our analysis suggests that community engagement is a time-intensive activity. Respondent B underscores this in the following comment: “If you see an installation in a village during your visit that [sale] might not have happened in last two weeks. It [sales] might have happened through months [sic]”. Respondent H expresses a similar opinion on community engagement

activities: “I did not count visits [to Khajuri village] [...] Marketing process took 3-4 months. We started in November [2015] and completed installation by March [2016]”. In another instance, the community engagement process took around 5 months – starting with local NGO engagement, in September 2017, which took about 4 out of those 5 months, according to Respondent G. What this timeframe emphasises is that only continuous customer engagement can build the social trust needed to making the sale. Community engagement is, therefore, a time-consuming but worthwhile process that demands extensive organizational resources.

5.2 Stakeholder Management

The second key activity is stakeholder management. Social entrepreneurs rely on collaborations with stakeholders, in order to address challenges. Here, we define a *stakeholder* as “any group and individual who can affect or is affected by the achievement” of a social enterprises’ objectives (p. 25) [97]. The stakeholder approach to value creation is integral to accomplishing an organization’s purpose (p. 24) [97]. The concept of stakeholder management bears some theoretical resemblance to collaboration across organizational boundaries, within the framework of Austin et al. [11], as well as to partnerships, within the framework of Scott [12]. In practical terms, stakeholder management enables Boond and Selco to create SHS financing, by leveraging banks and financial institutions. In terms of policy, both enterprises collaborate with decision-makers through advocacy organizations. Maintaining positive and effective relationships with banks, financial institutions, and policymakers is necessary for SHS business owners to run a successful social enterprise; however, when government policy discourages entrepreneurial growth, many new businesses are forced out of the market.

The main challenge in stakeholder management often has to do with financing: how do SHS enterprises partner with local financial institutions? Our analysis underscores the time-intensive nature of the collaboration and partnership-building processes. Further, these relationship-building processes remain very important, culturally. As the founder of Selco recalls during the IHS Markit Seminar Series [98], working with financial institutions is, and has been since 1995, incredibly time-intensive: “It took us three years: 95, 96, 97. Till people are sick of our faces – the bankers – they would say, ‘Solar is not related to income generation, so we only finance something that is directly linked to income generation, like agricultural produce, fertilizers’”. The Programme Manager of Selco, Respondent C, expresses similar frustration, in 2016: “Relationship with a bank is a difficult and [a] time consuming process.

In Karnataka, we have done pilots and we are doing this since [sic] long time. Even here [in Karnataka], on average, it will take one and half months [to establish a relationship]”. As these responses illustrate, the time-intensive nature of collaboration can be detrimental to businesses, especially when they lack the requisite skills to secure a financial backer for SHS.

In Boond’s case, relationship-building with financial institutions led to unpredictable delays and additional costs. Respondent E, from Boond, describes the resource-intensive nature of collaboration and partnership-building as follows: “Getting the relationship with the bank took about two years of struggle”. When the company initially approached the bank, the chairman of the bank was not supportive. “We spoke to bank officials,” recalls Respondent E, but despite these attempts, the local “branch manager was not supportive”. The company again lobbied the new chairman, who approved the SHS financing. Now, Respondent E continues, “it was mandated. Hence we pushed forward” with the loan. In another instance, Boond faced similar challenges with a microfinance institution. As Respondent G explains: “We took the help of Rangde (MFI) to finance the system”. Once again, “relationship building started in September 2017 and we signed MoU [Memorandum of Understanding] in March 2018”. As these quotes show, relationship-building with financial institutions is vital to entrepreneurial success. This lengthy process not only demonstrates the importance of continuously engaging with financial institutions, but also that those engagements eat up significant time and resources, and therefore increases rates of entrepreneurial failure.

Stakeholder management also involves maintaining positive connections with policy influencers, ultimately to ensure that SHS businesses can continue operating in conducive policy environments. In principle, the absence of policy frameworks and the improper use of subsidies are two main factors hampering the prospects of SHS [99]. To address these challenges, engaging with policymakers is especially important. For this reason, Boond engages with policymakers indirectly, through organizations such as the Clean Energy Access Network ([CLEAN](#)), which advocates on behalf of off-grid solar companies. However, Boond is unable to take full advantage of those subsidies. As Respondent E describes, “There will be a positive effect, you see, as long the subsidy is there, definitely. The government has limited resources. But again, the issue is when subsidies are not released in time”. Respondent E elaborates on the need to create a friendly environment for SHS financing through policy: “An alternative to that [subsidy], we have always been pushing the government to work on ecosystem [to enable SHS finance] through various forums [like CLEAN] rather than providing

capital subsidies”. However, Respondent E expresses scepticism about the impact of the forums: “the solar off-grid has a very poor lobby. We voice our opinions, but there is nobody there to care about our opinions”. On the other hand, Selco, through its foundation, is a proponent of SHS financing and is an active participant in off-grid solar forums like CLEAN, [Shakthi Foundation](#), and [Gogla](#). In an interview from 2011, Hande notes that policy frameworks are conflicting and inconsistent [100]: “There is a lack of practitioners’ participation in the policy decisions”, he continues, “The so-called ‘environmental mafia’ of Delhi is not allowing practitioners to give inputs”. In 2014, the Indian government’s policy objective was to achieve 100% electrification. Selco Respondent C describes the 2016 policy environment as follows: “Harish is an active member of [policy] advocacy groups. But on a policy level, things are not coherent [on off-grid solar]”. Policy inconsistencies are visible in some of the more sparsely populated regions of Udaipur, where Boond operates. There, the government distributed solar home systems for free, before the national election in 2019. Boond Respondent G reflects on the consequences of that distribution for business operations: “In Kotra block, they [government agencies] have distributed (for free) 100W systems in February [2019]. This affected our market growth in the area”. He adds, “We discontinued our operations in that area”. In the context of this interview, Respondent G seems to be implying that the distributed systems were cost-free, and that this has impacted business operations. Taken together, these stories indicate that uncertain policy environments are one of the major risk factors for entrepreneurs in rural BoP markets.

5.3 Organizational Capacity Building

Organizational capacity building is understood, generally, as a strategic tool to support not-for-profit organizations in achieving their social missions [101] and has varying generalizations [102]. In the case of social enterprises, capacity building increases the ability to effect lasting change [103]. As previously mentioned, organizational capacity building is about the strategic management of inputs [80]. Austin et al. [11] and Scott [12] talk about capacity building in a similar fashion, mainly in terms of organizational alignment and local capacity building, respectively. Within the context of our analysis, organizational capacity building deals with three entrepreneurial activities: technical know-how, managerial know-how, and social trust. These activities empower organisations in the SHS business, and increase the likelihood of profitability. To put it simply, enterprises need to manage resource constrained business

environments, in order to implement SHS projects in rural BoP markets and gain the trust of customers and stakeholders.

Capacity building efforts are about the strategic management of inputs, with human resources as a primary factor. For social enterprises, finding human resources is a challenge. Commercial entrepreneurs use wage prospects to attract human resources. Without this lure, social entrepreneurs may face difficulties in mobilizing human resources. Our analysis has detected two main activities that enable the proper management of inputs: technical know-how and managerial know-how. Respondent E describes the technical know-how of last-mile technicians, in relation to organizational capacity building: “Working conditions and engagement with the last mile team is strong and they are close part of the team. We have invested in building the [technical know-how] capacity over a period of time”. Respondent E references on-the-job training activities for capacity building, stating: “We started investing in the last-mile eco system by training local youth as technicians” and adds, “I’ll say 90 percent of them have been trained on the job”. Respondent E concludes that “in terms of last-mile team we did not face any particular problems so far”, and notes that “The reason behind that [strong grass-roots team] is when it comes to last mile human resources, we have been paying better salaries than the market”. Selco had a similar experience with last-mile technicians, according to Respondent A. Both Boond and Selco have cited high retention rates for last-mile technicians. Hiring last-mile technicians with fixed salaries is a strategic decision specific to rural BoP markets, and is an effective means of building capacity using technical know-how.

From an implementation standpoint, managerial know-how is needed on three separate levels, including for last-mile, middle-level, and top-level managers. The top-level managers of an organisation are typically more motivated and work for lower salaries than the market average. Middle-level managers are crucial for organizational survival; however, recruitment and retention can be challenging. Last mile staff are instrumental in building social trust and brand recognition for a social enterprise. Managerial know-how is essential, at the last-mile, in establishing social trust within targeted communities. Selco Respondent A argues for the importance of capacity building through last-mile staff managerial know-how: “We have to give the expertise to technicians. For that we are having proper training structure. We are mainly concentrating on subjects: technical, documentation, reporting and PR [public relationship]”. Respondent E stresses the importance of managerial know-how in deploying a variety of last-mile resources: “you [referring to last-mile manpower] have to multitask. At

grassroot level, I mean, a technician can not just be a technician or a sales guy can not be a sales guy because the cost of doing business is so high that once a person is going to the field he should be able to address technical issues at least basic one even if he is not a technician". In other words, the company ought to equip its last-mile staff with a broad skill set and knowledge base. This means that technicians and community engagement staff should have not only the ability to communicate and interact with the local community, but also sufficient technical knowledge in fixing basic problems. This level of operational efficiency is necessary, as last-mile staff often travel 30 to 40 km a day to visit multiple customers. In addition, as Respondent E states that "If the technician is going to solve a service complaint, he also has to educate the customer and build a brand for the company". Organisational capacity building, in terms of managerial know-how in last-mile, helps build trust in the brand and the products, which lowers overall risk for the company.

Boond management experienced difficulties with middle-level management and had a strong top-management team instead. Respondent E articulates that challenge as follows: "We have been looking for a good communication person for a long time and we have not found one. Similarly, for managing operations also we have been struggling to find a good operations person". Respondent E adds that "in terms of top [level] management I think we have been very fortunate in terms of getting [in] touch with one another and to build this initiative". Our analysis of the interview data did not reveal any specific challenges, in Selco's case. This could be attributed to the hybrid organizational structure of Selco, with its separate for-profit and non-profit division (Selco Foundation). Goyal et al. [44] concludes that this hybrid structure enables Selco to balance its social mission with economic viability. Otherwise stated, hybrid organizational setup provides Selco with the opportunity to overcome constraints related to resource mobilization. Taken together, human resource mobilization is instrumental in creating social value for reliable service delivery – but it remains a blind spot for the organization because, without a strong middle-management team, the risk rises.

Organizational capacity building, from a social trust perspective, relates to the reliability of SHS on a practical level. The reliability aspect primarily deals with SHS performance and is correlated with organizational credibility. To this end, Boond activities are centred on customized SHS, standardizing installation procedures, and servicing through an Annual Maintenance Contract (AMC). As Respondent E remarks, on customization: "When a customer buys a home system, it is customized to his needs". Respondent H elaborates, "We visit

customer house and identify location for light fittings, battery and charge controller”. Respondent I underscores the importance of customization, as well, stating that “Customer homes are prone to water leaks and other things. We consider housing structure during installation [of SHS] and consider their (customers) inputs (about energy requirements)”. To ensure the reliability of the product, Boond includes an AMC as part of their offering. Usually, the AMC is bundled to the cost of the SHS. Respondent F explains customization in terms of the overall system cost, as follows: “We offer quality SHS products” as a result “our [system] cost is higher due to installation [procedure], [choice of] parts, and AMC”. Our analysis reveals that Selco operations are centred around brand credibility and trust building. This outcome is supported by Goyal et.al [44]. Taking all of this into account, organizational capacity building establishes social trust between customers and stakeholders and enables the organization to manage the resource constrained business environment of the BoP. Therefore, the lack of social trust may be detrimental to organizational survival in the rural BoP market.

5.4 Discussion

As the interview responses reveal, Selco and Boond both reflect several aspects of Austin et al.’s [11] framework which, in turn, helps us understand how social enterprises remain viable in rural BoP markets and the risks involved. First of all, these responses and the corresponding framework emphasize social value creation. Within the scope of this article, value creation is, essentially, household electrification, via SHS, in rural BoP households. Both Boond and Selco representatives discuss value creation in a similar manner, as both businesses focus on building relationships and trust with local villagers to create that social value. Secondly, both companies attempt to transcend organizational boundaries by building and managing culturally and socially significant relationships with local stakeholders, and especially with financial institutions. Finally, organizational alignment is about providing reliable services by managing human resources adequately and efficiently. This organizational alignment is evident, in terms of how both companies have worked towards building an efficient organizational capacity, through practical implementation.

Both Selco and Boond’s organizational activities mesh with Scott’s [12] framework, however, the framework does not consider risk as intergral part of rural BoP markets. To begin with, Scott’s [12] framework emphasizes community interaction: both companies’ representatives stress the importance of community interaction as an integral part of grass-roots operations. Further, both organizations engage in partnership building activities in order to navigate the

challenges of rural BoP markets. Next, we find that local capacity building, which attempts to fill institutional gaps, is all about organizational capacity building. These capacity building efforts influence managerial decisions on advancing operations in rural BoP markets. Finally, both organizations had to overcome numerous barriers, in order to create social value through SHS.

Key Activities	Main Intents	Risk
Community engagement	Social linkage and customized solutions	Manageable
Stakeholder management	Partnering with financial institutions Navigating policy landscape	Detrimental Challenging
Organizational capacity building	Technical know-how Managerial know-how Social trust	Manageable Challenging Detrimental

Table 4. Categorizing the three main key activities according to risk.

The findings of this study have practical implications, in terms of how SHS social enterprises ought to conduct their business operations. We propose to enhance Scott’s [12] business framework by adding risk as yet another dimension which social enterprises operating in a rural BoP markets must overcome (Table 4), as risk management is an integral part of social enterprises. Nevertheless, social enterprises, by nature, operate in environments with higher risk factors, when it comes to the creation of new markets or the provision of new services – especially where none existed before, such as in rural BoP markets. As such, we scale these risk factors from manageable, to challenging, to detrimental. In rural BoP contexts, a *manageable* risk would not prevent social enterprises from creating social value; *challenging* is defined as a persistent obstacle that could potentially jeopardize business activities; and a *detrimental* risk is one which could potentially incapacitate entrepreneurial endeavours.

6 Conclusion

This article, supported by its empirical findings, does two things: it offers risk as a new perspective on how social enterprises in BoP markets coordinate key activities; and it interrogates the relationship between social entrepreneurship, BoP market characteristics, and organizational narratives. All of this is done in order to understand energy access issues and

related challenges to rural BoP markets. The first major finding of this article is that it is essential to factor risk into business model frameworks for off-grid solar in rural BoP markets, given the Boond and Selco case studies. This claim is supported by the social entrepreneurship literature, which suggests that investing in BoP markets is often high-risk. As such, this article argues that preparing for and managing high stakes is central to any rural BoP business venture. While our analysis identifies that interviewees have a sophisticated understanding of the degree of risk that they are undertaking, a paucity of literature suggests that further risk analyses of social enterprises ought to be undertaken. This article stratifies rural BoP market risk levels as either manageable, challenging, and/or detrimental. By conducting a comparable risk assessment, social enterprises could formulate better responses to the risks inherent in system-integration business models.

The second finding illuminates that social trust between customers, stakeholders, and a company's human resource division is essential to manage risk. Stakeholder management reveals the oft-invisible operational realities of rural BoP markets. Moreover, the driving purpose behind stakeholder management is to create a favourable business environment; without the financial backing of local and regional financial institutions, companies may find themselves unable to sell SHS in rural BoP markets. As the interview source material indicates, building traction with financial institutions is a risky process, because partnering is time-intensive and prone to setbacks. Further, unpredictable and ever-changing policy environments hinder business prospects. Thus, engaging with policymakers is challenging to any business venture in rural BoP markets. In addition, partnering with financial institutions is one of the largest and most detrimental risks. Third, organizational capacity building is another key activity to ensuring success; it concerns technical know-how, managerial know-how, and social trust building. An absence of externalities makes capacity building easier compared to stakeholder management. As the interviews reveal, technical know-how is manageable and uncomplicated compared to managerial know-how. Taken together, the degree of associated risk also determines the optimal strategy for rural BoP SHS social enterprises, in terms of business operations and resource constraints. All of these results suggest that building social trust is critical to the social value creation process which, in turn, may transform communities into profitable, rural BoP markets.

Since this study only considers two case studies, the results suggest additional narrative analyses of SHS businesses could reveal novel business approaches. A microlevel study of other companies – operating under similar market conditions, but in different locations – could explore organizational dynamics, managerial blind-spots, and other macro-level tensions. A study of that nature would be useful to stakeholders, policymakers, and other players in energy markets. By adopting a narrative analysis approach, future research can help decision-makers mitigate and offset the risks inherent to rural BoP entrepreneurial ventures.

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