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# Social innovation with open source software: User engagement and development challenges in India

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## ABSTRACT

A diverse range of innovative solutions based on Free-and-Open-Source Software (FOSS) have been developed for marginalized communities in developing countries. It has been suggested that such small-scale and home-grown solutions (e.g. mobile phone apps), usually championed by social enterprises (SEs), are more likely to introduce pro-poor change than infrastructure heavy ICT initiatives designed by state and other international actors. In the Indian context, FOSS-based social innovations (SIs) introduced by SEs are helping poor communities tackle previously thought-to-be unresolvable socio-economic problems. An interesting question, therefore, would be: in what ways is the SE model and approach uniquely equipped to develop FOSS-based SIs that deliver pro-poor change? The empirical component of the research attempts to shed light on this question by uncovering the nuts and bolts of the development methodology deployed by an SE during the coding and launch of an FOSS-based SI. Findings highlight the significant role of the founder's social vision; the challenges of accurately capturing and translating to software developers the nature and nuance of social problems; and, the incumbent issues in putting together a methodology that creates active user engagement throughout the software development process, overcoming difficult barriers such as language and culture.

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## 1. Introduction

There has been great optimism and financial outlay for ICT projects in developing countries (DCs) (Heeks and Kenny, 2002) for the purpose of introducing pro-poor change through better access to the information society (Toffler, 1980). With about 1.2 billion, or over 20% of the world's population living in absolute poverty, doubts are often raised as to whether the capabilities of ICTs can really be harnessed for development (Heeks and Foster, 2013). The literature highlights many examples of failed ICT projects in DCs with development goals. While some of these projects may have been supported by a development rationale (Madon, 2000; Mansell, 1999), such as the harmonization of price differentials and creation of demand for social inclusion; there is limited empirical evidence of ICTs positively affecting development in poor nations (Eggleston et al., 2002). In this paper, we illustrate how the open source approach to software development enabled a

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social enterprise (SE) to develop a social innovation (SI) to meet the information needs of farmer members of agricultural co-operatives in India with tangible results. India, a globally recognised IT services provider is home to 37.5% of the bottom billion (Alkire et al., 2015) and persistent rural poverty limits accessibility and connectivity for those who are primarily engaged in agriculture (Ministry of Rural Development – Government of India, 2014).

Despite the above scepticism, innovation and technology policy actors in DCs place considerable emphasis on ICTs to promote economic and social development (WBI (World Bank Institute), 2009) through the creation of efficient innovation systems (Nelson and Winter, 1982). Here, policy actors usually hold the belief that ICTs can enable the “leap frogging” of entire stages in development, thereby, bridging the so-called “digital divide” (Norris, 2001). This has been quite difficult to achieve in practice as low and middle income countries continue to stagger behind in measurements of their innovation systems' effectiveness (Cornell University et al., 2013) and only modest progress has been made by such countries in the achievement of the millennium development goals (Center for Global Development, 2015).

Even though ICTs' promise of leap frogging stages of

development has not fully materialized; the enthusiasm for their potential is still strong. The rapid pace of change in today's information society has created possibilities for a redefinition of the 'ICTs for development' discourse. It is being suggested that the use of ICTs for development, dubbed ICT4D, is moving from the older version 1.0 to a new version 2.0. Where ICT4D vr.1 marginalized the poor, allowing a supply-driven focus, ICT4D vr.2 centralizes them, creating a demand-driven focus. While vr.1-fortified by the "bottom of the pyramid" concept (Ramani and Mukherjee, 2014; Silvestre and Silva Neto, 2014; Hall et al., 2014; Prahalad et al., 2009) characterized the poor largely as passive consumers, vr.2 sees them as active producers and innovators (Heeks, 2008). Evidence suggests that solutions developed under the ICT4D vr.2 worldview, which place central emphasis on requirements of the poor by enabling them to participate in the design process as active innovators, have had much greater success in changing circumstances of target groups than top-down and centrally planned ICT initiatives for promoting general economic development and poverty alleviation (Moseson et al., 2015; Yildirim and Ansal, 2011; Eggleston et al., 2002; Avgerou, 2008).

It is suggested that the ICT4D vr.2 worldview is best operationalized when SIs are championed by social entrepreneurs or enterprises and are enabled by the principles of free and open source software (FOSS). Here the inter-relatedness and conceptual harmonization between the triad of SIs–SEs–FOSS would be crucial. SIs are novel solutions to a social problem for which the value created accrues primarily to society as a whole rather than private individuals (Phills et al., 2008). SEs undertake entrepreneurial activity with an embedded social purpose (Austin et al., 2006); operationalized through discovering, defining, and exploiting opportunities in order to enhance social wealth (Zahra et al., 2009). While FOSS is software that allows its users freedom to run, distribute, study, change and to make improvements to it where access to the source code is a necessary precondition (Free Software Foundation, 2015).

It is proposed that an important but understudied link exists between SIs, SEs and FOSS; and, understanding the nuances of this link will be important for advancing new theory in the ICT4D vr.2 discourse. To advance theory, it is believed that as a first step, an in-depth investigation to uncover the processes that SEs adopt to develop SIs under FOSS principles ought to take place. In the empirical component of this research, results of such an investigation are detailed, keeping the software design and development methodology central to contributions.

The paper is organized as follows: first, a theoretical background is presented which explores (a) the relationship between social innovation and development, (b) FOSS and its impact on DCs, and (c) the role of social enterprises and user centred approaches to deliver social innovation. Second, a justification for the choice of country, site and specific case are presented; also highlighted are the research's aim, philosophical lens, and data collection and analysis approaches. Next, case data from the research is presented which describes the processes of development, launch and uptake of an FOSS-based software solution developed by a SE. The following discussion section pulls together the major findings and contributions from the research, where we outline a number of possible contributions of the present study to existing theory and practice of social innovation and social entrepreneurship. Finally, in the conclusion section, final thoughts on the value of the research are put forth and directions for further work in the area are proposed.

## 2. Theoretical background

### 2.1. Social innovation and development

The capability to innovate and to bring innovation successfully to market will be a crucial determinant of the global competitiveness of nations over the coming decade (OECD, 2007). It is estimated that between 50% and 80% of economic growth comes from innovation and new knowledge (Mulgan, 2006) and (through a feedback effect) economic activity promotes innovation activities (Galindo and Méndez, 2014). The problem, however, is that the traditional innovation paradigm places a great deal of emphasis on the science and technology (S&T)-focussed application of the term "innovation" (Cloutier, 2003; De Muro et al., 2007; Hochgerner, 2009; Howaldt and Schwarz, 2010; Klein and Harrison, 2007; Vienna Declaration, 2011). This paradigm leads to policies which are heavily focused on infrastructure diffusion. Indeed, the quality of basic ICT infrastructure has seen considerable improvements year on year in developing countries (Heeks, 2010). Unfortunately, the failure of such S&T-focussed policies has been playing a role in the uplift of social problems created by issues such as unemployment, corruption, urban overcrowding, increased conflicts and so on (SSIR (Stanford Social Innovation Review), 2013). As a result, a paradigm shift is now occurring which emphasises on a "new nature of innovation", with a number of critical characteristics that differentiate it from innovation in the industrial era (Prahalad et al., 2009). Within this new paradigm of innovation, there is an emphasis on innovations that are "hidden" from the point of view of "traditional" conceptualizations and measures of innovation. Social innovation falls within this new paradigm.

Social innovations are innovative solutions to problems in society that mobilise ideas, capabilities, resources, and social arrangements required for sustainable social transformation (Alvord et al., 2004). They present new solutions to some of society's most pressing problems such as those linked to economic development and health and education services for marginalized sections of the community (Datta, 2011). Across the world during the past decade, there has been a phenomenal surge of interest in social innovation as a way to achieve sustainable economic development (Dawson and Daniel, 2010; Graddy-Reed and Feldman, 2015). This interest comes in the wake of claims for a more responsive role of governments to address long-standing social problems affecting the most vulnerable populations in developing countries.

There has been a perception, justified or not, that policy makers are not paying enough attention to what innovation has to offer and on the ways it could be operationalized in order to meet basic development needs. The traditional focus in innovation policies has been on research and development (R&D), however, increasingly, it is being shown that innovation goes far beyond industrial R&D. There is a significant role of tacit knowledge, experience, and learning capabilities, particularly when considering these aspects in developing countries. Therefore, in order to promote development, there is a need to include different types of activities, actors, beneficiaries, tools, themes, objectives, rules, frameworks as well as new challenges and strategies (Bortagaray and Ordóñez-Matamoros, 2012). The value of SI is now being taken seriously as an opportunity to shape the responses of governments, researchers, social innovators, entrepreneurs and philanthropists to new social realities, generating new solutions, connecting with citizens, and promoting reforms (Moulaert and Mehmood, 2010; Hubert, 2011).

It is acknowledged that the diffusion of technological infrastructure and even usage has been dramatic (Heeks, 2010); the addressing of social problems, however, requires the availability of information (ITU (International Telecommunication Union), 2013). 'Infrastructure availability' does not equate to 'information availability'. Software applications that are usually free to use and cost

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