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A success of some sort: drip irrigation Social Enterprises and Drip Irrigation in the Developing World

Jean-Philippe Venot

UMR G-EAU, France

IRD, France

Wageningen University, Netherlands

Abstract

This paper explains the processes behind the framing of drip irrigation as a promising technology to address current poverty and environmental challenges in the developing world. I draw from critical development and science and technology studies and highlight that this imagery has been actively performed. Insiders elaborated a compelling narrative calling upon a *will to improve* through technology and the *moral legitimacy* of social entrepreneurship in development; they worked hard to establish a supportive coalition in an ever wider network. This story hinges on several assumptions, which upon closer scrutiny appear to be problematic: the unicity of smallholder farming, the attribution of inherent technical characteristics to a specific object - the “drip kit” - regardless of the context in which it is used, and the framing of social entrepreneurship and market-based approaches as alternative models even though these rather constitute a re-working of existing arrangements within the international development community. Nonetheless, the pro-poor and environmentally friendly smallholder drip irrigation narrative still continues to be successful in harnessing the support of the international development community, despite the little capacity drip irrigation has had to transform smallholder farming, especially in sub-Saharan Africa. Unpacking the origins, actors and building blocks of the discursive success of smallholder drip irrigation provides fresh perspectives on the practices of development in the sector and is the first step towards more meaningful engagement with smallholder farmers in the developing world.

Key words: Development, Narrative, Poverty, Technology, Water Resources; Developing countries

Highlights:

- The promises and potential of smallholder drip irrigation are discursive constructs
- Drip irrigation is appealing because of its association to social entrepreneurship
- Social entrepreneurship is not an alternative development model as is often claimed
- Smallholder drip irrigation remains an artefact of development projects

Introduction

For nearly three decades, drip irrigation, that is, the frequent application of small quantities of water directly at the root zone of crops through a system of perforated plastic pipes¹ has imposed itself as one of the most popular technologies in the field of irrigation and agriculture amidst professionals and the wider public (Venot et al., 2014).²

¹ Though the *concept* of drip irrigation can be summarized in a sentence, there is a wide diversity of drip irrigation *systems*. Burt and Styles (2007) provide a comprehensive account of their technical and managerial dimensions.

² In 2012, for example, Daniel Hillel, an US-Israeli scientist said to “have pioneered micro-irrigation in arid and dry land regions” was awarded the World Food Prize, which recognizes “the achievements of individuals who have advanced human development by improving the quality, quantity or availability of food in the world” (<http://www.worldfoodprize.org>). Similarly, in 2013, Netafim, “the global leader in drip and micro irrigation solutions” was named the 2013 Stockholm Industry Award Laureate, which “honors business sector contributions to sustainable water management” (www.siwi.org).

One of the reasons for this is because drip irrigation is a material embodiment of a broader agricultural development discourse popularized by the former UN Secretary General Kofi Annan. This discourse stresses the need for ‘more crop per drop’ or, in other words, for using agricultural water more efficiently and productively in a context of water crisis and food insecurity. In short, drip irrigation would allow to address a current challenge, that of the finite character of natural resources, in order to contribute to the shaping of a better future, that of sustainable development.

Over the last 50 years, most research and development efforts on drip irrigation have been driven by the notions of efficiency and productivity, leading to ever more hi-tech and expensive systems for farmers in developed economies. In the late 1980s, at a workshop on technological and institutional innovation in irrigation organized by the World Bank, Daniel Hillel, recent recipient of the World Food Prize, could only wonder:

Perhaps the most glaring problem demanding attention arises ironically from our very success in developing the technology of drip irrigation to such a high level of mechanization. Have we let our fascination with high technology take control of our research, and have we, in consequence, turned away from the majority of the people in this hungry world who really need irrigation? I am referring, of course, to the special needs and circumstances of developing countries (Hillel, 1988, p93).

Despite the high-profile of the person and of the arena in which this statement was made, it yielded very little immediate action. The situation changed in the late 1990s/early 2000s. An increasing number of calls and development efforts from non-governmental organizations to design and disseminate ‘modern’ irrigation technologies that would meet the needs and specific

circumstances of smallholder farmers³ in developing countries (i.e. systems that would be smaller, cheaper and easier to use and manage than those designed for farmers in developed economies) acquired a resonance they never had before on the basis of early report of success in south Asia (Cornish, 1998; Kay, 2001; Polak et al., 1997). In addition to being a ‘sustainable’ and ‘modern’ technology, drip irrigation came to be seen as a powerful tool to bring upon prosperity and development among poor smallholders as “*a new spectrum of [low cost] drip systems now exist and can form the backbone of a second green revolution, this one aimed specifically at poor farmers in sub-Saharan Africa, Asia, and Latin America*” (Postel et al., 2001). In this paper, we use the term “smallholder drip irrigation” to designate such type of systems.

Nearly 15 years after this call, the standard tale of smallholder drip irrigation continues to be articulated by development practitioners and in peer reviewed academic publications. Burney and Naylor (2012), Friedlander et al. (2013), Kulecho and Weatherhead (2006), Namara et al. (2007), Woltering et al. (2011) are example of studies using field-level empirical evidence to assess the extent to which smallholder drip irrigation delivers on the promises of higher income and improved livelihoods. These studies invariably frame smallholder drip irrigation as a powerful tool for poverty alleviation, even though they point out to the many constraints that exist towards

³ Smallholder farming is a fluid category that means different things to different people and whose boundaries fluctuate depending on the vantage point considered (for a recent discussion, see Sourisseau et al., 2014). The term smallholder is used for the sake of clarity, as a synonymous for ‘small-scale’ or ‘small farms’ (often less than 1 ha), privately owned, under the control of the farmer using his/her own labour for cultivation purposes.

a successful, sustainable and large-scale adoption of these systems, especially in sub-Saharan Africa.

This paper shifts the focus of analysis away from the technology, its perceived potential, and the dynamics of its (dis)adoption. It tells the story of *how* drip irrigation has been framed as a successful technology for addressing the global challenge of poverty in developing countries, including an analysis of the extent and ways scientific publications contributed to this phenomenon. The main concern here is not about assessing whether a particular artifact, approach, project, or policy (in this case, drip irrigation for smallholders in the developing world) is successful (or not) but to unravel the processes through which a *positive connotation* about a given type of intervention is constructed and transferred.

This paper draws from and contributes to a body of literature within the field of anthropology of development that highlights the importance of the *interpretation* of events over the events themselves (Li, 2007; Mosse, 2005). Notably, the paper is inspired by the statement of Mosse (2005, p158) that “*success is not merely a question of measures of performance; it is also about how particular interpretations are made and sustained socially*”. This can happen through narratives, that is, cause and effect storylines that frame a problem, identify its causes and propose intervention solutions that are often depicted, in the narrative itself, as silver bullets or panaceas (for a critique of the notion of panacea, see Ostrom et al., 2007). Narratives have been shown to be particularly stable interpretations whose contribution to shaping the policy and practices of development and the environment is significant (Keeley and Scoones, 2003; Roe, 1991, 1995; Sumberg et al., 2012). As such, unpacking their origins and the reasons they persist constitute an important research agenda; it can indeed yield alternative perspectives on seemingly intractable problems (Scoones, 2005). This understanding of the importance of narratives in

development and the environment is complemented with insights from the field of Science and Technologies Studies; more specifically the paper draws from the practice-based theory of innovation proposed by Madeleine Akrich et al. (1988a, 1988b). This is justified by the material dimension of the study-object (drip irrigation, a system of plastic pipes and ancillary devices) and allows for highlighting the role that materiality play in shaping a positive reference about a development intervention.

In the words of Büscher (2014), this paper studies how success is sold or marketed.⁴ Scholars have shown that the success (as any value interpretation) of a given intervention hinges on two pillars. First, the practices of ‘insiders’ directly involved in its promotion or implementation, and notably the elaboration of a compelling story and the enrollment of a network of actors for its legitimation (the broader the network, the more stable and legitimate the story becomes). Second, the importance for this insider work to travel outside this immediate circle and draw on broader theories and models (Blaikie, 2006; Büscher, 2014; Mosse, 2005; Rap, 2006).

Understanding how, and why, smallholder drip irrigation has acquired a positive connotation among a wide network of development actors requires situating this specific story within broader

⁴ Büscher (2014) frames (value) interpretation as a (knowledge) commodity, whereby value is defined as a “more or less ephemeral production of evaluation” (Graham, 2006 in Büscher, 2014). The economic metaphor of the commodity is a very powerful one; it allows for an intuitive understanding that meaning and interpretation (as any material objects) are produced, distributed, and consumed. It tends, however, to over-rationalize the shaping of success, which is also firmly grounded in belief systems and aesthetics.

trends and discourses of development. This is discussed in the next section, which focuses on the increasing role and importance of the private sector in development and makes reference to the emergence of a specific organizational form, the *social enterprise*. The paper then describes how ‘insiders’ shaped a positive connotation about smallholder drip irrigation for poverty alleviation. The paper highlights that success formation rests on five key dimensions reinforcing each others, namely, a compelling –if simplified- story, a technological innovation framed as a ‘perfect’ product, an ‘innovative’ development approach, a personalization of change and innovation, and a legitimization network pro-actively built. The discussion comes back to the correspondence between insider practices and characteristics and broader ideologies and value systems regarding technology, social entrepreneurship and development. A short conclusion recaps the findings and highlights potential areas for future research.

The changing form of development aid

Companies have more of a role than ever to play in reducing the poverty and social exclusion that widens the gap between the haves and have nots (BPD, 2002).

This address of the then president of the World Bank Group at a meeting of Business Partners for Development (a network of development agencies, non-governmental organizations, and businesses) reflects a widely shared belief that private sector actors have a growing role to play in the field of development.

Such calls are grounded in the diminishing role and importance of the state following structural adjustments plans in the 1980s and 1990s, a growing disillusion vis-à-vis the effectiveness of public development aid, and the sheer scale of corporate financial transactions (OECD, 2012; Reality of Aid, 2012). Public-Private-Partnership (PPP), Foreign Direct Investment (FDI),

140 Corporate Social Responsibility (CSR), and Bottom of the Pyramid approaches (BoP) are among
141 the main models of private sector involvement in the field of development (for instance, UNDP,
142 2004; OECD, 2006). The increasing influence of the private sector in the field of development is
143 not without sparking debate. Whether pursuing the dual objective of profit making and social
144 improvement remains mere rhetoric or constitute a real breakthrough vis-à-vis current approaches
145 remains, for instance, a highly disputed topic (Reality of Aid, 2012).

146 This debate is at the core of the concept of *social entrepreneurship*, which has received
147 increasing attention over the last 20 years. Social entrepreneurship has become an international
148 cultural phenomenon following increasing skepticism about the ability of governments and big
149 businesses to meaningfully address social problems such as poverty, exclusion and the
150 degradation of the environment (Dacin et al., 2011; Teasdale, 2012).

151 The academic literature on social entrepreneurship is characterized by definitional debates about
152 what it *is* and what it *is not* (Mort et al., 2003; Peredo and McLean, 2006, and Short et al., 2009).
153 The concept, however, remains overwhelmingly framed as a positive phenomenon and a new
154 model to solve today's grand challenges (Dacin et al., 2011). In other words, social
155 entrepreneurship has emerged as one such institutional panacea against which Ostrom et al.
156 (2007) warned us. Such celebration is particularly noticeable in the management literature that
157 counts for most work published in the field (see Dey and Steyaert, 2010 for a critique).

158 Discussing the diverse framings of social entrepreneurship and related organizational forms, i.e.
159 *social enterprises*, is beyond the scope of this paper. We will limit ourselves to recalling what
160 scholars consider as the key characteristics of social-entrepreneurial action. First, a central focus
161 on social or environmental outcomes that has the primacy over profit maximization or other

162 strategic considerations; second, the pursuit of innovation through new organizational models and
163 processes, new products and services, or new thinking about societal challenges; and third the
164 diffusion of innovation via market oriented action and scaling up of initiatives through alliances
165 and partnerships (Huybrechts and Nicholls, 2012).

166 **Social enterprises and smallholder drip irrigation: Methods**

167 These facets of social entrepreneurship are illustrated by two organizations involved in the design
168 and promotion of drip irrigation for smallholders in the developing world. These are International
169 Development Enterprises (iDE; founded in 1982 by Paul Polak) and Driptech (founded in 2008
170 by Peter Frykman). iDE and Driptech are not the only two organizations involved in the
171 promotion of smallholder drip irrigation in the developing world⁵ but they certainly are those that
172 have received the most attention from international development agencies, private foundations,
173 and researchers alike. As such, they offer a fertile ground to understand how interest and value
174 interpretation over smallholder drip irrigation has been created and widely circulated. The

⁵ Other organizations focusing on the same sub-sector include for-profit companies such as Global Easy Water Product (www.gewp-india.com, an upshot of iDE-India manufacturing smallholder drip irrigation systems in India) and Microdrip (www.microdrip.pk, disseminating iDE-India products in Pakistan), and the social enterprise Proximity Design, an upshot of iDE active in Myanmar (www.proximitydesign.org). Multiple NGOs or charitable organizations, not articulating an entrepreneurship or business rhetoric, promote drip irrigation for small farmers in developing countries too (Agronomes et Vétérinaires sans Frontières, Chapin Living Waters, Hellen Keller International, etc.); they are not discussed in this paper.

175 objective here is not to evaluate iDE or Driptech activities but to use these organizations as a
176 prism to critically reflect on broader ideologies and values about technology and development.

177 The two organizations illustrate the polysemy of the term and concept of social entrepreneurship,
178 as illustrated in the way they define themselves:

179 *iDE is an international non-profit organization dedicated to ending poverty in the developing*
180 *world, not through handouts but through a market-based approach to poverty reduction [...]*
181 *iDE views the rural poor as entrepreneurs, producers, and customers (www.ideorg.org;*
182 *October 29, 2013).*

183 *Driptech is a venture capital-backed, for-profit social enterprise [...]* *Our mission is to*
184 *alleviate poverty by creating extremely affordable, water efficient irrigation solutions for*
185 *small-plot farmers in developing nations through our proprietary, widely deployable*
186 *manufacturing systems [...]* *The company distributes its products through local governments,*
187 *corporate partners, and NGOs in India and China (www.driptech.com; September 15, 2014)*

188 Driptech pitches itself as a for-profit social enterprise. iDE defines itself as a non-profit
189 organization, yet, is often presented as a successful example of social enterprise by the
190 mainstream press and organizations that actively promote social entrepreneurship such as the
191 Skoll and Schwab foundations and the Acumen fund, which have notably endorsed iDE-India.⁶
192 As expressed by one informant “*iDE is not a social enterprise – because it does not generate*

⁶ iDE India started as an iDE country program. Since 2003, it is an independent Indian not-for-profit enterprise.

193 *profit- though it works in this space because of its focus on business and supply chain*
194 *development”* (interview data, August 16, 2013). Both iDE and Driptech indeed share a similar
195 market creation approach “*that emphasizes specific products, which have a high poverty*
196 *alleviation impact”* and whose center-piece is the establishment and development of a supply-
197 chain constituted of small scale local entrepreneurs (Heierli and Polak, 2000; see below).

198 The analysis is based on a review of a wide range of publicly available data such as general
199 audience books, mainstream press articles, interviews, videos, blog posts and websites (which,
200 the analysis will show, play a critical role in success formation). This is complemented by an
201 analysis of academic articles published on the topic of smallholder drip irrigation in the
202 developing world and by a dozen of interviews with former and current staff of iDE and Driptech
203 (including Paul Polak) and other actors involved in the sector and who had been, or still are, in
204 contact with these two organizations. Most of the quotes used in this paper are drawn from books
205 written and talks and interviews given by the founders of Driptech and iDE who have extensively
206 communicated about their respective organizations. In a few instances, the analysis is built on
207 direct quotes from a discussion held with Paul Polak. The anonymity of other respondents has
208 been maintained. Again, this use of quotes is not to commend or criticize the ideas and practices
209 of specific individuals who have become the public faces of a specific technological artifact and a
210 related dissemination approach.⁷ This is motivated by the fact that the personalization of change

⁷ Most of the ideas reported in this paper were expressed in the mid to late 2000s. Individuals might have changed their views since then. It does not make the analysis of the processes that underpinned the creation of a positive referential around smallholder drip irrigation less relevant.

211 is a key element of social entrepreneurship and of success formation. The analysis can't shy away
212 from making it explicit, ironically contributing to shedding further light on these public faces.

213 **The five pillars of shaping success**

214 *A good story*

215 Like any other development and research initiatives, social entrepreneurship in the drip irrigation
216 sector starts by building its legitimacy by situating itself against the backdrop of current global
217 challenges. The script then stresses the potential that small scale farmers represent to address
218 these interconnected challenges, but also the difficulties they face and the shortcomings of their
219 current practices. These need to be redressed through the provision of knowledge and technology
220 for smallholders to effectively play their role:

221 *Poverty, hunger and water scarcity are three of the world's most urgent problems* (Frykman,
222 2011a) [...] *Of the 1.2 billion people in the world who earn less than \$1 a day, some 900*
223 *million are small farmers* (Polak, 2007, p21)

224 *[They] are the future of agriculture and food security [...]*

225 *At the same time, agricultural water usage is growing unsustainably [...]* *One of the reasons is*
226 *that farmers waste a tremendous amount of water with flood irrigation [...]* *If we want to lift*
227 *these farmers out of poverty, we need to help them become better farmers. They need*
228 *knowledge and technology to improve their productivity* (Frykman, 2012).

229 Though he recognizes the complexity of global challenges, Paul Polak quickly narrows them
230 down them in the name of action:

Of course, most major problems are complex; if you want to understand a complex problem, you have to reach a thorough understanding of each of its root causes and how they interact. But finding a practical solution requires a different strategy. It is more a matter of finding the simplest single “lever” capable of producing the biggest positive result (Polak, 2008, p54).

The problem gets to be delineated as being that of ‘low income’ and the solution naturally follows, ‘increased income through technological improvements’. Moreover, it is legitimized because diagnosis and proposition have been made by small scale farmers themselves:

These people [small scale farmers] told me they were poor because they couldn’t earn enough from their one-acre farms. They said they needed access to affordable irrigation before they could grow the high value crops that would increase their income, and sometimes they needed help to get these crops to markets where they could sell them at a profit (Polak, 2008, p8).

A ‘perfect’ product

The above narrative stresses the importance of technology to address societal and environmental problems. Drip irrigation is presented as a promising artifact to redress past shortcomings, but with a twist as it needs to be reinvented to meet smallholders’ specific circumstances:

Drip irrigation saves the most water; [...it] has been around for 50 years or more, so, why aren’t small plot farmers using drip irrigation? Unfortunately, existing solutions are too complex [...] Traditional drip irrigation does not scale down to the needs of small scale farmers (Frykman, 2012).

A revolution in irrigation is needed to design and disseminate a range of new low-cost irrigation technologies that fit the needs of one-acre farms (Polak, 2008, p193).

252 This revolution would stem from a key word, empathy, allowing for “*seeing and doing the*
253 *obvious*” (Polak, 2008, p 19) through a user-based approach to technology development:

254 *Everything I have to say [...] depends almost totally on having interviewed three thousands*
255 *poor families, listened carefully to what they had to say, and learned everything I could about*
256 *the specific context in which they lived and worked* (Polak, 2008, p 17) [...]

257 *The things they need are so simple and so obvious; it is relatively easy to come up with new*
258 *income-generating products that they are happy to pay for [...]* (Polak, 2007, p19)

259 *There needs to be a strong emphasis on user-based design* (Frykman, 2011b) [...] *For small*
260 *plot farmers to purchase something with their hard earned money, it has to be **perfect** for their*
261 *needs. Getting this right requires developing the highest level of customer understanding and*
262 *empathy. Sometimes that requires rolling up your sleeves and building that farmer’s*
263 *connection side-by-side in the field* (Frykman, 2012, emphasis added).

264 iDE played a pivotal role in engineering this ‘perfect’ drip irrigation system, which according to
265 Polak (2008) needed to be affordable, small-size and infinitively expandable. iDE’s first
266 experiments with such systems took place in the mid-1990s in South Asia (Polak et al., 1997;
267 Postel et al., 2001; Polak and Yoder, 2006). Drip irrigation systems for smallholders in
268 developing countries would quickly become to be known under the generic name of ‘drip-kit’
269 (see Figure 1).⁸ In the early 2010s, Driptech introduced a proprietary laser technology to punch

⁸ The first efforts to design and disseminate drip kits are commonly attributed to Richard D.

Chapin, a US industrialist manufacturing irrigation equipment for the US market. He did so in the

270 holes in plastic tubing. This is said to lead to higher uniformity in water application and higher
271 yields when compared to systems such as iDE's, in which holes are generally punched with a hot
272 needle (Driptech, 2013).⁹ The two main industrial manufacturers of drip irrigation equipment (the
273 Israeli Netafim and the Indian Jain Irrigation Systems Inc.) have a special line of products
274 targeting smallholder farmers in the developing world too.¹⁰

1970s upon request from the Catholic Relief Services for smallholder farmers in Africa. His for-profit company (Chapin Watermatics Inc.) produced and disseminated the kits on a non-profit basis through a foundation he established (Keller, 2000). Drip kits were designed as an alternative to more traditional drip systems and targeted the “poorest of the poor” (Polak, 2008), in South Asia and sub-Saharan Africa. In many countries, notably in the Mediterranean region and the Middle East, smallholder widely use drip irrigation systems but not in the form of kits; they assemble the different parts that are required and that they purchase directly from small scale retailers (Venot et al., 2014; Benouniche et al., 2014a).

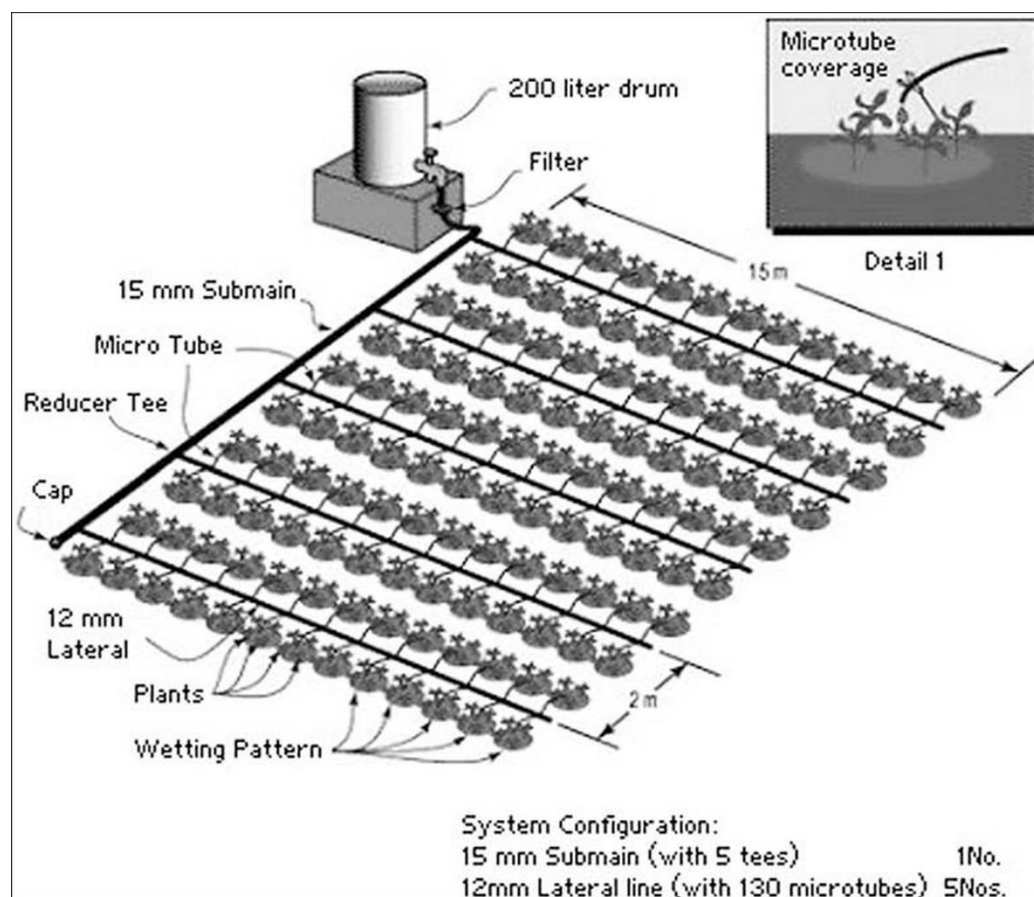
⁹ Uniformity is one of the main metrics used to measure the performance of irrigation systems (Burt et al., 1997).

¹⁰ Systems developed by industrial manufacturers are widely considered to be of higher quality but also more expensive and complex to use than those developed by iDE and Driptech. Debates on the pros and cons of each option remain limited to a small circle of “insiders”. As industrial manufacturing costs have decreased, iDE and commercial companies are now discussing possible partnerships. Industries have a large manufacturing capacity and quality control procedures, which have long been a challenge for iDE. They see the dissemination approach iDE is

275 The efforts of iDE, Driptech and industrial manufacturers to design drip irrigation systems for the
276 poorest farmers are grounded in the same story (see above) and have run alongside each other, in
277 partnership with centers of the Consultative Group of International Agricultural Research (see
278 Wanvoeke et al., 2015a on the linkages between NETAFIM and the International Crops Research
279 Institute for the Semi-Arid Tropics- ICRISAT). For large industrial manufacturers, smallholder
280 drip irrigation in the form of drip-kits is marginal in economic terms. It is mostly justified by and
281 contributes to a broader corporate social responsibility agenda; it is also an attempt to tap into
282 what is seen as a high potential market at the “Bottom of the Pyramid” (Prahalad and Hart, 2002),
283 though the latter has proved difficult to tap into (with the exception of the telecommunications,
284 pharmaceutical and fast-moving consumer goods sectors) in relation to a lack of infrastructure
285 for products distribution and of prior products’ awareness from potential consumers (see, for
286 instance, Karamchandani, 2011; Simanis, 2012).

developing as a possible way to address what they call the “last mile distribution problem” (that
is making sure that farmers have easy access to their products), hence as a way to open-up new
markets.

288 Figure 1. Schematic “vintage” drip irrigation kit (Polak & Yoder, 2006).



290 *An innovative development model*

291 Social enterprises in the field of irrigation cannot be reduced to technology development. Beyond
 292 engineering, entrepreneurship is the second pillar of their approach – maybe the most important.
 293 iDE and Driptech indeed clearly acknowledge that technology is not a silver bullet. They argue
 294 that technological promises can only be fulfilled through a market-based approach, thus replacing
 295 a technological fix by an institutional one:

296 *The path out of poverty lies in releasing the energy of Third World Entrepreneurs. The good*
 297 *news is that small-acreage farmers [...] are already entrepreneurs, and are surrounded by*

298 *thousands of other small-scale entrepreneurs operating in workshops, stores and repair shops*
299 (Polak, 2008, p13, p39).

300 The first step towards unleashing the cumulative forces of engineering and entrepreneurship
301 would be to see smallholders as consumers in a broader market-based approach to development
302 (Heierli and Polak, 2000). Here, the term consumer is positively connoted and purposefully used
303 to stress that smallholders are free to choose (or not) to buy and use particular products:

304 *Treating smallholder farmers as customers; it's a respect issue. Rather than deciding for them*
305 *what they need, we allow our customers to decide whether our offerings have value for them*
306 *or not* (www.ideorg.org ; accessed October 29, 2013).

307 *Small-acreage farmers are entrepreneurs. All these entrepreneurs are willing and able to*
308 *invest in creating their own wealth if they can gain access to opportunities that are affordable*
309 *and profitable enough to attract them* (Polak, 2007, p39) [...] *We trust the fundamental*
310 *intelligence of their decision making* (Polak and Warwick, 2013, p204).

311 The products (engineered technology) and the approach (entrepreneurship) are thereby
312 legitimized and said to be sustainable: who indeed, earning 1\$ a day, would buy something with
313 no direct value and/or not take care of it thereafter?¹¹ By distancing themselves from the aid

¹¹ iDE indicates a price of \$25 for a system allowing the irrigation of 100 m² (this does not include the cost of the water pumping and storage system). Promoters of these systems are of the view that farmers can pay back their initial investment in less than a year (2-3 cropping season) and often offer credit facilities.

sector and disqualifying “*giveaways as harmful*” (www.ideorg.org; accessed October 29, 2013), social enterprises positioned themselves in a space that proved conducive to harness the support of emerging yet powerful development actors such as private foundations, which were familiar with this economic and business thinking.

A public face

The personification of social entrepreneurship is particularly marked in the United States due to the historical landscape in which the concept evolved there,¹² and the focus of influential think tanks such as the Ashoka and Skoll foundations. These were set up “*to find and support outstanding **individuals** with pattern setting ideas for social change*” (Defourny and Nyssen, 2010; <https://www.ashoka.org/>) and to “*drive large scale change by investing in, connecting and celebrating social **entrepreneurs** and the **innovators** who help them solve the world’s most pressing problems*” (www.skollfoundation.org; accessed January 16, 2014), respectively (emphasis added). One such example of the personification of change is the *Uncommon Heroes* film series of the Skoll foundation. It features, among others, the first CEO of iDE-India and personalizes the emergence and work of this organization. (<http://www.skollfoundation.org/approach/uncommon-heroes/>; accessed January 16, 2014).

Paul Polak (interview data; August 9, 2013) points out that this personification remains largely staged by other organizations than iDE and Driptech themselves:

¹² Defourny and Nyssen (2010) compare the conception of social entrepreneurship in Europe and the United States.

332 *I did not start iDE with a mission in mind. I started with an idea of exploring how business*
333 *could eliminate poverty. I think of myself as an entrepreneur or a problem-solver; not as a*
334 *social entrepreneur. That people come to see and define you, with insight, through the lens of*
335 *newly formed concepts is true for everything.*

336 The founders of iDE and Driptech as well as other individuals active in the same space, however,
337 surf on this personification wave.¹³ They often link their trajectory and current activities to a
338 personal formative experience. In a recent interview, Paul Polak (2011), for example stated that

339 *“[My] dad comes from a peasant background in Czechoslovakia; he lived in a house with the*
340 *people upstairs and animals downstairs, so I have an innate affinity for peasants. Also, we*
341 *were Jewish, and in 1938, refugees were streaming across the border from Germany with*
342 *broken heads. Pretty much anybody could see what was coming. My dad said, “There’s going*
343 *to be hell to pay soon,” and made plans to escape. But when he tried to tell our family and*
344 *friends, they said things like “but what would we do with the furniture?” I got from him an eye*
345 *for seeing the obvious”.*

346 Peter Frykman, on the other hand, explains:

347 *“for me the formative moment was at graduate school [...] I was teaching and learning*
348 *alongside some of the smartest and most dedicated people I have ever met but at the same*

¹³ Dov Pasternak, an Israeli scientist long affiliated to the Ben-Gurion University of the Negev who also worked for ICRISAT, is another public figure of smallholder drip irrigation in sub-Saharan Africa (Garb and Friedlander, 2014; Wanvoeke et al., 2015).

349 *time, I was filled with doubt. What was my purpose? And how was I going to use my strength*
350 *[...] to achieve impact on a global scale? I enrolled in a course called entrepreneurial design*
351 *for extreme affordability. They sent me to Ethiopia to research the needs of small plot farmers*
352 *and I arrived in the middle of the worst drought in 20 years. It was clear that if these farmers*
353 *were going to lift themselves out of poverty, they needed a way to use their extremely scarce*
354 *water resources as efficiently as possible (Frykman, 2012.)*¹⁴

355 Beyond the anecdotes, these quotes reflect a Schumpeterian conception of the entrepreneur.

356 Indeed, when asked what makes an innovator, Peter Frykman answers

357 *“[It] requires creativity, bravery and dedication. Innovators are creative because they bring a*
358 *fresh perspective to whatever problems they are trying to solve; they are brave because they*
359 *are not concerned what other people might think about them; and they are dedicated to make*
360 *their vision a reality” (Frykman, 2011a).*

361 Doing so, he paraphrases Akrich et al., (1988b) who describe the Schumpeterian entrepreneur as

362 *“this exceptional being who, in hedging his bets on invention and market, knows how to bring*
363 *an intuition, a discovery, a project, to the commercial stage. He is the mediator, the sheer*
364 *translator, who brings together two universes with distinct logics and horizons, two separate*
365 *worlds, each of which would not know how to survive without the other [...] the*
366 *entrepreneur’s mission is vital and his task overwhelming” (Akrich et al., 1998a).*

¹⁴ Peter Frykman worked closely with the Ethiopia office of iDE during his stay in that country.

The personalization described here is not different from what has been observed in the micro-credit sector, impersonated by Nobel Prize Muhammad Yunus, or in the agricultural sector in which, for instance, Norman Borlaug has been presented as a ‘brand hero’ of the Green Revolution (Sumberg et al., 2012). Drawing from Akrich et al. (1998a, 1998b), the next section shows how these public figures have worked to establish an ever extending supporting network.

Enrollment strategies: Establishing a supporting network

Given that social entrepreneurs champion a variety of social innovations that are not widely known, it is likely that they will face a liability of newness in their attempts [...] Given this liability, legitimacy is likely a critical resource needed for the success of these social ventures [...] Social entrepreneurs may be quite social in the manner in which they carry out their activities, share their knowledge, and celebrate their work (Dacin et al., 2011, p1207).

Communication is indeed an integral part of Driptech and iDE strategies. The two organizations are particularly skillful when it comes to creating interest and recruiting spokespersons, which Akrich et al. (1988a, 1988b) have long identified as cornerstones of success in innovation. iDE for instance is now a well-established and renowned organization –so much so that former president of the United States, Bill Clinton, made a guest appearance at iDE’s annual meeting in 2012 and provided an endorsement quote to Paul Polak’s last book.

Providing and attributing meaning to data

Paul Polak (interview data, August 9, 2013) holds the view that iDE’s recognition came first and foremost “*because of excellent results in the field and satisfying the customer [i.e. the farmer]. It is by providing good data that we could eventually impress the donors*”.

388 I argue that beyond data itself, what proved critical to harness support was iDE's ability to
389 attribute positive meaning to this data and translate it in a language that other actors would
390 understand. This was notably achieved through the establishment of a monitoring and evaluation
391 system built around key indicators, which were of interest to new development actors giving
392 primary importance to economic rationality in development investment. This was stressed by a
393 former iDE staff during an interview (see also Polak, 2008, p21):

394 *IDE was very good at measuring progress vis-à-vis a few key metrics such as farmers'*
395 *satisfaction, farmers' income, volume of sales to customers, hence return on investment. We*
396 *had a standardized monitoring and evaluation framework at organizational level to do that*
397 *[...] This was not easy to put in place [...] donors liked the fact that we could provide numbers*
398 *regarding their return on investment. Assessing farmers' income is very difficult and numbers*
399 *are always sketchy [...] but we could provide some numbers and show that there was a*
400 *database behind these. This was enough; there is a tendency to believe that numbers, like*
401 *maps, are the truth* (interview data, August 16, 2013).

402 **Legitimation and popularization: academic publications and general audience books**

403 iDE's founder fully recognizes that it took much more than field data to create interest and gain
404 support and legitimacy:

405 *After 10 years or so of experiment and once we had achieved some success, I had a clear*
406 *strategy to popularize the movement and I hooked up with people who could help in doing so.*
407 *The book 'Out of Poverty' was also part of this strategy [...] Regarding Mrs Y, I had read*
408 *what she wrote and she was quite well known. I gave her a call and, predictably, she was*
409 *interested. I invited her to join me on a trip to Bangladesh and India where we interviewed*

410 *farmers. She was blown away by what she saw. We became allies and have remained good*
411 *friends since then*¹⁵ *[...] As for Mr. Z, I did not know him personally but one of my colleagues*
412 *did. He is very respected in his field. I called him up; he lived nearby and came down here.*
413 *Our collaboration started by a cup of coffee, which turned into an 8 hours discussion.*

414 *iDE started in the field but, then, as things picked up, I gave a lot of talks and attended a lot of*
415 *conferences. At one point in time, we collaborated with IWMI [International Water*
416 *Management Institute] for the same reason. We also got some money from the Ford*
417 *Foundation to write a paper but before this, XXX and I had already published a paper on what*
418 *iDE did in Nepal* (interview data; August 9, 2013).

419 At a time when most research on drip irrigation was geared towards the refinement and
420 automation of hi-tech systems for farmers in developed countries, finding allies among water,
421 irrigation and development professionals who would endorse iDE's technology was important.
422 Such technical and scientific legitimacy was notably gained through collaborative publications in
423 specialized journals such as the *Journal of the American Water Resources Association* (Polak et
424 al., 1997), the *Hydrogeology Journal* (Polak and Yoder, 2006) and *Water International* (Postel et
425 al., 2001), which count as many positive translations of iDE's experience in South Asia. The
426 latter paper was made possible by a grant of the Ford Foundation (see above quote) and
427 celebrates the potential of drip irrigation for small farmers and poverty alleviation; it still is the
428 most widely quoted work on the topic. A few years later, and as a result of a largely parallel

¹⁵ This visit to Bangladesh took place as Mrs. Y was doing research for a book she was writing (personal communication via email on May 1st, 2013).

process of smallholder drip irrigation promotion in sub-Saharan Africa by international agricultural research centers such as ICRISAT and development aid agencies (see Wanvoeke et al., 2015a), several scientific publications in journals such as *Irrigation and Drainage* (Woltering et al., 2011) and *World Development* (Burney and Naylor, 2012) further celebrated the promises of smallholder drip irrigation. The latter paper is particularly interesting as it reported on a project where smallholder drip irrigation was experimented alongside solar-powered pumping, thus bringing together two distinct technologies that had very strong appeal on their own.

iDE (like Driptech) insist that engineering is only one element of a broader approach that aims at business and value chain development and recognize that innovation can emerge from the field (see above). ICRISAT, on the other hand, used a classic agricultural extension model whereby drip-kits were tested in experimental stations or fields to demonstrate their potential and then disseminated to farmers (see Garb and Friedlander, 2014 for a discussion of the differences in approaches). The story used and the artifacts (drip kits) promoted by social enterprises and international research centers presented enough similarities so that a coherent positive imagery could be projected to the ‘outside world’.

At the same time, other academic publications, notably in *World Development*, singled out iDE from the classic development aid sector by praising “*its original and systemic approach [which is] a welcome contrast to much conventional development aid*” (Clark et al., 2003). This contributed to situate iDE in the rapidly evolving field of international development and to make it attractive to new donors, which had an interest in moving away from public-led development aid. As stated by one respondent and iDE senior staff:

450 *Private foundations are very keen at working with iDE. I think they see us as one example of a*
451 *model that is interesting to support; an organization working with a business approach and*
452 *market forces for the social good* (interview data; April 11, 2013).

453 New major development players such as private foundations were also attracted by the ability and
454 readiness to “*think and act big*” (Polak, 2008, p18). Such stance matched their own ambition and
455 willingness to invest large sums of money in a selected number of initiatives, which, in the
456 development jargon, held the promises of impact at scale.¹⁶

457 Academic publications acted as a pledge of technical reliability and sound approach. At the same
458 time, general audience books such as *Pillar of Sand* (Postel, 1999) and *Out of Poverty* (Polak,
459 2008) as well as broad media coverage in the popular press contributed to bringing the topic out
460 in the open, also leaving some of the complexity aside (see Büscher (2014) who highlights that
461 knowledge constructions available to the ‘outside’ are often less nuanced than knowledge
462 produced by ‘insiders’).

463 **Enrolling spokepersons**

¹⁶ The Bill and Melinda Gates foundation was a major donor of iDE in the late 2000s. At the time, the foundation was exploring the place small scale irrigation could play in its portfolio. After some experiments, the private foundation decided to re-center its agricultural portfolio on initiatives dealing with seeds and fertilizer – two topics seen to have the potential for higher “impact at scale” (as had been the case during the Asian green revolution).

464 Today, the promises of smallholder drip irrigation in developing countries are skillfully captured
465 and promoted by intermediaries such as the Skoll and Ashoka foundations. These organizations,
466 and others, present the technology as being ‘proven’ or ‘effective’. They then focus on its
467 potential social and economic impacts. Given such media coverage, recognition by the peers, for
468 example through awards, is of crucial importance especially for young companies such as
469 Driptech, which are looking for extending their operations. Being a 2012-recipient of the World
470 Economic Forum Technology Pioneer Award ([http://www.weforum.org/community/technology-](http://www.weforum.org/community/technology-pioneers)
471 [pioneers](http://www.weforum.org/community/technology-pioneers)) was a stepping stone for Driptech. According to their former head of operations, awards
472 are indeed important as “[they] help us build our brand; it helps us attract more capital and build
473 our business even more and spread our technology to benefit more farmers (Martin, 2011).

474 Beyond awards, social enterprises extend their sphere of operations by increasing their visibility
475 through the enrollment of key individuals as advisors or executive board members. iDE and
476 Driptech boards bring together people from different backgrounds (business, research, and civil
477 society) who can open their respective networks and, by lending their name, contribute to
478 building the legitimacy and extending the sphere of operation of these organizations. For
479 instance, speaking about the international agricultural research sector (with which the author is
480 most familiar), iDE’s board long counted Robert Havener, former Director General of several
481 CGIAR centers and now deceased, as one of its board members. Along the same line, Driptech
482 counts Paul Polak and Frank Rijsberman (former Director General of IWMI; former Director of
483 the Water, Sanitation, & Hygiene initiative of the Bill & Melinda Gates Foundation; and now
484 CEO of the CGIAR) among its advisors. Other advisors and board members are presented as
485 experienced entrepreneurs; they are meant to testify of the seriousness of iDE or Driptech vis-à-
486 vis potential investors as expressed by Peter Frykman in an interview he gave on Driptech:

In many ways, our success with investment stemmed for our very first angel investor, who is a successful entrepreneur and who supported us very early on, and as we hit our milestones, as we made progress, as we proved to him and to other people that we were committed and serious and we were going to be successful, then, he was very pleased and proud of us and he opened up his network and brought on a bunch of other angel's investors (Frykman, 2011c).

Discussion

Belief, aspirations and the will to improve

*Micro-irrigation succeeds not because it is big or because it has been long established but because there are people **building it, who live it, sleep it, dream it, believe in it** and build great future plans for it (Reinders, 2006; emphasis added).*

This statement of one of the Vice-Presidents of the International Commission on Irrigation and Drainage (ICID; the main professional body for irrigation practitioners and researchers) is illustrative of the fascination that micro-irrigation exerts.

When looking more specifically at drip irrigation, one can only observe that its development and promotion has long been embedded in strongly ideological and political movements. The first steps of modern day drip irrigation are said to have taken place in Israeli Kibbutzim in the Negev desert (WFP, 2012; www.netafim.com). These coupled a strong collective ideology with a largely political aspiration to 'make the desert bloom'. Similarly, the search for water saving technologies cannot be isolated from the very political history of settlement and agricultural development in the arid Western United States (see, among others, Reisner, 1993).

The promotion of drip irrigation in developing countries has, on the other hand, long been (and still partly is) embedded in a ‘superior call to do good’ often tinged with Christian belief and charity. *Chapin Living waters*, the non-for-profit foundation of drip-kit pioneer Richard Chapin was for instance “*founded as a means to express Christian love to needy people in third world nations through small-scale drip irrigation technology*” (www.chapinlivingwaters.org). Today, many Christian and secular NGOs are involved in the promotion of drip irrigation systems for smallholder farmers. Inspired by the rhetoric of aid and charity, many of these organizations give away drip irrigation kits to farmers (sometimes against a symbolic contribution).

Social enterprises distance themselves from this approach on the ground that it would be unsustainable and disrespectful to smallholders. They see ‘hand-outs’ as depriving farmers of their own choices. However, they replace a belief in aid by a belief in entrepreneurship and the underlying desire to do good is still driving action as can be seen in the following quote:

When farmers are given the opportunity, they invest in their own prosperity [...] Together, we can use engineering and entrepreneurship to achieve impact on a global scale. Together, we can make prosperity an option for the next generation of small plot farmers (Frykman, 2012).

As such, social entrepreneurs share with other development actors an impulse, that of the “will to improve” described by Li (2007) in her study of development interventions in Indonesia. This will to improve is grounded in a government rationality focused on the welfare of the population and prescribing the right manner of disposing things; the moral obligation attached to it means that shortcomings and failures, instead of discrediting interventions, reinforce them. Indeed “we can’t just give up”; what is important is to show the need for further action rather than results.

Echoing Li (2007), I have shown that this will to improve lies on two main pillars. First, a ‘problematisation’ or the identification of a deficiency that needs to be rectified (in this case, the high level of poverty and low water use efficiency among smallholders). Second, a process of rendering technical, that is, of representing the problem to be solved as an intelligible field with specifiable limits and particular characteristics (in this case, low income levels among farmers, limited water availability, high value crops, and ‘proven’ drip irrigation equipment). Rendering technical leads to simplification; broader political-economic processes that have a bearing on any given situation are removed from the frame of analysis. Though this is clearly assumed by Paul Polak and other social entrepreneurs in the name of action (see previous section), this also means that their intervention can never achieve all it seeks.

This is because the problematisation and technicisation that characterize the smallholder drip irrigation narrative articulated by social enterprises is problematic for several reasons. First, it reduces the logic of smallholders to one of earning more income even though scholars highlighted the very challenges in defining what makes a smallholder in relation to the multiplicity of their logics (including of resistance to and autonomy from economic forces, and of adaptability and enhanced resilience) and strategies to address poverty, environmental, health, and energy challenges (Acloque et al., 2015; Sourisseau, 2014; van der Ploeg, 2009). Second, it sees drip irrigation efficiency as a given, even though efficiency has been shown to be highly dependent on farmers’ logics (for instance, Benouniche et al., 2014b) and has also been questioned at a more conceptual level. Scholars have indeed long highlighted that the term efficiency is often used differently by different people, can refer to different elements of the water balance, and means different things at different scales (Perry, 2007; Lankford, 2012; van der Kooij et al., 2013).

551 *Moral legitimacy of social entrepreneurship*

552 A second key feature I highlighted is the un-apologetic reference of smallholder drip irrigation
553 promoters to the notion of entrepreneurship both at the level of their organization (the adoption of
554 a market based approach) and at the level of the farmer. In doing so, they fit a broader socio-
555 ideological climate whereby entrepreneurship has become a reference point in development
556 discourse and has emerged as a new orthodoxy (Dey and Steyaert, 2010; see first section).

557 Smallholder drip irrigation has come to be closely associated to what is now seen as a preferred
558 model of organization, the *social enterprise*. Located at the juncture of two sides of development,
559 an ethical concern as ‘care for the other’ and an aesthetic ‘care of the self’ (for a discussion, see
560 Qarles van Ufford et al., 2003), social enterprises have acquired a “moral legitimacy” and are
561 widely presented as an alternative development model (see Dart, 2004 for an insightful analysis).
562 The moral legitimacy of the social enterprise reinforces the engineer-based framing of drip
563 irrigation as a modern and efficient technology. Together, they buttress the positive connotation
564 that smallholder drip irrigation has acquired. After all, if good organizations, acting for the right
565 reasons, promote a modern technology, it can only be positive.

566 That social enterprises constitute a truly alternative way of ‘doing development’ in the irrigation
567 sector does not hold under scrutiny. Admittedly, iDE and Driptech aim at strengthening small
568 scale private actors –maybe more than public development agencies, notably small entrepreneurs
569 who sell drip kits for a profit. They are, however, part and parcel of the broader international
570 development community, in which they found a supporting coalition, and of which they share
571 many of the codes and working culture. iDE and Driptech are largely funded (i.e. subsidized) by
572 development aid agencies, philanthropists and “angel investors”, and they sometimes work in

partnership with national governments and non-governmental organizations that tend to promote new technologies through subsidy programs even if these are seen as harmful by social entrepreneurs. Further, in sub-Saharan Africa, social enterprises partly adopt similar approaches to those used by national and international research institutes and development aid agencies such as pilot experiments, demonstration sites, farmers' field schools, with similar results: everything comes to an halt as soon as external support vanishes (see for instance, Garb and Friedlander, 2014, Kulecho and Weatherhead, 2005; Wanvoeke et al., 2015b).

Finally, like most development agencies, social enterprises evaluate their action (and communicate about it) vis-à-vis what can be best termed 'intermediary indicators' such as their volumes of sales instead of looking at whether and how the products they sell are actually used. Such attention to intermediary indicators is made possible and justified by two major beliefs sustaining the promotion of drip kits. First, the belief that poor farmers only buy what they really need and will invest in specific products only if these yield rapid benefits (Polak 2008) even though there is increased evidence that drip-kits are often seen by farmers as a gateway to other benefits (Wanvoeke et al., 2015b). Second, the belief that the drip irrigation hardware has intrinsic characteristics: whatever the context it is efficient and leads to increased yields – two presuppositions that have been shown to be problematic (see above).

Technology: Immunity to context, configuring users and ascribing responsibilities

The story presented reveals the marginality of smallholders and dramatizes their incorporation in the modern world of entrepreneurship. As highlighted by one respondent, however,

“a narrow focus on income generation might be detrimental to what should remain the primary objective, that is, positive social change [... it might lead] to lose sight of equity and

595 *justice issues as it is easier to show some success in generating additional income with*
596 *farmers who already have a bit of money and are literate”* (interview data, August 16, 2013).

597 Beyond the issue of whom to target illustrated by the quote, I argue that by framing smallholders
598 as entrepreneurs primarily driven by economic rationality, social enterprises support a simplified
599 vision of poverty that overlooks its structural dimensions and call upon an individualistic
600 problem-solving script (see also, Dey and Steyaert, 2010). In this script, the choice and
601 responsibility to get out of poverty ultimately falls on individual smallholders who, if given an
602 opportunity, “*will invest in their own prosperity*” (Frykman, 2012).

603 What social enterprises propose to do then is to create the conditions for making this investment
604 possible. This is meant to be achieved through two main levers: the provision of an adapted
605 technology and its dissemination through a strengthened private sector, based on market
606 principles. Despite the proclaimed importance given to user-based design (Polak, 2007) and
607 system-wide technological capacity (Clark et al., 2003), social enterprises articulate a rather
608 traditional and problematic vision of technology. In that vision, material facts (in this case the
609 drip irrigation equipment) are largely independent of the context in which they are developed and
610 used, and even, of the people who use them. Garb and Friedlander (2014) see in the search for a
611 ‘perfect’ product that drives promoters of smallholder drip irrigation an attempt to sever the link
612 between artifact and socio-technical infrastructure. This search is thought to allow for a seamless
613 transfer of the artifact from one site to another and from one set of farmers to another. I share
614 their analysis that it is largely counterproductive and undermines the extent to which the drip kits
615 can be put to productive use given the socio-technical nature of technologies (Bijker et al., 1992).

616 In the case of smallholder drip irrigation, this decontextualized vision of technology translates in
617 pre-packaged ‘drip kits’, whose small size coupled with an infinite expandability (as for Legos, it
618 is said that kits can be combined one to another) gives ground to claims of universality: they can
619 be used anywhere, by anyone. In actual terms, however, the script embeds assumptions about
620 potential users (for instance, in sub-Saharan Africa smaller kits of 20 m² are said to be most
621 adapted to women, larger kits of 100 m² are often meant for individual male farmers while 500
622 m² kits are geared at farmers groups), their respective resources (notably in terms of access to
623 land and water), and their primary objective, which would be earning more money. Further, the
624 consumer is not totally free to choose as clearly stated by one respondent:

625 *While it is ideal to offer a range of products suited to farmers’ needs, price point, etc. the*
626 *challenges to do this well multiply quickly [...] You need to start somewhere and this*
627 *somewhere is “what you have in stock” (interview data, August 16, 2013).*

628 Here, the drip kit, externally promoted through social enterprises and other development agencies
629 and packaged in standard carton boxes, stands in stark contrast with small motorized pumps. The
630 latter are widely available “off the shelf” in multiple forms and for multiple purposes to
631 smallholders without external support, and have been shown to have a transformative capacity
632 (both in positive and negative terms) on irrigation in developing countries (see among others de
633 Fraiture and Giordano, 2014 and Shah, 2009). At a more conceptual level, the drip kit also stands
634 in stark contrast with the Zimbabwe Bush Pump described by Marianne de Laet and Annemarie
635 Mol (2000). The drip kit has indeed little *fluidity*, a term used by de Laet and Mol (2000) to
636 characterize a technology that has vague and moving boundaries, that is, a *fluid* identity, or said
637 more simply that is adaptable, flexible and responsive to its surroundings. Framed as a ‘perfect

product’, the neatly and definitively bounded drip kit is quite the contrary: it becomes untouchable hence has little scope to play a part in any significant changes.

Finally, the idea that it is possible to design a technology that would meet the needs of smallholder farmers writ large not only overlooks their diversity but reinforces the idea of individual responsibility. Indeed, if an organization has designed “*the simplest, most affordable, and most field-ready drip irrigation system [that] provides a cost-effective means for even the poorest farmers to increase their water use efficiency, growing more crops to feed their families and bring to market*” (www.driptech.com; emphasis added), it becomes an individual choice to use it or not. Whose responsibility is it then if the technology does not spread like wild fire or does not yield the expected results? Certainly that of the poor smallholder stuck in his/her old ways (which can be redressed through capacity building and extension) or of a non-conducive environment. It is not the responsibility of the social entrepreneur animated by empathy and a will to improve, and equipped with a ‘proven’ technological artifact. In a twist, it is not the technology (i.e. drip irrigation) that needs to be fitted to meet farmers’ needs but the smallholders themselves, who need to be configured to give a favorable environment for the technology to express its potential.

Conclusion

A dual diagnosis motivated this paper. On the one hand, and over the last 20 years, smallholder drip irrigation has been framed as a promising tool to address global poverty and environmental challenges, including in the academic literature (see for instance Postel et al., 2001). This narrative triggers great fascination and has significant traction within the international development community (Venot et al., 2014; Wanvoeke et al., 2015c). On the other hand, first-hand observations in sub-Saharan Africa, widespread talk among development practitioners, and

661 scientific publications also highlight that smallholder drip irrigation only take place within the
662 sphere of development projects (see for instance Kulecho and Weatherhead, 2005 and Wanvoeke
663 et al., 2015b). Despite the positive attributes of efficiency and productivity commonly ascribed to
664 the technology, the latter does not spread as hoped for by its promoters.¹⁷

665 Further, until now, scholars almost exclusively focused on one side of the story. From a
666 normative standpoint, and taking the positive attributes of drip irrigation as granted, most studies
667 on the topic provide a set of rather conventional recommendations to extend the use of
668 smallholder drip irrigation in developing countries: capacity building, integration in supply
669 chains and markets, supportive policies, etc. (see, among others, Friedlander et al., 2013; Kulecho
670 and Weatherhead, 2006; Namara et al. 2007; Woltering et al., 2011). Drawing from another body

¹⁷ What happens in Burkina Faso (the country the author is most familiar with and in which there has been significant investment in promoting smallholder drip irrigation) is a striking example of the lack of transformative capacity of drip irrigation kits. In January 2015, after 4 years of operation, iDE (the main promoter of drip irrigation kits in the country) had sold 4,200 kits (85% of which to NGOs and governmental projects; see Wanvoeke et al., 2015c). These kits, taken together, would allow covering a maximum of 50ha (as stated above, a kit sold does not necessarily implies it is used). This number can be compared to the several thousands of hectares that are irrigated by tens of thousands of farmers using small scale pumps in Burkina Faso, as reported by de Fraiture and Giordano (2014).

of literature that highlight the importance of interpretation (Li, 2007; Mosse, 2005) and narratives in shaping development (Roe, 1991), this paper sheds light on another side of the story.

The primary objective is to understand *how* a positive interpretation about drip irrigation has been elaborated and sustained over time. This is because better understanding these processes and the building blocks of this stable interpretation can shed new light on the dynamics of smallholder drip irrigation in developing countries, hence yield alternative explanations to the widely shared diagnosis that it has remained an artifact of development projects.

The paper shows that the positive imagery that smallholder drip irrigation holds has been actively shaped by ‘insiders’ directly involved in the design and dissemination of a technical package, ‘the drip kit’. These insiders have elaborated a compelling story, which shares the characteristics of the development narratives described by Roe (1991): *it has a beginning, middle, an end and revolves around a sequence of events in which something happens or from which something follows*. In the story, smallholder farmers are the future of agriculture but are poor and use their scarce water resources inefficiently; they also aim at increasing their income and can do so provided they access appropriate technology to grow high value crops for the market. Drip kits are said to fulfill a void. The story highlights that the latter share the characteristics of efficiency and modernity of classic drip irrigation equipment but that their small size, low cost and ease of use make them ‘perfect’ for smallholder farmers in the developing world and adaptable to any condition. The story ends by highlighting the potential of drip kits for poverty alleviation from household to global level.

This story is problematic for several reasons. Ideologically, it overlooks the multiplicity of smallholder farming and reduces the latter to its economic rationality. It also promotes a way of

farming (the production of high value crops for the market) that is particularly risky even though risk minimization and an enhanced capacity to face external shocks (such as price volatility) are often key strategies and objectives of smallholders. Conceptually, the story ascribes inherent features to an artifact, the drip kit, independently of the context and the people who use it thus overlooking the strong interdependency between the social and the technical dimension of technology (Bijker et al., 1992). At a technical level, claims that drip kits would be efficient *per se* are particularly problematic, given recent work highlighting the need for a critical examination of the notion of efficiency (for instance, Lankford, 2012; van der Kooij et al., 2013). At a more fundamental level, framing drip-kits as ‘perfect’ products that could be seamlessly transferred, leads to depriving them of the very *fluidity* (de Laet and Mol, 2000) they would need to have a transformative effect on smallholder farming. It also leads to overlooking other options and ways for promoting irrigation in the developing world. Ethically, finally, the story ascribes the responsibility of (lifting oneself out of) poverty to smallholders themselves, even if that choice is constrained by structural and political conditions and relations.

As highlighted by Li (2007), a complex situation is rendered technical (and a-political) and translated into a stable interpretation: ‘drip irrigation is good because it will alleviate poverty’. Mosse (2005) highlights that this interpretation only becomes ‘reality’ with a unity of points of view. Insiders have actively sought to create interest and build alliances among an ever wider network of development actors including bilateral and international development agencies, private foundations, international research organizations, Non Governmental Organizations and industrial manufacturers of irrigation equipment. What proved central to this exercise is the unapologetic reference to the notion of entrepreneurship and the use of a market-based rhetoric by charismatic individuals who became to be seen by others as examples of the mythical

716 Schumpeterian entrepreneur through whom change takes place. This positioned the promoters of
717 smallholder drip irrigation in a specific space, that of the social enterprise, which has acquired a
718 moral legitimacy (Dart, 2004) and is seen as a preferred model of organization by many actors
719 who are disenchanted by the poor records of development aid and doubtful regarding the role and
720 agenda of big business in development. Here too, the story is problematic. What can be observed,
721 indeed, is less an alternative development model than a delineation of a niche and the re-working
722 of existing arrangements within the international development community. Social enterprises
723 share many of the codes and the working culture of other development agencies, including a
724 concern with the prospect of having impact at scale and the use of intermediary indicators to
725 measure it. In this case, the volume of drip-kits sales is of primary importance to ensure
726 continued support from national and international development agencies. In the absence of other
727 coherent narratives, the story social enterprises articulate takes over: if sold, it means the drip kits
728 are bought by farmers hence that they are needed and used as intended by their promoters.

729 The pro-poor smallholder drip irrigation narrative appears to be successful to harness the support
730 of the international development community in which the notions of social entrepreneurship and
731 technical potential are particularly appealing. Until now, however, it has had little transformative
732 capacity in terms of triggering a smallholder-led movement of irrigation development, especially
733 in sub-Saharan Africa. By focusing on the actors who elaborated the storyline and the strategies
734 they used to do so, I show the narrative for what it is, that is, a social construct carefully crafted
735 by development agents and carrying with it an array of hidden and sometimes problematic
736 assumptions. The cause and effect relationships described in the story and the potential of drip
737 irrigation should not be taken for granted; they only exist if they are performed.

Unpacking development narratives, which work to blackbox issues and establish specific interventions as illusory panaceas, can provide fresh perspectives on seemingly intractable problems (in this case the little transformative capacity of smallholder drip irrigation). Rather than providing counter narratives, it is about engaging with existing ones and debating their apparent naturalness. In this case, the analysis highlights the need to better understand the logics of smallholders to engage in drip irrigation development projects rather than assuming that their motivations neatly echo a broader development narrative. Shedding light on these motivations may lead to redefining what smallholder drip irrigation actually is for different actors (a nice story, a technical object for improving agricultural productivity, a means to connect to certain networks, etc.) hence to better assess the extent to, and the contexts in which it can actually lead to positive transformation of smallholder farming (or not). For development practitioners, this means leaving smallholders engage with drip irrigation in their own terms and potentially redefine the technology, which, in turn, holds the promises of better targeting interventions rather than pursuing illusory objectives. Such ‘grounded strategy’ implies distance with dominant development narratives that all exhibit a measure of ‘success’ in the form of potential and preferably large scale positive change. This can be done by shifting the analytical focus from the development intervention itself to the actors who shape it and sustain particular value interpretation about it. In this light, there is need to reflect on the way actors construct of perform ‘successful outcomes’ and to make explicit the value systems that underpin such measures.

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963 **Figures**

964 Figure 1: Schematic “vintage” drip irrigation kit (Polak and Yoder, 2006)

