When responsible innovation may be impossible : lessons from the Hassan biodiesel project

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Responsible innovation has become a popular research topic with its own funding programme and conferences, and its own Journal of Responsible Innovation. However, while identifying conditions that make innovation more responsible is certainly an important project, current discussions on what Responsible Innovation is (e.g. Stilgoe et al. 2013; Taebi et al. 2014) conflate two distinct theses:

(Strong RI): Innovation can be done responsibly as long as conditions X, Y and Z are met.
(Weak RI): Innovation cannot always be done responsibly, but if it can, it is through meeting conditions X, Y and Z.

In this paper we argue that only the weak interpretation of responsible innovation can be correct, and in the light of this, we flag key limitations of the RI concept for innovation policy practice in highly contested domains such as biofuels - the subject of our MVI project. We do so by presenting a case study of a problematic - yet still ongoing - innovation in biodiesel production in India. We argue that this innovation was beset by so many obstacles that it simply could not have become successful. Among those obstacles are material barriers to responsible innovation and strongly diverging understandings of farmers' realities. Moreover, the problematic project outcomes point to the importance of paying attention to "exnovation" in innovation processes, something that has remained unstudied in the RI literature. We use the exnovation concept to discuss the importance of considering existing practices that need to be abandoned because of an innovation. However, it can also be used to draw attention to the need to remain open to the possibility of responsible discontinuation of innovations that turn out to be impossible or undesired after all (cf. Stilgoe et al.'s approach to RI).

In India as well as globally, interest in Jatropha curcas as a biodiesel feedstock suddenly rose to great heights in the early years of the 21st century, only to crash spectacularly just a few years later (Kant & Wu 2009) as it was discovered that the "wonder-crop" struggled to give commercially attractive yields, even with substantial inputs (van Eijck et al. 2013; Axelsson et al 2011). More importantly, the boom and bust led to problems like land grabbing (Baka 2013; Lahiri 2009) and companies reneging on contracts with smallholder farmers as soon as news on disappointing yields started spreading (Ariza-Montobbio et al 2010). The fact that Jatropha grown for commercial biofuel purposes requires sizeable inputs of water, fertilizers and pesticides (Rajagopal 2008), means that it by no means delivers the 'green fuel' that airline carriers such as KLM and Lufthansa had claimed it to be (Bryce 2013).

One of the very few biodiesel projects in India that is still active is located in Hassan district, Karnataka state. Run by the University of Agricultural Sciences Bangalore and funded by the Karnataka State Biofuel Development Board (KSBDB), its promoters argue that their approach avoids all above-mentioned problems. Rather than focusing on Jatropha curcas alone, they distribute seedlings of 5-7 species to farmers, free of cost. These farmers, after being informed about the use of the oilseeds from these trees, are advised to plant them only on the edges of their land or in their backyards. Except during the first year, the trees would not need any inputs due to their vicinity to cropland. Farmers would not be at risk of losing any money since they did not put anything in to begin with. These claims about the Hassan biodiesel project have been and continue to be influential in shaping biodiesel activities and state-level policy in the entire state of Karnataka, and the Hassan project lobbies to revive India's ambitious but failed National Biofuel Policy as well (cf. Kumar et al. 2012).

At first glance, the Hassan biodiesel project seems to take previous criticisms on biodiesel into account. Unfortunately, our ground-level evaluation of feedstock production practices tells a different story. Saplings planted on the edges of lands that are fully rain-fed generally do not survive. However, most farmers resist the suggestion of watering them, even in villages where project field staff have visited regularly; the quantity of rain is insufficient for their food crops and household use in the summer season. Saplings planted on the edges of irrigated land (which is much more rare) may survive only if planted right adjacent to the cropland. Thus, the absolute scarcity of water counts as a physical barrier to biodiesel innovation here.

Another issue derives from the existing practices and markets around especially Pongamia Pinnata-- locally the most popular oilseed tree. Its leaves are traditionally used to fertilize the soil, and the oilseeds have long been collected and sold to the soap industry. The wood is popularly sold to brickmaking industries. This has led to a decline in the number of trees over time, and also the amount of seeds collected – and the price per kg of seeds has increased. Hassan biodiesel field staff encourage the farmers to increase collection of the seeds from remaining trees. However, even though the seed price has gone up, farmers say they have not been more active in collecting these seeds after learning about the biodiesel project. Many prefer to diversify their income sources by cultivating other trees, including teak, silver oak and jack fruit that yield a high price for fruit and timber. Moreover, daily wages are higher than the income from collecting and decorticating seeds for a day. Working from a perspective that differs drastically from farmers' daily realities, the project's designers had failed to weigh the opportunities from biofuel innovation – an innovation driven by factors such as the growing transport sector and airline carriers' demand for 'green' fuels, against the costs and risks of exnovating these existing societal practices. Given the volatiliy of biodiesel markets, the promotion of large-scale exnovation of existing farmer'practices for risk spreading and maximising resilience to external changes is quite unwise, especially since the proponents of biofuel innovations have an exceedingly poor track record in protecting smallholder farmers from risk (Sulle and Nelson 2009; Diop et al. 2013; Balkema and Pols 2014). In short, there is very little that would make this project qualify as a success story in biodiesel innovation. Rather, it raises significant questions whether or not it would be desirable to continue this project at all.

The significance of these lessons extends well beyond the context of Karnataka state, or India. In the Netherlands, too, many parties are interested in replacing a significant proportion of our fossil fuels with biofuels, and this vision cannot be realised without sustained significant imports of biofuels (Bindraban et al. 2009, p. 11). Despite the fact that biofuel imports from developing countries are relatively modest at the moment, EU biofuel policy has had clear negative impacts on those countries (Diop et al 2013). Also, discourse on 'unused land' and 'win-win situations' has so far kept interest in biofuel imports from developing countries alive – a discourse set within unequal power relations and underlain with a great diversity in vested interests. Yet many of those developing countries are characterized by similar adverse conditions and constraints to responsible innovation that we highlighted for the case of the Hassan project. Hence, we should ask what insights the extant Responsible Innovation frameworks can give us for the implementation of truly responsible biofuel policies in environments like the Netherlands and the EU, when much of this literature has under conceptualised key issues including the role of unequal power relations, diverging interests and worldviews, material barriers to innovation, and considerations of (ir)responsible exnovation. Responsible innovation should not only ask how to make innovation responsible, but also when and for what purposes innovation can(not) be done responsibly. By analysing a case study of an innovation that may deserve the qualifier 'failed' and extracting several factors from it that limit applicability of the responsible innovation-concept we raise a challenge that responsible innovation has to address if it is to develop into a mature discipline.