Standardizing sustainability : certifying Tanzanian biofuel smallholders in a global supply chain

Eindhoven Centre for Innovation Studies

Standardizing Sustainability:

Certifying Tanzanian biofuel smallholders

in a global supply chain

Henny Romijn, Sanne Heijnen and Saurabh Arora

Working Paper 12.02

Eindhoven Centre for Innovation Studies (ECIS),
School of Innovation Sciences,
Eindhoven University of Technology, The Netherlands

Standardizing Sustainability: Certifying Tanzanian biofuel smallholders in a global supply chain

Henny Romijn, Sanne Heijnen and Saurabh Arora

School of Innovation Sciences

Eindhoven University of Technology, The Netherlands

e-mail address for correspondence: h.a.romijn@tue.nl

Abstract

Standards and certifications, as 'scientific' instruments of public and private governance, have recently emerged as ways to deal with growing concerns about the triple P sustainability of global supply chains for renewable energy. Focussing on a chain for sourcing 'sustainable' biokerosene for use by a major European airline, this article studies the practice of a pilot certification project aimed at thousands of Tanzanian smallholders who cultivate Jatropha oilseeds (one of the few known feedstocks suitable for biokerosene production). In particular, we study the tense interactions and encounters between a 'universal' biofuel sustainability standard, designed in an ostentatiously participatory process in the Netherlands, and the socio-ecological realities of the smallholders in Tanzania. As a result of these encounters, many provisions in the standard and certification protocols were found to constitute cases of 'excess governance', which made little or no sense in the Tanzanian smallholder context. At the same time, the standard was found to exhibit instances of 'deficient governance' leaving several critical issues outside its purview. Most importantly however were the cases where the provisions in the standard were deemed legitimate by the project's implementers. Operationalization of these provisions in the smallholders' surroundings however relied on major translation efforts involving significant brainstorming in Tanzania, conducting remedial research for problem-solving, and perhaps most importantly, significant improvisation in the field. As a result of this operationalization, many of the standard's provisions had to undergo modifications that were initially resisted by the standard's designers. These modifications may have resulted in a standard that is more aligned with the local realities encountered in a particular region of Tanzania. But other frictions, similar and different from the ones discussed in this article, are bound to crop up as this 'adjusted' standard moves to newer locales and encounters diverse social realities. In concluding, we call for regional or niche standardization strategies, rejecting the idea of universal standards that can be applied globally. A niche standardization strategy, while serving the intended purpose of the standards (in terms of 'social' and environmental sustainability), should facilitate the poorest farmers from reaping the benefits of the sustainability of their existing practices, a sustainability they cannot afford to prove 'scientifically'.

Introduction

This article documents a case study about sustainability certification of Tanzanian smallholder farmers in a global chain for biofuel feedstock supply for a European airline. The certification project was initiated in a context of recent policy measures adopted by the European Union and its member states to promote the use of biofuels. These measures, accompanied with growing public concern about climate change and oil shortages in the last decade, prompted a barrage of biofuel promotional activities by corporate and non-profit actors in the EU and beyond.

The effects of these rampant efforts were soon to be felt, and by 2007-8, many actors in the EU (and elsewhere) had begun to voice serious concerns about the sustainability of biofuels. In particular, it had become clear that Europe would only be able to meet a small part of its biofuel targets from feedstocks cultivated domestically (Bindraban et al 2009). This gave rise to the question where the bulk of the non-EU supply was to come from, and under what conditions would this biomass be cultivated. The first estimations about devastating greenhouse gas emissions, ecosystem annihilation and human displacement from large biofuel plantations on cleared peatlands in Indonesia and Malaysia began to reach the general public.

Around this time, the Dutch Environment Minister, Mrs Jacqueline Cramer, constituted a committee of policy and academic experts tasked with the formulation of adequate social and environmental sustainability criteria for the cultivation and utilization of biofuels. The idea was that these criteria could act as bases for designing guidelines and standards for governing biofuel production and use, particularly for biomass imported from far-away places where formal institutions of social and environmental governance are either weak or work according to free market principles. Indeed, these Cramer Criteria (CC) were adopted by the Dutch standardisation institute (NEN) as the basis for drafting a national biofuel standard. This process eventually culminated in a biofuel sustainability norm NTA8080/81[1], a first version of which became operational in 2010.

A Dutch entrepreneur with a Tanzanian subsidiary, procuring Jatropha oilseeds from smallholder farmers for biokerosene production, soon showed interest in obtaining certification under NTA8080/81. The entrepreneur formed a consortium to carry out the certification pilot project, which included the NEN and a technical university as partners. We analyse the practice of this project to govern Jatropha cultivation by Tanzanian smallholders, from its inception in January 2010 to May 2012, primarily from the viewpoint of the main university participants in the consortium. The project is scheduled to end in June 2013, so we document an unfinished story and cannot draw any conclusions about the project's final outcomes. However, the story allows us to draw some important lessons about multi-actor certification processes as "gathering[s] in tension of multiple, sometimes contradictory realities" (Moreira, 2011:11, citing Law, 2004:97-100).

[1] NTA8080/81 refers to a set of two documents including (1) NTA8080, the Dutch Technical Agreement describing the requirements for sustainably produced biomass for energy applications to be applied at organizations that wish to sustainably produce, convert, trade, or use biomass for energy generation or as transportation fuel; and (2) NTA8081, the description of the accompanying certification scheme, which specifies the 'rules' to enable certification against the requirements of the NTA8080. For more information, see: http://www.sustainable-biomass.org/publicaties/3892.

The article is structured as follows. We begin with an overview of the literature on governance in global value chains. This is followed by a general description of the standards and protocols under study. The actual process of certification pilot study is documented in two subsequent sections. A final section provides some concluding remarks.

Governing for sustainability in global value chains

Governance has long been a central concern of the global value chain (GVC) literature (see Gibbon et al. 2008 for a literature review). It was initially viewed as the exercise of power by lead firms in imposing their product and process requirements on suppliers in buyer-driven chains, such as those for clothing garments, or product characteristics on buyers in supplier-driven chains such as those for personal computers (Gereffi 1994). In newer work, Gereffi and co-authors have refined the driven-ness approach by considering five different modes of GVC governance: market, modular, relational, captive and hierarchy (Gereffi et al. 2005). Power asymmetry between chain actors increases as one moves from market to hierarchy. Arms-length transactions of the market mode are characterized by low informational complexity, high supplier capabilities and relatively low switching costs to new partners, while the hierarchy mode is associated with high informational complexity and low capabilities among suppliers.

The foregoing approaches to GCC governance have been criticized on a number of counts (see Gibbon et al. 2008; and Muradian and Pelupessy 2005 for overviews). Of particular relevance for our purposes is the criticism that both approaches tend to sideline the process through which the product performance and quantity requirements of buyer firms are translated into product and process standards, and how the standards are enacted by different actors through certification schemes or otherwise. It is in standard-setting and -implementing (certification) processes of ‘governance in practice’ that different socio-technical realities of buyers, suppliers and any third party certification/standardization bodies collide with each other.

Recent work in GVC governance, focusing on agricultural commodities, has begun to study the exchange between multiple realities as (sustainability) standards and certification protocols are created and implemented in specific socio-geographical settings (see Bain and Hatanaka 2010; Bain et al. 2010; Loconto 2010; Ouma 2010; Berndt and Boeckler 2011; Konefal and Hatanaka 2011). Building on conceptual insights from Science, Technology and Society (STS) studies, these scholars highlight how the objective and unified frontend of sustainability standards, exhibited and ‘sold’ to the consumers of certified agro-commodities, masks the messy world of the same standards and commodities in the making. In the latter world, standardization and certification are argued to be always unfinished processes ridden with unequal relations of power between different actors. Despite the unequal relations however, no single actor is able to simply impose its desired standards on other actors. But rather compliance has to be worked out through multiple translations i.e., mutual adjustments made by different actors in order to gradually align their interests with each other. Furthermore, in this STS-inspired work, standards are viewed as ontological entities that attempt to make the “realities that they claim to describe.” (Busch 2011:1; also see Timmermans and Epstein 2010). And while they help reshape practices on a farm, and in an office or a factory, the standards themselves are often adapted and adjusted to better suit local conditions. These mutual adjustments are geared toward the production of a situation in which the localized standards and certification protocols come to accurately describe the actual practices and conditions they refer to (cf. Callon 2007, 2008).

We make two interrelated contributions to this emerging literature on standardization and sustainability certification in GVCs. First, while most studies have focused on efforts of different actors in implementing the standards and monitoring for compliance during certification, we study the prior process in which certification protocols are designed and piloted in the field. This standard-setting process has been termed as the legislative phase, as opposed to the later executive (implementing the standards) and judicial (monitoring and assessing compliance) phases, of governance in practice by Tallontire (2007). The legislative phase appears too early in the entire standardization and certification procedure to have an ontological effect in terms of remaking local realities and practices (of farmers). Rather the legislative phase is characterized by flexible standards and protocols which are, in principle, still open to 'official' modifications in rulebooks. In the following, we map how some of these modifications were produced, paying specific attention to the coming together in friction of different actors' interests and practices. This analysis also constitutes our second contribution to the recent GVC governance literature which has largely focused on how 'users' of the standards and protocols subvert or modify them in everyday practice, leading to the relative neglect of the study of modifications made to the standards by (or in collaboration with) the standard-setters themselves.

The standard and the protocols

The NEN's biofuel sustainability norm NTA8080/81 follows the Cramer Criteria (CC), which consist of six core themes (Cramer et al, 2006): greenhouse gas balance; competition with food production and/or supplies of local energy, medicines and building materials; biodiversity effects; economic effects; social wellbeing effects; and environmental effects. The first three themes concern issues that are specifically important for energy supply from biomass sources, whereas the remaining three specifically address the "triple P" dimensions of sustainability. Assessing the performance of biomass energy along these dimensions requires the traceability of the relevant biomass streams to their point of origin, and validating the conditions under which the biomass energy is being produced. In NTA8080/81, the CC have been redefined into the following nine core sustainability principles:

1. The greenhouse gas balance of the production chain and application of the biomass is positive.
2. Biomass production is not at the expense of important carbon sinks in the vegetation and in the soil.
3. The production of biomass for energy shall not endanger the food supply and local biomass applications (energy supply, medicines, building materials).
4. Biomass production does not affect protected or vulnerable biodiversity and will, where possible, strengthen biodiversity.
5. In the production and conversion of biomass, the soil and soil quality are retained or even improved.
6. In the production and conversion of biomass, ground and surface water are not depleted and the water quality is maintained or improved.
7. In the production and conversion of biomass, the air quality is maintained or improved.

8. The production of biomass contributes towards local prosperity.
9. The production of biomass contributes towards the social well-being of the employees and the local population.

Certification of smallholders in the Jatropha supply chain from Tanzania requires: (a) implementation of a monitoring and control system to ensure that all Jatropha seeds have been grown in line with the above sustainability principles; and (b) setting up an organisational structure that enables certification of the smallholders as a group, since they are too small and resource-poor to be certified individually.

The Dutch entrepreneur, DJS's interest in certification was predominantly fuelled by the fact that it had just struck a deal with a subsidiary of the Dutch national airline (S-KLM for short) for supplying Jatropha oil, which is one of the few known suitable feedstocks for biokerosene. S-KLM had been deputed by its mother company to develop the airline's sustainable biofuel feedstock sourcing. S-KLM foresaw the implementation of the EU Renewable Energy Directive (EU-RED) under which certain requirements would be posed that all imported biofuel feedstocks into the EU would have to meet. S-KLM agreed to pay a handsome price for the pure Jatropha oil supplied by DJS which in turn sources its feedstock from its Tanzanian Jatropha subsidiary (henceforth TJS), an oil processor which obtains its oilseeds from thousands of smallholder farmers cultivating Jatropha plants as hedges around their food-crop plots and homesteads in rural Tanzania.

Amidst all the upheaval about unsustainable practices on biofuel plantations, this dispersed small-scale hedge arrangement seemed to hold out the promise of becoming a truly attractive business model. It avoided direct competition with food production for land and did not destroy any valuable ecosystems through direct or indirect land use change. In fact, in the majority of cases, the Jatropha oilseeds came from long-existing hedge stock, because Jatropha had been a well-known plant in Tanzania for decades. It was widely used in the socialist Ujamaa period to resolve land disputes through demarcation of land boundaries, at a time when many rural people were on the move due to the government's forced resettlement in ujamaa villages.[2] For smallholders, sale of the Jatropha seeds brought in a small amount which, although perhaps not exceeding 1% of their annual income, could pay for the school fees of a child.

DJS constituted a consortium to bring its certification project to fruition. In addition to DJS (the project leader), NEN, TJS, S-KLM and one of Netherland's technical universities (TU) were enlisted. The consortium filed a proposal with NL Agency, an agency of the Dutch Ministry of Economic Affairs and received a subsidy under the Ministry's Importation of Sustainable Biomass scheme toward the end of 2010. When the subsidy was granted, NL Agency indicated that this project should serve as an example of how environmentally sustainable and socially inclusive biofuel development can be realised, in the spirit of the CC. The project started execution on 1st January 2011, and it is supposed to run until mid-2013. During the final six months of the project, at least 5000smallholders should be officially audited and certified. In the first two years (2011-12), various preparatory activities are to be carried out by the project consortium to enable the auditing by an independent certification agency in the final six months of the project. The following story highlights key experiences encountered during this preparatory trajectory up to May 2012.

[2] Source: A. van Peer, personal communication 13 October 2011.

Certification phase I: The feasibility study

The first 6 months of the project consisted mainly of a feasibility desk study to identify any binding constraints in the operations of TJS and its smallholders, which could prevent the supply chain from meeting one or more of the six core CC themes. An important part of the feasibility study was to come up with reliable estimates of greenhouse gas emission reductions achieved with Jatropha biokerosene. However, none of the existing GHG calculation tools, not even the EU's own tool, Biograce, facilitated a GHG lifecycle assessment for Jatropha. Ultimately the project team had to design a separate 'pathway' for hedge Jatropha on their own, using sparse data from existing studies about Jatropha in combination with some assumptions from the palm-oil pathway in Biograce. The outcomes of the emission reduction estimations thus remain subject to an unknown margin of error. Estimations were produced for a variety of scenarios, using different combinations of assumptions concerning the fossil fuel baseline, by-product emission allocation, extent of carbon stock change due to land use change, degree of emissions from conversion of pure Jatropha oil into biokerosene, and the amount of fertiliser given to the farmers as a compensation for the nutrients removed from their soils through the harvesting of Jatropha seeds (further details below). The estimated GHG emission reductions ranged from more than 100% (mainly due to assumed favourable carbon sequestration rates in newly planted Jatropha) to a mere 33% (as would occur in a setting of net carbon stock loss when older non-Jatropha hedges would be cut down to make way for Jatropha hedges). Agreement among the different project members was never reached about which GHG scenario should be used as a baseline for S-KLM, and it also still remains unclear how a certification auditor will judge any competing evidence.

Part of the GHG controversy emanated, literally and figuratively, from the ground in Tanzania. The oil processor collects the seeds from the farmers and presses oil out of them, which leaves a considerable residue called seedcake. The seedcake is still rich in (hard-to-extract) oil, and contains nutrients and minerals that the plant has absorbed from the soil. Hence, in order to meet the NTA8080/81 requirement of avoiding reduction of soil fertility, ideally some compensation for these losses has to be provided to the farmers. In sub-Saharan smallholder agriculture, soil nutrient depletion is already a severe problem. The seedcake, if returned to the farmer, acts as an organic fertiliser. JTS is aware of this but does not see a concrete way to take the seedcake back to the farmers' plots, since the farmers are spread out widely across a terrain of hundreds of square kilometres, and the rural road infrastructure is very poor. Collecting the seeds from the farmers is already a herculean task, which can only be realised due to the cheap transport services offered by trucks that return empty from upcountry, after having delivered their goods from coastal Dar es Salaam to inland regions. There are however no empty trucks available for transporting the bulky seedcake back upcountry, and renting dedicated extra transport capacity would be too costly and unwieldy. Instead, the project team analysed the GHG effects of providing the farmers with an occasional dose of mineral fertiliser. As mineral fertiliser is very compact and lightweight, it would be easier and cheaper to handle. But as a fertiliser it is less valuable than the seedcake, and has a negative effect on the GHG emission balance of the Jatropha oil supply chain, mainly due to the unavoidable emissions from Nitrogen application. Just how significant this latter effect would be, became evident when the TU team produced estimates, based on the assumption of replenishing quantities of Nitrogen and Potassium similar to those that are removed through Jatropha cultivation:

The emission reductions from pure Jatropha oil chain (up to the point of delivery in Rotterdam port) would fall well below the minimum requirements of the EU-RED. This finding led the project consortium to prepare two separate feasibility study documents: the uncomfortable estimates have only made it into a 'private' version of the document that has not been circulated outside the consortium. Presumably it is hoped that certification auditors will not pick up on the issue when they read the 'public' version.

While this research was under way, it also became clear that returning the seedcake to the farmers would not be in the interest of JTS for other reasons. The seedcake still has substantial energy value and this can be utilised by pressing it into pellets and briquettes, for use in local urban areas where these products find a ready market as a substitute for the increasingly expensive traditional cooking fuels: charcoal and wood. The proceeds from these seedcake products constitute a much valued source of additional revenue for the oil processor. Furthermore, in GHG assessments for the EU-RED, emissions associated with traditional cooking fuels can be subtracted from the emissions produced as part of utilising Jatropha seeds, thereby improving the GHG performance of the Jatropha oil chain. In view of the problematic GHG results detailed above, this constitutes a major advantage of utilising the seedcake for energy purposes. At the same time, however, this use of the seedcake (actively encouraged by the EU-RED) comes at the expense of further soil nutrient depletion of the smallholders' land, threatening their livelihood sustainability.

Despite encountering many such issues, and some nagging concerns over expected high costs of sampling and auditing large numbers of smallholders despite resorting to smallholder group-certification as advised by the NEN, the consortium decided that they should go ahead with preparatory field activities for certification from mid-2011.

Certification phase II: Base line studies in the field

> "*there has always been a clear difference in vision between 'people on the ground' and between policymakers and academics, and that is no different this time." (Manager, JTS, Tanzania)*

This phase consisted predominantly of the collection of certain baseline data from the smallholders, required by the NTA8080/81 for monitoring purposes. It was at this point that the TU first got in touch with the manager of JTS in Tanzania to ask for verification about the number and location of the smallholders that the company is sourcing from. The TU team needed this information because they, following the NTA8080/81, had to collect water, air and soil samples from a defined number of smallholders. This is necessary to enable future group certification, after the formation of smallholder cooperatives. The original project document, drafted less than a year earlier, had foreseen a manageable total of 5,000 smallholders in two regions, to be organised into two cooperatives of 2,500 members each. According to the NTA8080/81 requirements, this situation would require baseline water, air, and soil samples to be taken from at least the square root of the number of members per cooperative, i.e. a minimum of 50 smallholders per cooperative. However, the response from the TJS manager indicated that reality on the ground had moved ahead of the original plan:

"We have expanded into several new regions. I believe we are now sourcing from around 57,000 farmers. The exact number is not known because the administration by the local collection centres is not exact and many farmers are not yet officially registered with us as suppliers. Many people who come to sell seeds are not the farmers, it's mostly children and old people, they could be farmers' relatives but they could also be unrelated poor vulnerable groups. Therefore I think we need a different division for the cooperatives, and we also have to review the number of members per cooperative. The original plan does not make sense anymore … it is infeasible to audit the square root of the members of each cooperative, and then having to take samples from them on an annual basis! This will become a completely unmanageable undertaking." (excerpt from e-mail communication from TJS manager to TU team leader, 21st May 2011).

There were other reasons for apprehension on the part of the project implementers. The NTA8080/81 text spoke of the requirement to form homogeneous cooperatives in terms of climatic conditions, water availability, soil type, and agricultural practices. On this, the manager wrote: *"Another problem that I foresee is the heterogeneity of the soils and water availability. In Mi… there is kichanga soil and there is no water source, hence no irrigation. In contrast, in Mb… where we are active now, there is Tifutifu soil and people can regularly use water from a nearby river. These are big differences in what is considered to be one and the same region. The other regions have again quite different soils and climate variations. There is a lot of local and regional variability – and we are talking of vast sourcing areas, spanning hundreds of square km, some are over 600 km away from our processing site. The NTA8080 requirement of homogeneity of soil and climate within each cooperative group can only be met if we form very small cooperatives of a few hundred farmers each, but that is absolutely no option for the reasons I already indicated [too many cooperatives]. Please ask NEN to relax this requirement."* (*Ibid*).

NEN, however, responded by asking for proper scientific evidence before considering any relaxation of their norm requirements. The TU then had to trace detailed soil maps for Tanzania (ultimately located at the FAO), and superimpose on these the approximately 2000 smallholders who had already been registered in a central database with their GPS coordinates, in the absence of any physical addresses in rural Tanzania. The pictures which ultimately could be produced with the help of a specialist from Wageningen University were still rather primitive, as they could not go beyond a resolution of blocks of 20 square-km and covered only one sub-region of the sourcing area. Meanwhile the GPS coordinates of many farmers also turned out to be inaccurate – black dots mysteriously turned up in large numbers in places on the map where the firm was adamant about not having any smallholders. Anyhow, the maps showed great soil diversity in Tanzania, and smallholders within one and the same region were seen to be located on several different soils. The NEN was ultimately satisfied with the maps and relaxed its homogeneity assumption, but the amount of effort involved in getting this one obstacle removed was enormous.

The TU meanwhile began to assess the implications of the changed number of smallholders (57000 instead of the original 5000) to be included in the project. The new numbers required samples to be taken from about ten times the number of farmers specified in the original plan. These concerns were aggravated by reports coming in from the field regarding the actual work involved in the sampling (more on this below). Furthermore, the NTA8080/81 text gave rise to many questions about how to operationalize the water, air and soil sampling and analysis procedures. The TU team was unsure about how to execute all measurements and analysis in accordance with the protocols specified by the NEN. They were unsure if they would find laboratories in Tanzania that would have the capacity and capabilities to execute the analyses. Taking thousands of samples back to the Netherlands was obviously too difficult and expensive to consider.

The foregoing illustrates the collision between Tanzanian agrarian realities and the context in which the NTA8080/81 norm was designed. Although the designers of NTA8080/81 had taken care to involve different stakeholders during its incubation process, this obviously did not include African smallholders. The norm design was done in several rounds, with possibilities for feedback and suggestions from an interest group, the so-called Committee of Experts, constituted by Dutch environmental and fair trade foundations, governmental representatives, and the private sector, in order to ensure broad support for the eventual outcomes through a participatory process. But the Dutch designers of the norm did not, or could not, consider the institutional complexities of scientific and agrarian realities in different parts of the world. The scenario of a biofuel supply chain spanning hundreds of square kilometres and consisting of tens of thousands of smallholders without physical addresses, who are cultivating plots no larger than less than 0.5-2 acres each, had been impossible to conceive by NTA8080's designers. The so-called 'inclusive' group certification option allowed by NTA8080/81 clearly does not work for this type of production system.

Ultimately the main hurdle in the way of feasible operationalization turned out to be the requirement of soil samples to be taken and analysed from the square root of the number of cooperative members on an annual basis. Although the water sampling requirements in the NTA 8080/81 were similar to this, and equally tenuous in principle, it had become obvious that there was no surface water anywhere in the close neighbourhood of any smallholder plot, while groundwater levels of at least several metres deep finally convinced the NEN to relax its requirement of water sampling. The logic of measuring the Biological Oxygen Demand (BOD) in the water was in any case found to be ludicrous for Tanzania. BOD is useful for monitoring *excess* nutrient supply, a requirement inspired by the nitrogen-surplus situation in the Netherlands with its huge pig population. In contrast, as noted above, East African soils widely suffer from nutrient depletion problems. This was, therefore, a case of "excess governance" of the NTA8080/81, which seemed to serve no purpose except satisfying EU and Dutch bureaucratic requirements as an aim in itself.

The soil management (and associated sampling) requirements presented challenges of a different order. The overwhelming majority of Tanzanian smallholders farm organically, if only because they cannot afford to buy expensive mineral fertilisers and chemical pesticides. In general, their Jatropha plants do not affect food production because Jatropha does not yield nearly as much value as common staple foods such as maize, beans, cowpeas or cassava. The few (larger) farmers who tried to introduce mini-plantations on an experimental basis during the initial Jatropha hype, about 5-6 years ago, have long since uprooted the shrubs again in disappointment and frustration (GTZ 2009). Thus there is very little land use change to speak of. Currently, in Tanzanian smallholder communities, Jatropha largely survives as a wind-break hedge, an anti-erosion device, pen for farm animals, grave marker, land dispute settlement mechanism, and privacy-yielding hedge around homesteads (van Eijck and Romijn 2008; NL Agency 2010). Labour, water, animal manure or any other major resources are first allocated for food production, while Jatropha is treated as a residual crop. Thus, in broad terms, the smallholders satisfy the NTA8080/81 principle 5, which states that "*In the production and conversion of biomass the soil and soil quality are retained or improved.*" The only problem is some localised nutrient mining due to the Jatropha seed removal, but this is something over which the farmers cannot exercise control. It is something that others further down the supply chain have to address (e.g. by returning seedcakes to the farms, see above). The main problem with the soil requirements in the NTA 8080/81 is, then, that the smallholders simply do not have the means to prove their organic practices according to the expensive and unwieldy demands of a European standard with its specific and rigid interpretation of what constitutes as 'adequate scientific proof'. This case exemplifies the nature of unequal power relations operating in the certification process, due to which only some actors' knowledge and practices are considered legitimate and scientific.

Concerning the air emissions, the NEN, after some negotiation, accepted that using biomass, that is cleared to make way for Jatropha plantings, for cooking purposes does not constitute as 'waste burning' – which is not allowed under NTA8080/81 – but can be interpreted as good utilization of the biomass. Since farmers normally use wood fuel for cooking, heating and other household purposes, using their cleared biomass instead of logged wood from surrounding areas will therefore not generate additional emissions.

The experiences with NTA8080/81's cumbersome and often superfluous provisions, as discussed above, may be considered as cases of "excess governance" by the standard. In contrast, the project also encountered the opposite problem of "deficient governance". For instance, NTA8080/81 did not call for collection of samples from a control group of farmers who have not been cultivating Jatropha. Without this control group, it is difficult to separate any ecological impact of Jatropha cultivation from other factors that produce similar impacts. In particular, as already noted, soil fertility deterioration may not be limited to Jatropha growers alone. Despite repeated attempts by the project's implementers, the NEN remained unconvinced of the need for control samples for a long time, and during one of the project progress meetings the taking of control samples was even flagged as a waste of TU's allotted budget.

The foregoing analysis of the coming together in tension of different realities may be depicted in a schematic diagram, as shown in Figure 1. The upper half of the figure represents the requirements in NTA8080/81, which were the result of a participatory exercise in the Netherlands, while the lower half of the figure schematically depicts Tanzanian smallholder reality with which the NTA8080/81 norms were confronted. Deficient governance cases are placed in the left side of the figure, while cases of excess governance are on the right. In the 'middle ground', where governance was felt to be feasible and operable, the norm requirements could only be applied with major translation efforts involving significant brainstorming in Tanzania, conducting remedial research to identify acceptable ways forward, and perhaps most importantly, significant improvisation in the field.

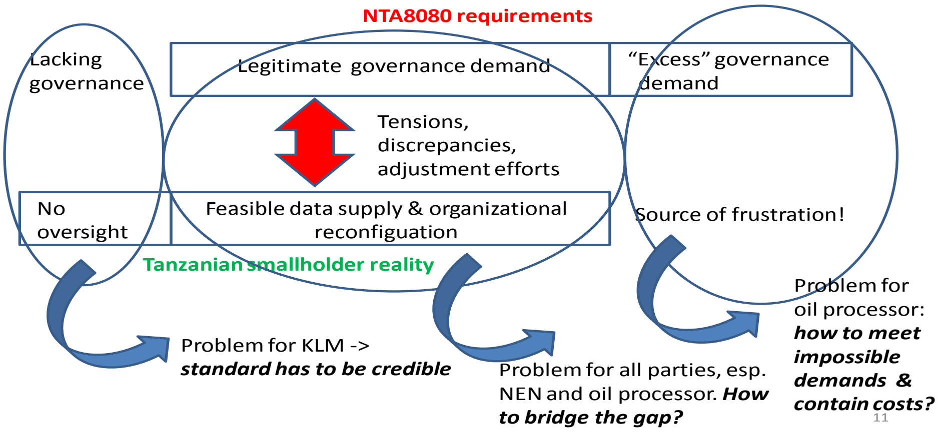

Figure 1: The NTA8080/81 sustainability standard meets Tanzanian smallholder reality

As the fieldwork for the collection of baseline data in Tanzania took shape, many newer instances of excess and deficient governance were encountered. Due to lack of space in this article, we only discuss some key issues below to provide an idea of the nature and extent of the discrepancies faced. Before doing so however, we first hone in on some key problems that fell in the intermediate category of "legitimate governance demand" by NTA8080. The list given here is not exhaustive. These problems were experiences where prolonged discussion and mutual adjustment by the parties in the Netherlands and Tanzania were eventually able to produce a compromise.

- ***Where* to measure soil quality?** The NTA8080/81 emphasized that adverse effects on food production must be avoided, but the Jatropha hedge is obviously located *beside* the food plot or even some distance away from it. The TU team ended up taking samples from both food plots and under Jatropha hedges, since the NEN was unaware of the requirements that would be posed by the auditors. This was, obviously, laborious and expensive.
- ***How deep* to dig for the soil samples?** Again, the NTA8080/81 did not provide adequate guidance. NEN indicated that this must be determined locally. But for assessing the soil quality of a food plot, one should not go deeper than 40 cm in order to obtain meaningful estimates of e.g., soil carbon, whereas a depth of 40 cm is barely sufficient for determining effects from deep Jatropha roots on the soil under the hedge. At the same time, the sample results from the food plot and hedge must be mutually comparable as well and this can only be the case if the same soil depth is used for both. A compromise depth of 50 cm was decided upon for all samples, but this is obviously a coarse rule of thumb.
- ***How* to dig?** Soil probes were recommended, but they were found to be useless in stony ground. Heavy-duty shovels, pick axes and pangas were required to get into some Tanzanian soil, but that meant obtaining rough, "disturbed samples" – another unavoidable problem that would detract from the reliability of the soil quality data.
- ***Where* to analyse?** A local laboratory was contracted for the analysis of almost 440 soil samples that needed to be processed. The first results that came back revealed values that were outside theoretically possible ranges, and the laboratory had to be requested to re-analyse everything. About 6 months later, the final values for some of the key nutrients had

still not been delivered. By this time it had become obvious that the laboratory is not equipped to handle large numbers of samples. The future scenario of certifying 60,000 odd smallholders who are supplying to TJS acquired nightmarish proportions. If the soil sample analysis for a mere 5000 smallholders lead to such huge obstacles, then how would one deal with an eventual quantity at least 12 times as large?

- ***How* to deal with 'illegitimate' target groups?**
  As already forewarned by the TJS manager, the main seed suppliers proved to be children and elderly people. Does this, then, involve child labour? This is the inevitable question asked by European parties, and absence of proof to the contrary usually stands firmly in the way of any certification involving labour standards. The Cramer Criteria, on which NTA8080/81 is based, likewise include a clause which forbids the use of child labour. Information from interviews with the 2300 database farmers seemed to indicate that their children were indeed attending school. But school timings in rural Tanzania are limited to the morning hours, so the children can help out on the farm after school. Of course, this could also include picking, peeling and selling Jatropha seeds. Such farm work by children is a sheer necessity for many poor farming families. Is this child labour, or not? The auditors' verdict is still out there.

Moving on to the problems with deficient or missing governance by NTA8080/81. The NEN was rather uninterested in taking up these issues even though they were found to constitute major gaps in sustainability oversight in the opinion of the scientists from the TU. The TU team argued that when these gaps would be discovered by outside parties, they could easily lead to future problems with the credibility of the standard. Here's a sample of these issues:

- **Neglected key shortages of minor minerals:** Significant nutrient removals of Ca and Mg from local biomass production systems can occur due to frequent harvesting of woods and/or crop seeds. Scientific research in Eastern African settings has shown that this can have a significant impact on local soil productivity (e.g., Lulandala and Hall, 1990; van Hook et al., 1982). However, NTA8080/81 does not require their measurement and monitoring. It only asks for the measurement of macro nutrients P, K, N, and soil organic carbon content.
- **No requirement to measure soil moisture content:** This non-requirement was a huge oversight since some biofuel crops, including Jatropha, are known to be water hungry and hence could affect water availability for adjoining food crops.
- **No need to measure toxic effects from Jatropha by-products:** The NEN argued that the NTA8080/81 is solely meant to capture the sustainability of "production units" in the Jatropha oil supply chain. This meant that any by-products emanating from the oil production could remain unscrutinized, and that the entire oil processing operation by TJS was left outside the purview of NTA8080/81. Bizarrely, NTA8080/81 prescribes in great detail the monitoring of soil, water and air effects on smallholder plots, even where these can be expected to be minimal, whilst completely disregarding any similar effects after the seeds have left the smallholder plots. In view of persistent reports about the high toxicity of Jatropha, especially due to the presence of *phorbol esters* (Makkar et al. 1997; Gubitz et al. 1998), this was deemed a particularly unacceptable omission in NTA8080/81 governance by the TU team and the staff of the collaborating research institute in Tanzania.

Perhaps the most serious problems arose from the **"excess governance demands"** depicted in the right-hand side of Figure 1. In the following, we focus on the financial implications of the excess governance issues discussed at the start of this section. The requirement to register all smallholders in a database with their GPS details turned out to be an expensive affair, with the average cost per farmer exceeding 4 euros for the initial 5000 farmers included in the certification project. This is due to the time consuming nature of the registration process, which has to be done on location in remote rural areas, to take proofs such as photos of the hedges, and measure the hedge length and width. On top of these costs there would be annual soil sample analysis. As stated before, the number of farmers from whom baseline soil samples were taken had to be at least one hundred. The costs of this initial baseline sampling and analysis amounted to around 4500 euro for laboratory costs, while additional amounts were spent for the labour and transport involved in the collection of the samples etc. Since a substantial number of these farmers would have to be re-analysed on *an annual basis* to meet the NEN's requirement of monitoring, these costs were deemed to be prohibitive for the prospective cooperatives. It is also worth noting that these were the approximate costs of certifying the first 5000 farmers only, which supply a mere 11-12% of the oil processor's estimated break-even level of oil production (source: TJS manager). The other 88-89% would presumably still need to be certified later, *without* any subsidies from NL Agency and assistance from the TU. Furthermore, according to NTA8080/81, a certification auditor would need an average of 3 hours to audit one smallholder (*excluding* travelling costs). Overall the cost of certification was estimated to exceed the benefits (for the supply chain) by a large margin. The benefits, to recall, consisted primarily of market access to the EU aviation sector which paid a more attractive price than would be possible on local markets. But clearly, despite or maybe due to NTA8080/81's provisions of group certification, it did not cater to the needs, or appreciate the realities, of thousands of smallholders in Tanzania.

As the financial and logistical consequences of certification became clearer, the TU team along with the TJS manager began to explore ways to reduce costs through more workable organizational arrangements. First, they suggested replacing a part of the sampling with estimations based on calculations of nutrient removals due to seed harvesting, and limiting primary soil measurements to once in 5 years. But the NEN could not allow a modification in the prescribed NTA8080/81 procedures without consultation with, and permission from, the Dutch Council of Accreditation (RvA, a body that supervises the quality of procedures used by the NEN and other standardization institutions in the country). The RvA, however, was extremely reluctant to get drawn into such operational issues, and referred the NEN to the European Cooperation for Accreditation (ECA), of which RvA is a member. The ECA had recently drawn up a guiding document for group certification, which was duly sent to NEN. This rather bulky document revealed that the NEN's NTA8080/81 did not meet all of ECA's group certification guidelines, and that it would have to comply with these guidelines by mid-2013. This discovery did not bode well for the project. At the time of writing, the NEN was still trying to find out from the RvA how it can or should interpret the ECA group certification guidelines.

Concluding remarks

Despite being unfinished, the story of the certification process documented above allows us to draw some general lessons about sustainability standards and their implementation in global supply/value chains. It is clear that the processes of standard design and operationalization by standardization bodies such as the NEN cannot foresee the problems encountered during implementation, especially in other parts of the world. The institutional and ecological complexity of realities such as those of the Tanzanian smallholders cannot be reduced to guidelines and protocols of a 'universal' globally-applicable standard. This is true even for standards, such as the NTA8080/81, designed in a participatory process on the basis of widely accepted sustainability principles that were formulated with the intention of protecting the poor and vulnerable people and environments. The irreducibility, of complex realities to standards and norms, then paves the way for ontological effects produced by standards which attempt to make the realities so as to accurately describe them. The pilot stage of the certification process studied by us is perhaps too early to witness such ontological effects. We have instead focused on the adjustments made and attempted on the 'official' standard itself as it is confronted with the real world of growers and processors in a small part of Tanzania. As a result of these adjustments, that were often resisted by the powerful actors in the certification project, the standard may have become more aligned with the local realities encountered. But other frictions, similar and different from the ones discussed in this article, are bound to crop up as this 'adjusted' standard moves to newer locales and encounters diverse social realities that make up our world. Perhaps a way of reconciling the heterogeneity and complexity of the world is to reject the idea of universal standards, instead opting for regional or niche standardization (cf. Epstein, 2007). In such niche standardization, it may be possible to take better account of socially and geographically bounded realities, such as those of the Tanzanian smallholders growing Jatropha as hedge, through participatory ('socially inclusive') design and implementation stages, such as through recommendations discussed in Ser Huay Lee *et al.* (2011) and van Beuningen and Knorringa (2009). This niche standardization strategy, while serving the intended purpose of the standards (in terms of 'social' and environmental sustainability), should not exclude the poorest farmers from reaping the benefits of the sustainability of their existing practices, a sustainability they cannot afford to prove 'scientifically'.

References

Bain, C. and Hatanaka, M. (2010) 'The practice of third-party certification: Enhancing environmental sustainability and social justice in the Global South?' in V. Higgins and W. Larner (eds.) *Calculating the Social: Standards and the Re-configuration of Governing*. Basingstoke: Palgrave MacMillan, 56-74.

Bain, C., Ransom, E. and Worosz, M. (2010) 'Constructing credibility: Using technoscience to legitimate strategies in agrifood governance ,' *Journal of Rural Social Sciences* 25(3), 160-192.

Berndt, C. and Boeckler, M. (2011) 'Performative regional (dis-)integration: Transnational markets, mobile commodities and bordered north-south differences' *Environment and Planning A* 43, 1057-1078.

Bindraban, P. et al. (2009) 'Can biofuels be sustainable by 2020? An assessment for an obligatory blending target of 10% in the Netherlands', Netherlands Environmental Assessment Agency, Bilthoven.

Busch, L. (2011) 'Food standards: the cacophony of governance,' *Journal of Experimental Botany* 62, 3247-3250.

Callon, M. (2007) 'What does it mean to say that economics is performative?' in D. MacKenzie, F. Muniesa, and L. Siu (eds.) *Do Economists Make Markets? On the Performativity of Economics*., Princeton NJ: Princeton University Press, 311-357.

Callon, M. (2008) 'Economic markets and the rise of interactive *agencements*: from prosthetic agencies to habilitated agencies' in T. Pinch and R Swedberg (eds.) *Living in a Material World*. MIT Press, 29-56.

Cramer, J. et al. (2006) 'Criteria for sustainable biomass production'. Final report of the Project Group 'Sustainable production of biomass'. Dutch Energy Transition Taskforce. The Hague.

Epstein, S. (2007) *Inclusion: The politics of difference in medical research*. Chicago: University of Chicago Press.

GTZ (2009) 'Jatropha Reality-check, a field assessment of the agronomic and economic viability of Jatropha and other oilseed crops in Kenya'. Endelevu Energy, World Agroforestry Centre, Kenya Forestry Research Institute.

Gereffi, G. (1994) 'The organization of buyer-driven global commodity chains: How US retailers shape overseas production networks' in G. Gereffi & M. Korzeniewicz (eds.) *Commodity Chains and Global Capitalism.* Westport, CT: Praeger Publishers, 95-122.

Gereffi, G., Humphrey, J., and Sturgeon, T. (2005) 'The governance of global value chains,' *Review of International Political Economy* 12, 78-104.

Gibbon, P., Bair, J., and Ponte, S. (2008) 'Governing global value chains: An introduction,' *Economy and Society* 37, 315–338.

Gübitz, G.M., Mittelbach, M., Trabi, M. (1998) 'Exploitation of the tropical oil seed plant Jatropha curcas', *J. Biores. Technol*. 67, 73–82.

Konefal, J. and Hatanaka, M. (2011) 'Enacting third-party certification: A case study of science and politics in organic shrimp certification'. *Journal of Rural Studies* 27, 125-133.

Law, J. (2004) *After method: Mess in social science research*. London: Routledge.

Lee, J.S.H., Rist, L., Obidzinski, K. Ghazoul, J. and Lian Pin Koh (2011) 'No farmer left behind in sustainable biofuel production', *Biological Conservation*. 144, 2512-2516.

Loconto, A. (2010) 'Sustainable performed: Reconciling global value chain governance and performativity', *Journal of Rural Social Sciences* 25(3), 193-225.

Lulandala, L.L.L. and J.B. Hall (1990) 'Nutrienty removals in harvesting of Leucaena hedgerows at Mafiga, Morogoro, Tanzania.' *Forest Ecology and Management* 35, 207-216.

Makkar, H.P.S., Becker, K., Sporer, F., Wink, M. (1997) 'Studies on nutritive potential and toxic constituents of different provenances of Jatropha curcas.' *J. Agric. Food Chem*. 45, 3152–3157.

Moreira, T. (2011) 'Healthcare standards and the politics of singularities: Shifting in and out of context,' forthcoming in *Science, Technology and Human Values,* published online, doi: 10.1177/0162243911414921

Muradian, R. and Pelupessy, W. (2005) 'Governing the Coffee Chain: The Role of Voluntary Regulatory Systems' *World Development* 33, 2029-2044.

NL Agency (2010) 'Jatropha assessment. Agronomy, socio-economic issues, and ecology'. Utrecht.

Ouma, S. (2010) 'Global standards, local realities: Private agrifood governance and the restructuring of the Kenyan horticulture industry.' *Economic Geography* 86, 197-222.

Tallontire, A. (2007) 'CSR and regulation: towards a framework for understanding private standards initiatives in the agri-food chain'. *Third World Quarterly* 28, 775-791.

Timmermans, S. and Epstein, S. (2010) 'A World of Standards but not a Standard World: Toward a Sociology of Standards and Standardization'. *Annual Review of Sociology* 36, 69-89.

van Eijck, J.A.J. and H.A. Romijn (2008) 'Prospects for Jatropha biofuels in developing countries: An analysis for Tanzania with Strategic Niche Management'. *Energy Policy* 36 (1), 311-325.

van Beuningen, C. and P. Knorringa (2009) *Inclusive Improvement. Standards and Smallholders. Taking Stock and Moving On.* HIVOS and Institute of Social Studies, The Hague.
van Hook, R.I., Johnson, D.W., West, D.C., and Mann, L.K. (1982) 'Environmental effects of harvesting forests for energy'. *Forest Ecology and Management*. 4, 79-94.