Introduction

Interest in the study of standards and standardization within the social sciences has grown dramatically over the past two decades (Timmermans and Epstein 2010). Prior to that time, standards largely remained in the realm of the technical (e.g. U.S. Standards for Grain). Officially, standards are created to standardize processes (industrial and management), to facilitate trade by both ensuring inter-operability and encouraging competition through differentiation, and to protect consumers by stabilizing product qualities. In doing so, standards are presented as strictly technical details, based on scientific criteria, around which people and things are expected to conform (e.g. standard dress sizes require both fabric and humans to conform to a fixed set of measurements).

Standards and standardization can be found throughout every major social institution including the military (e.g. standard uniforms and weapons), medicine (e.g. the International Classification of Diseases, now in its tenth edition), education (e.g. standardized testing), and the economy (e.g. a single standard currency for each nation, usually backed by a state-owned national bank) (see Busch 2011, 93–112). Indeed, only through the standardizing of markets and the economy as a whole has world trade been able to increase (Busch 2011, 112). One area of tremendous growth has been in agriculture and food (agrifood) trade. Without overstating the case, standards and standardization have played a large role in the creation of our globalized food system, in that standards and standardization provide a means of simplifying what could be a very laborious and complex process. Initially, the use of standards and standardization afforded the creation of global grain commodities, as everything from seeds to fertilizer became standardized (Busch 2011). However, in recent years, standards have been used systematically to differentiate products and processes. Within the social sciences, social studies of science approaches in combination with political economic approaches have shed light on the ways in which technical standards are inherently social and part of power struggles, not simply in their formation, but also in their implementation and outcomes.

Three case studies elaborate how a combination of political economic and science studies approaches can illuminate the social, political and economic decisions behind the scientific standards used to create more sustainable agrifood systems. The first focuses on sustainable agriculture standards in the United States and the ways in which the market increasingly...
influences the standard-setting process and benefits dominant companies in the marketplace. The second examines efforts to construct global “sustainable” beef production standards and the ways smallholder farmers in Southern Africa will not likely benefit from the new standards. The third case study explores a participatory guarantee system, an alternative certification system based on the concept of farmer-led evaluation of farming practices at a local level in Colombia, which seeks to resolve tensions between different types of knowledge in the development and enforcement of standards by creating hybrid practices in organic agricultural production. All three case studies provide a lens for understanding the political economy of standards, notably the privileging of particular types of knowledge and agricultural practices and the ways in which the market shapes standards creation, implementation, and enforcement.

Standards

Standards are agreed-upon criteria for a product or process (Brunsson and Jacobsson 2000; Giovannucci and Ponte 2005). Standards are a ubiquitous part of daily life, whether in the realm of education, health care, or food and agriculture. Yet, far from being strictly technical details, scholars and practitioners alike have increasingly recognized that “standards are intimately associated with power” (Busch 2011, 13). The construction and implementation of standards construct the world in certain ways instead of others (Busch 2000; Brunsson and Jacobsson 2000), and by implication standards are one means by which products, processes, people, and other living entities (e.g. bacteria and animals) are judged.

New types of standards and processes for standards development and implementation have become more important with increased global trade (Giovannucci and Ponte 2005). Specifically, private-sector, voluntary standards have proliferated. Whereas public standards are those criteria created by government authority and enforced through laws and regulations, private standards are any standards created by private interests (e.g. a company, industry, or a non-governmental organization (NGO)) and generally are enforced through market mechanisms (Bain et al. 2013). Private standards are often referred to as voluntary, because there are no laws requiring adoption, but rather adoption becomes de facto mandatory in that if a seller wants a company to purchase a product, the seller must conform to various private standards. For example, in 2007, when Unilever announced that it would source only Rainforest Alliance-certified tea by 2015, a seemingly voluntary standard became mandatory for market access because other large tea blenders – Tetley, Twinings, Sara Lee – announced similar policies. Because of concentration in the tea industry, nearly half of all buyers were demanding certified tea and because tea is a blended product most producers sell at least a small percentage of their production to one of these companies. In order to stay in the business, farmers needed to become certified (Loconto 2010).

With globalization and economic liberalization, the agricultural sector has shifted from government regulation to increasingly private or public–private regulation, most of which is occurring via standards creation and implementation. Private standards are not only viewed as a means to overcome the limits of state capacity to regulate food supply chains, but also as an opportunity for states to delegate regulation to private actors (Ponte, Gibbon, and Vestergaard 2011). Yet, far from a complete retreat of the state, some scholars see the use of private standards in combination with public or quasi-public regulation as an example of re-articulated regulation (Utting 2008; also see Ponte, Gibbon, and Vestergaard 2011). By re-articulated regulation, scholars mean that the food system is now governed by a wide range of actors (both human and non-human), including representatives of the state, the private sector and/or civil society. For example, whole sectors are now being governed through standards and these “standards mark a governance field characterized by a complex configuration of deregulation and different modes
Science and standards

of re-regulation. It is a political field that poses itself as de-politicized” (Ponte, Gibbon and Vestergaard, 2011, 289). More specifically, Giovannucci and Ponte (2005) argue that standards, particularly sustainability standards, are a new form of a social contract – where the relationship of the state to its citizenry is renegotiated, with NGOs and firms playing a larger role in defining the terms of the relationship.

Political economic approaches have long been critiqued in agrifood studies for their tendency to emphasize the structural to the detriment of local differences and forms of resistance (see Busch and Juska 1997). This can be seen in the case of standards where some studies have assumed “all powerful standards are meaningfully implemented at the local level” thereby “inculcated on to the local” (Ponte 2014, 263). However, we argue that scholars who utilize science studies, particularly Latour (2005), in combination with political economic approaches provide for a much more nuanced understanding of the power of standards. Political economic approaches highlight the power dynamics of standards that arise out of agrifood value chains and identify how these shape the actors that are included and excluded (Ponte 2014). Actor-network theory, which is best known for understanding how actors (human and non-human) interact through networks, affords the ability to identify how power is performed and enacted (Busch 2011; Latour 2005; Loconto 2010). These two theoretical frames when combined provide an additive effect in better understanding the role and impact of standards (Cheyns and Riisgaard 2014).

The three case studies taken up in this chapter all examine sustainability standards. Sustainability standards in agriculture are “flooding” the marketplace (Daviron and Vagneron 2011, 91). While historically standards allowed actors within the agricultural commodities market (e.g. producers, suppliers, and retailers) to agree upon and communicate a set of criteria upon which goods could be bought and sold at a distance, standards for the purposes of creating alternative goods, like organics, were created for a slightly different purpose. While the former focuses on product standards, which are observable qualities, like color and size, the later focuses on so-called process standards (Bingen and Busch 2006). These tend to be qualities that are not directly observable. In addition, many of the newer process standards created in the past 30 years have sought to reduce the commodification of agricultural goods, meaning the standards were put in place to create markets that valued more than simply the price of an agricultural product. These so-called alternative agricultural goods were created using process standards to recognize values such as non-exploitative labor relations, animal welfare, and production practices that do not harm the environment. These sustainability standards have coincided with the expansion of alternative agricultural movements, a broad array of initiatives and practices that are seen as challenging the status quo in our food system (Friedland 2010; Hinrichs and Eschleman 2014). However, as the number of sustainability standards has increased dramatically, it could be argued that these standards are being used to “re-commodify” alternative agricultural goods (Daviron and Vagneron 2011), meaning the market value of the product is driving much of the value chain. Of course, sustainability standards do not automatically denote an alternative agrifood standard and vice versa. For example, locally produced eggs may be part of an alternative food standard (e.g. “buy local”), but this standard is not necessarily a sustainability standard (e.g. local production practices may not qualify as environmentally sustainable).

While social studies of science have been important in drawing academic attention to standards as more than technical specifications, the three case studies in this chapter elaborate on the importance of retaining the analysis of power found in political economic approaches in the study of standards and standardization. The first case study focuses on the creation of agricultural sustainability standards in the United States. Specifically, two sustainability governance initiatives are evaluated for their degree of market embeddedness, revealing the ways in which standards, despite being technical recipes, are always reflections of particular
political and economic interests. The second case study expands upon this point, examining why the development of global sustainability beef standards cannot overcome local environments imbued with unique political and economic interests. Finally, once standards are set, the third case study explores how compliance with these standards is assured and the ways in which particular spheres of production and the people that populate these spheres attempt to resist and recreate standards to better fit their needs.

Sustainability metrics and standards for US agriculture

As alluded to earlier, there is a “green frenzy” taking place in which there is “a tooth-and-claw-competition among a growing pack of stakeholders, including environmental activists, think tanks, bloggers, industry associations, consultants … all clamoring to establish and impose their will on green standards” (Unruh and Ettenson 2010, 110). In agriculture, one place this green frenzy is playing out is in the battle over sustainability, with much of the effort to define and operationalize agricultural sustainability now taking place in private settings (Loconto and Fouilleux 2014). In the United States, there are many multi-stakeholder initiatives (MSIs) that have developed metrics and standards for sustainable agriculture. In this section, two of the leading initiatives – Field to Market and National Sustainable Agriculture Standard (LEO-4000) – are discussed.

Begun in 2006, Field to Market was the first agricultural sustainability MSI to emerge in the United States. It was initiated by a group of 12 agribusiness stakeholders and environmental advocacy organizations to develop technology-neutral, science-based metrics for commodity crops. Its membership has since grown to 66 members, with large agribusiness firms and grower associations accounting for a majority of the membership. To date, Field to Market has developed seven environmental metrics, which are land use, soil conservation, soil carbon, irrigation water use, energy use, greenhouse gas emissions, and water quality (Field to Market 2012). They have also developed an online software platform in which farmers can measure their performance using their environmental metrics.

LEO-4000 initially started as an effort by a certifying body, Scientific Certification Systems, to develop a sustainability standard for US agriculture. Recognizing that the standard would have greater legitimacy if developed through a multi-stakeholder process, Scientific Certification Systems transferred the draft standard to the Leonardo Academy, which is an American National Standards Institute (ANSI)-accredited standard development organization. Beginning in fall 2007, consistent with ANSI protocols, the Leonardo Academy advertised the impending standard development process. It then selected a standard development committee of 58 stakeholders, which included “commodity producers, specialty crop producers, agricultural product processors and distributors, food retailers, environmental, labor, and development organizations, NGOs, industry trade associations, government representatives, academics, regulatory officials and certifiers” (Leonardo Academy 2012). After multiple drafts, revisions, and public comment periods, ANSI approved LEO-4000 as the American National Standard for Agriculture. The standard is tiered with multiple levels of certification, applies to all crop agriculture, and includes principles and metrics on social, economic, and environmental sustainability (Leonardo Academy 2013).

Comparing the two initiatives, Field to Market has developed a set of eco-efficiency metrics, that do not threaten the current structure of the food and agriculture marketplace. In contrast, LEO-4000 has developed a standard that, if implemented at the platinum level, would result in significant changes in agricultural practices and thus, threatens to upset the current agrifood marketplace. In brief, LEO-4000 has produced a standard whose objective is transform the current unsustainable practices of agriculture, whereas Field to Market has produced a set of metrics that
seek to improve the sustainability of agricultural practices without disrupting the marketplace for food and agriculture. In part, the differences in these two initiatives are an outcome of the different ways each of these initiatives are embedded in the food and agriculture marketplace.

While LEO-4000 initially did include representation of stakeholders from conventional agriculture, following the third annual meeting of the standard committee, in which a series of votes on the principles of the standard largely went against the interests of agribusiness, many of the representatives from conventional agriculture resigned. In a public statement they claimed that “the committee is dominated by environmental groups, certification consultants, agro-ecology and organic farming proponents. These groups have neither the vision nor desire to speak for mainstream agriculture and the 95 percent of farmers who will be materially affected by any resulting standard” (Williams et al. 2010). The resignation of many stakeholders from conventional agriculture tilted the committee towards stakeholders from alternative agriculture and civil society organizations. Reflecting the views of remaining members, the result is a stringent standard that categorizes much of existing agriculture as unsustainable.

Whereas the membership of LEO-4000 was selected to be representative of all stakeholders interested in food and agriculture, the membership of Field to Market has been strategically constructed along much narrower lines. Stakeholders from conventional agriculture constitute the overwhelmingly majority of the membership. In 2012 when it released its second report outlining its metrics, 31 of the 44 members were either grower associations, or companies or organizations associated with the input, processing, or retailing industries. The result is that a majority of Field to Market’s membership benefits from current market arrangements. Furthermore, the environmental advocacy organizations that are part Field to Market, such as the World Wildlife Fund and Environmental Defense, have a history of working cooperatively with industry. Thus, they have tended to utilize approaches that work within current market structures and practices to solve environmental problems (Dowie 1997). The outcome is a set of quantitative metrics that focus largely on eco-efficiencies and do not specify what sustainable agriculture actually entails or set sustainability benchmarks.

The cases of LEO-4000 and Field to Market also indicate that the market embeddedness of governance initiatives may affect the implementation of metrics and standards. Despite being approved by ANSI as the national sustainability standard for US agriculture, the LEO-4000 standard is unlikely to be widely adopted at this time. Contestation of LEO-4000 by stakeholders from conventional agriculture has resulted in little support for the standard from many of the dominant companies in the agrifood marketplace. As noted by stakeholders from conventional agriculture, it appears that it will be a “niche” standard at best in the near future. In contrast, given the widespread support of Field to Market by agribusiness companies and grower associations, Field to Market’s metrics are likely to see significant adoption. This is because, as they have done with other standards, actors such as Walmart and Kellogg can use their power in supply chains to encourage or require producers to use Field to Market’s metrics.

The above analysis illustrates some of the ways that the development and adoption of metrics and standards are embedded in political economies. Thus, while metrics and standards are often understood as technical recipes they also reflect specific political and economic interests. In the case of sustainability metrics and standards for US agriculture, the above case studies demonstrate that lead market actors can use their power and resources to channel metrics towards more conservative options that do not threaten political economic arrangements, and de-legitimate metrics and standards that may be counter to their interests. Additionally, given that there are often multiple standards competing with each other, standards are increasingly understood as market goods. Hence, as the case of sustainability standards in the US indicates, market actors can use their power and resources to both facilitate and hinder the adoption of specific metrics and standards.
Global sustainable beef production and Southern Africa

There is a new global sustainable beef initiative being organized by the private sector, both industry and non-governmental organizations, that seeks to reduce the environmental harms caused by beef production. The initiative, the Global Roundtable on Sustainable Beef (GRSB), focuses on multiple regions of the world, including Southern Africa. The GRSB mission is “to advance continuous improvement in sustainability of the global beef value chain through leadership, science and multi-stakeholder engagement and collaboration” (GRSB n.d.), and to date the group has developed a set of five principles, with each principle having four to nine criteria, which are “a set of conditions or processes by which a system characteristics can be evaluated” (GRSB Annual Report 2014, 15). For example, principle one states that the “global beef value chain manages natural resources responsibly and enhances ecosystem health”, after which there are nine criteria, which include, for instance, “practices are implemented to improve air quality” (ibid., 19).

To date, the GRSB has deliberately avoided developing more context-specific levels of indicators, metrics or practices. Instead the GRSB intends to work with national and regional groups to ensure that the more context-specific indicators, metrics and practices that are developed will fit into the overarching principles and criteria of GRSB. As with all standards development, the development of context-specific indicators, metrics and practices, is highly dependent upon who participates. This process is especially complicated in regions of the world that have heterogeneous producers and production systems, like that of Southern Africa.

There is a long history of dual agricultural systems in South Africa and Namibia, where there is a small percentage of well-developed, primarily white farmer-owned farms and a much larger percentage of the population who are primarily indigenous smallholders and largely subsistence farmers. The dual economies found within the agricultural sector are directly linked to past colonial and apartheid policies, which among other things included removal of indigenous people from the majority of agricultural lands, and policies that “encouraged” indigenous populations to seek work in formal, white-controlled, labor markets (see Ransom 2015). The vast majority of cattle in Southern Africa is owned by smallholders, but for a variety of reasons many of these cattle are not sold in the formal marketplace. Over the past decade, smallholders have been the target of numerous development projects that seek to formalize smallholders’ production systems and bring these cattle into the marketplace, and this includes current efforts on the part of Solidaridad and the World Wildlife Fund, two of the founding members of GRSB. These two founding members, in addition to Walmart, have also been founding members of two of the first “roundtable” initiatives, the Roundtable on Sustainable Palm Oil (RSPO) and the Roundtable on Responsible Soy (RTRS). This is important, because as with the previous case study of Field to Market, this suggests a certain degree of market embeddedness of GRSB. Other founding members of GRSB include: Cargill, Elanco, JBS, McDonald’s, and Merck Animal Health.

Based on analysis of the two previous roundtables along with several other sustainability councils, the academic literature suggests several things about the future development and outcomes of GRSB (Ponte 2014; Schouten et al. 2012). First, GRSB is likely to have a market impact, as some of the biggest purchasers of beef are involved in its founding. Yet, the final indicators, metrics or practices are not likely to represent a wide range of producers’ interests, especially smallholders. Rather, these standards will most likely represent the largest, most industrialized and well-capitalized farming operations, especially feedlots, which in South Africa produce over 70 percent of all beef consumed in the marketplace. Second, in general, roundtables are not highly inclusive (Schouten et al. 2012). In the case of GRSB, industry
represents 50 percent of all voting members, and producer groups are primarily national organizations that tend to represent the interest of the larger, most industrialized farmers. Governments and governmental agencies are limited to observer status. While GRSB is more global in representation than previous roundtables, the geographical representation remains fairly lopsided, with only a few members who have any ties to Southern Africa and no membership affiliation for Asia. Finally, GRSB is likely to be similar to other roundtables in that roundtables exclude radical solutions, opting for pragmatic solutions to environmental problems (Schouten et al. 2012).

There is also another problem regarding the GRSB’s approach to sustainability. Despite the group or collective dynamic of MSIs, the standards (indicators, metrics or practices) that get promulgated from these groups largely focus on individual farmers’ responsiveness. In other words, standards tend to privilege individual farmers, as opposed to the collective identity of farmers (e.g. smallholders versus feedlots) (Blowfield et al. 2008). While GRSB at least in theory recognizes the need to allow sustainability criteria to be developed to fit local circumstances, the target of the standards remains individual producers. Therefore, despite organizations like Solidaridad acknowledging the unique circumstances and challenges facing smallholders in Southern Africa, the goal within sustainability standards is to work to change individual smallholders, as opposed to working to change the structure within which smallholders operate. In summary, as this case shows, political economic approaches to standards bring into focus specific power relations unique to local spaces, even as the goal of standards is to transform the particular into a global commodity that eclipses the local.

Providing participatory guarantees for standards

Another important component of the political economy of standards revolves around the means through which compliance with standards is assured. The notion of compliance is a term that comes from a rules-based approach to standards whereby rule-makers establish the rules, rule-takers comply with these rules, and specific actors are authorized to ensure compliance (Mattli and Buthe, 2003). The separation of these roles into independent and ‘objective’ organizations is the hallmark of the tri-partite standards regime (TSR), which is the dominant governance model in the global political economy of standards (Hatanaka and Busch, 2008; Hatanaka et al., 2012; Loconto and Busch, 2010; Loconto et al., 2012).

While third-party certification dominates in the political economy of standards, alternatives, such as the participatory guarantee system (PGS), are growing in use. PGS is a recent re-emergence and rethinking of the original second-party certification model that was used in organic farming in the 1970s in the US, France, Japan and Brazil. These pioneers felt that in order to be in line with the environmental ethics of organic farming, the expertise of the farmer who knows the land was the most trustworthy (cf. Freyer and Bingen, 2014). This approach to certification began to erode in the 1980s as organic farming became integrated into national legislations and international trade systems (Fouilleux and Loconto, 2016). In developing countries, PGS reemerged over the past 10–15 years in organic farming in response to protestations against the dominant paradigm of standard-setting by corporate and Northern NGO actors. Third-party certification systems were seen as too costly for many small-scale producers and not applicable to local agro-ecological and socio-technical conditions.2

The contemporary PGSs are networks created within local communities and consist of farmers, experts, public sector officials, food service agents, and consumers. “They certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange” (IFOAM, 2016). PGSs serve to provide a direct...
guarantee, through the formation of a local market, for sustainably produced food and agriculture products. In Bolivia, Peru and Brazil we see the state re-entering the TSR through the certification window and not only as standards-setters. In these cases, government officials are involved in the guarantee committees that are set up for each PGS at the municipal level. Here the public actors are involved not only in providing extension services to farmers, but they also act as a member of the PGS.

An internationally supported PGS governance framework was first established in a workshop in Latin America in 2004, where international non-governmental actors (e.g. IFOAM, the Latin American Organic Agriculture Movement, Centro Ecologico in Torres, Rio Grande do Sul in Brazil, FAO) convened to develop a “Shared Vision and Shared Ideals” for PGSs around the world. This shared vision contests the ‘detached’ compliance approach of third-party certification, which focuses their governance efforts on mechanisms of ‘social control’.

In stark contrast to existing certification programs that start with the idea that farmers must prove they are in compliance to be certified, PGS programs use an integrity based approach that starts with a foundation of trust. It builds from there with an unparalleled transparency and openness, maintained in an environment that minimizes hierarchies and administrative levels.

(Källander, 2008, 7)

However, PGSs have only become a priority for the International Federation of Organic Agriculture Movements (IFOAM) advocacy at the international level since 2009 (IFOAM, 2014), after many years mainly focused on harmonization of standards and on third-party certification. PGSs pose a clear alternative to the dominant model of third-party certification as they are now legally recognized by an increasing number of national regulations. As of 2015, there were 123 functioning PGS initiatives and another 110 under development. These PGSs are spread over 72 countries, are endorsed by the state in Bolivia, Brazil, and India, and are being adapted to local contexts by hundreds of thousands of farmers on all continents. However, they are being promoted only for domestic or local markets and rely upon direct sales and short value chains. The main importers of organic products from developed countries still refuse to recognize them as credible systems of control, partly because of the legal structures that require third-party certification, partly because of concerns over conflicts of interest in PGSs, and also because of the dominance of the economic power of the organizations that promote TSRs (Fouilleux and Loconto, 2016).

PGSs challenge the dominant political economy of standards by democratizing knowledge in the oversight systems for compliance with standards among producers, experts and consumers who collectively ensure that the techniques are adopted (IFOAM 2016). This process is exemplified by the case of the Familia de la Tierra³ (FdT) network in the Bogotá region of Colombia. This group is instituting an interesting approach to resolving tensions between traditional and expert knowledge in the development and enforcement of standards through their PGS.

Before the creation of the FdT network in 2009, the 35 peasant farmers were not able to sell their agro-ecological products or would be forced to sell them as conventional products through the black market (as commercial production was not authorized in the peri-urban area of Bogotá). When this group of families began to collectively sell their native and traditional foods, they were met with stiff resistance from organic shops, restaurants and consumers in general, who did not trust that the products were indeed agro-ecological. A strong network between consumers in the city and producers in the peri-urban region was missing and knowledge about
the capacities and interests of both groups was non-existent. FdT took this up as a means to rethink its food system model (Nieto, 2016: 88).

They overhauled the linearity of the ‘value chain’ to create a cyclical paradigm for production and consumption. This began with FdT members nourishing the soil with micro-organisms and natural enzymes; they then began to produce their own seed (mostly native and creole varieties); third, they became the owners and producers of their own inputs; they learned to process food, design its packaging and market it, all as one collaborative, simultaneous and complementary unit. To close the cycle, not only did the organic waste need to be returned to the soil in terms of composting, but the final consumer had to be reconnected with the land, seed and food. FdT members did this with a locally adapted PGS that allowed them to develop a different kind of trading relationship with consumers and created empathy that cemented ties with responsible consumers. The certification process conducted on the farms of the FdT network includes the collection of socio-economic and environmental information about the farms, diagnosis by ‘coffee filter’ soil chromatography, visits by consumers and the delivery of certificates to the farms based on the approval of the network, which includes 18 restaurants, seven eco-shops and a responsible consumption network (Nieto, 2016).

There are a few key elements that make this PGS unique and well adapted to the local environment: first, the reproduction, saving and use of native seeds by farmers is the foundation of the certification. Second, the integration of farmer expertise as a form of social control empowers farmers to maintain their own expertise, and the use of a simple chromatographic analysis using coffee paper enables non-scientists (consumers, producers, intermediaries) to test the soil for pollutants and provides an independent measure of control. Finally, the collaboration between the urban and periphery families has had positive effects on the families and on their ability to mobilize others in the area as a number of changes have been occurring in the political economy of the city. Given concerns over the Bogotá watershed, the FdT network was effective in negotiating an agreement whereby the peasants living in the peri-urban area were given the right to farm – only if they practiced agro-ecological production – as a means to protect and improve the quality of water that entered into the urban area. This was possible only because of the horizontal alliances that the network made through their focus on the local market and the use of a locally bounded certification tool – rather than a positioning towards an export market and the independent authority of third-party certification.

**Conclusion**

Latour (1987) helps us best to understand that standards are fundamentally about acting at a distance, in that they are created to facilitate transactions between actors in distant locations. Yet, in the cases of the sustainable beef initiative and PGS, efforts are underway to develop standards that are sensitive to local heterogeneity. A political economic analysis of standards enables us to see that in the case of sustainable beef, even if GRSB is successful in creating standards sensitive to heterogeneity, the types of heterogeneity captured in the standards are not likely to be representative of all the local producers, but rather those producers with market power. Moreover, regardless of the standards that are developed, they will require individual producers to conform, without regard to the unique challenges the groups of smallholders experience in terms of access to markets in Southern Africa. In contrast, PGS provide an example of actors completely opting out of the dominant market standards and their accompanying audits and certification. Instead, actors have opted to recreate standards that better fit their own value chains and to build alternative markets and, in doing so, they have also opted to reintroduce and privilege their own experiential knowledge as farmers, retailers and
consumers. This, however, does have costs as the PGS actors are excluded from mainstream markets because of powerful political economic actors who do not trust the certification mechanism. Similarly, the case study in the United States alerts us to the ways in which market embeddedness can blunt the impact of efforts to create sustainability in agriculture. All three cases reveal that the more embedded sustainability standards are in the dominant market structure, the more conservative the standards tend to be in disrupting the status quo, which in this case are unsustainable practices in the global agrifood system.

We observe that all three case studies highlight the pursuit of sustainability standards that are backed by scientific criteria, as appeals to scientific criteria help to establish and maintain credibility (Bain, Ransom and Worosz 2010). However, which scientific criteria are utilized and for what purposes is strategic, in that appeals to scientific criteria can also prevent political debates. For example, appealing to a narrowly defined problem of identifying practices that improve air quality within sustainable beef standards precludes debate over the broader topic of the types of production systems that are better for the environment, including the air. Similarly, PGS and LEO-4000 are evidence that not all scientific knowledge is accepted equally or openly. Rather, scientific knowledge that challenges the dominant market structures tends to be marginalized or completely blocked from consideration in the marketplace. In the case of PGS, we also see that more accessible forms of knowledge, such as experiential knowledge, are discounted in favor of what is deemed more scientifically rigorous knowledge. Utilizing scientific knowledge that is certified by special equipment and trained experts is also a mechanism for maintaining the legitimacy of a specific set of standards.

Research utilizing social studies of science approaches bring into focus how non-human actors like standards are enrolled and can enact power in global value chains. Political economic approaches call our attention to institutional structures that shape the day-to-day lives of people. When combined, these two perspectives accentuate the fluidity of power in the formation, implementation and outcomes of standards. The results are far from fixed, but they are also not infinitely flexible. This is why, despite the growth of standards, social science research must continue to examine the consequences of a wide range of standards within specific social contexts (Timmermans and Epstein 2010). Such analysis is true for all types of standards, whether in the field of education, medicine, or global agrifood systems.

Notes
1 The United Nations defines Southern Africa as consisting of five countries: Botswana, Lesotho, Namibia, South Africa, and Swaziland. The bulk of this discussion directly pertains to primarily Botswana, Namibia, and South Africa, although there could be long-term relevance for Lesotho and Swaziland.
2 Interview with IFOAM president, February 20, 2014.
3 Family of the Earth.
4 This is a simple technique whereby farmers can use coffee filters to determine the mineral and microflora content of the soil in order to determine whether or not synthetic inputs have been used.

References
Science and standards


