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From Fishery to Fork: Food Safety and Sustainability in the 'Virtual' Knowledge-Based Bio-Economy (KBBE)

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ABSTRACT

In scientific and policy circles, the 'Knowledge-Based Bio-Economy' (KBBE) is seen as the way forward to increase productivity and competitiveness and to improve quality of life in the EU. The critical literature, however, sees KBBE as a self-fulfilling prophecy, a dominant master narrative that marginalizes other interpretations and policy options. In other words, the literature argues that KBBE is performative – it is a prescriptive model that effectively enacts itself. In this article, I contribute to this debate and argue that some aspects of KBBE actually constitute *failures* of performativity. In the realm of food safety, the appearance of having a system in place which functions 'as if' it followed regulation on food safety is what counts for good performance when systems are evaluated for conformity with EU rules. Little attention is paid to actual practices on the ground or the outcomes of such functioning systems. In fishery ecolabels, matching systemic compliance is more important than fulfilling the original objective of achieving sustainability. In this context, KBBE becomes a virtual abstraction, where processes and procedures become more important than outcomes, and where appearing to succeed is more important than succeeding. While appearing to match food safety procedures and ecolabelling requirements does have substantive outcomes, these do not necessarily come along the lines of the official rationales and can have negative consequences – fish stocks are at critically low levels in both locations covered in the case studies.

KEY WORDS: Knowledge-Based Bio-Economy (KBBE), food safety, sustainability, performativity, virtualism

Introduction

The concept of 'knowledge-based economy' (KBE) has been used in EU policy circles repeatedly in the last 10-15 years, but especially following the 2000 Lisbon summit of the EU Council. Reference to KBE goes back at least to the 1993 White Paper on growth, competitiveness and employment (EC, 1993), which set the strategic objective of increasing the knowledge-base of European economies (see Burfitt *et al.*, 2006, p. 7). At the 2000 Lisbon Summit, the EU unveiled an agenda of reforms aiming at turning the EU into 'the most competitive knowledge-based economy in the world by 2010' (European Commission, 2008). This led to the development of a master narrative in the EU based on technological change, on the creation and exploitation of knowledge, and on innovation. Within this larger framework, a more specific narrative has also emerged, one referring to developments and policy directions in the area of food, agriculture, fisheries and biotechnology, also known as the 'Knowledge-Based Bio-Economy' (KBBE).

According to the Commission, the term bio-economy 'includes all industries and economic sectors that produce, manage and otherwise exploit biological resources [and has] an approximate market side of over €1.5 trillion, employing more than 22 million people' (DG Research, 2007). KBBE was the topic of two major conferences, one under the Commission's Sixth Framework Programme (CEC, 2005) and one linked to the 2007 German Presidency (German Presidency, 2007). KBBE also features prominently in the Seventh Framework Programme and is the pillar of specific EU initiatives such as

Biofuel directives, the Biomass Action Plan, the Environmental Technology Action Plan and various Technology Platforms.

The EU's Seventh Framework Programme states that 'the KBBE will play an important role in a global economy, where knowledge is the best way to increase productivity and competitiveness and improve our quality of life, while protecting our environment and social model' (DG Research, 2007). The same document states that 'KBBE addresses the following needs: growing demand for safer, healthier, higher quality food; sustainable use and production of renewable bio-resources; increasing risk of epizootic and zoonotic diseases and food related disorders; sustainability and security of agricultural, aquaculture and fisheries production; increasing demand for high quality food, taking into account animal welfare and rural and coastal contexts and response to specific dietary needs of consumers' (DG Research, 2007).

Elsewhere, the EC states that 'without the rapid progress in the life sciences and biotechnology we have experienced, the knowledge-based bio-economy (KBBE) would not be possible. Indeed, few areas match the bio-sector for the breathtaking speed at which it is advancing . . . Unlocking Europe's huge potential in the KBBE requires a coherent long-term vision and consensus. It also requires proactive action on the scientific, economic and political fronts' (DG Research, 2008).

But how will the 'potential' of KBBE translate into 'benefits' for European economies and citizens? How will these benefits be measured? How will possible failures be

justified or addressed? In order to understand how these questions are likely to be answered, it is necessary to look into areas where 'knowledge-based systems' of biological management have been operational already. Two of these areas are food safety and fisheries management. How is knowledge used and managed in these areas? What consequences do such management systems have on 'outcomes' such as ensuring food safety and the sustainability of resources such as fisheries? How are possible failures addressed?

A substantial literature has emerged on KBE in recent years (see, among others, Foray & Lundvall, 1996; Godin, 2006; Jessop, 2005) and a related, smaller one, on KBBE (Benner & Lofgren, 2007; Birch, 2006; 2007; CEC, 2005; OECD, 2006). In both cases, the focus of analysis has been predominantly on the *productive* potential of knowledge, technology, science and innovation. However, the EC has also highlighted that KBBE provides 'opportunities and challenges beyond growth and employment', namely in 'secur[ing] a sustainable agriculture and fisheries production … [and in serving] public health through safer, healthier and higher quality foods' (DG Research, 2008). In this context, this article explores two KBBE-related fields that pertain to biological processes of control and management, rather than production per se: (1) food safety procedures on imports of fishery products into the EU; and (2) the 'sustainability' of resource extraction through fish ecolabelling. In both cases, I compare claims that food safety and sustainability management are based on scientific knowledge and proper systemic functioning with actual practices, and argue that KBBE becomes a virtual abstraction,

where processes and procedures become more important than outcomes, and where appearing to succeed is more important than succeeding.

Performativity and Virtualism

KBE and KBBE have been represented in the critical literature as self-fulfilling prophecies and/or as dominant master narratives that marginalize other interpretations and policy options (Felt, 2007), therefore empowering some interests over others (Burfitt et al., 2006). In other words, KBBE is considered to be performative – a prescriptive model that effectively enacts itself. However, even within this performative framework, some concepts are performed at the expense of others – that is, they are translated into practices that in turn make concepts more thinkable and feasible. This entails that specific forms of knowledge, science and expertise are enrolled in a project of representation of KBBE that ends up shaping 'reality' in its own image. The case studies examined below elaborate and complement on these perspectives suggesting that several aspects of what is portrayed in the mainstream as a 'properly' managed bio-economy – ideally based on quality and risk management procedures, systemic performance checks, and decision-making based on 'impartial' expertise and value-free science – may not fit with actual practices. These case studies suggest that there are instances of *failure* of performativity in KBBE that should also be considered as important on their own (Birch, 2007). In this context, it is useful to see some aspects of KBBE as virtual abstractions (Miller, 1998), where processes and procedures become more important than outcomes such as ensuring

food safety or sustainability, and where appearing to succeed is more important than succeeding. Particular performances (such as form-filling) are carried out at the cost of others (actually carrying out inspections).

Economic sociology debates on performativity that have developed over the last decade or so provide an appropriate guiding tool for the discussion of bio-economic management – particularly Callon's (and related) work arguing that the abstract representations of economics and by economists shape reality (Callon, 1998a; 1998b; 2002; 2007). While Callon applies his argument mainly to representations provided by mainstream economics/economists, Busch has extended such claim to 'Supply Chain Management', claiming that SCM's prescriptive elements are in fact partially displacing (or at least overlapping with) those coming from neo-classical economics (Busch, 2007). Busch states that SCM 'arose out of certain practices and has been gradually theorized, refined, clarified, and recast as a set of strategies for performing the economy' (ibid., p. 441). In other words, SCM as a model (itself a reflection of existing or forming practices) is increasingly shaping the working of the economy in its image.

Similarly, but applied to other fields, Power (1997), Strathern (2000) and MacKenzie (2004; 2006; MacKenzie et al. 2007) have argued that auditors, management consultants and financial analysts are increasingly able to transform the world into closer approximations of their abstract models. Current interpretations of KBBE seem to toe the line of this set of arguments: normative representations of KBBE in scientific conference

and EU policy circles pave the way for indeed 'creating' a KBBE (or at least some aspects of it) in its own image; thus, KBBE is an instance of performativity.

Yet, others have questioned whether representations of economic management actually change practices. Miller (1998; 2002; see also Birch, 2007; Carrier, 1998; Holm, 2007), in particular, has accused Callon of mistaking a representation of economic life for its practice. In his theory of 'virtualism' Miller argues that 'the virtualist institutions of economists, audit and management consultants all create a culture of audit and assessment that *has to pretend* that economic action consists of creating frames within which market like transactions can be constructed … [If anything] actual economic agents are trying to keep the market as an externality, outside the frame of transaction' (Miller, 2002, pp. 230-1; emphasis added).

Eventually, the difference between performativity and virtualism may rest on empirical grounds rather than on theory. This is signalled strongly by MacKenzie's latest work (2007a; 2007b), which explicitly distinguishes between 'generic performativity' and 'effective performativity', and highlights the material and pragmatic elements of what he calls 'the production of virtuality' (MacKenzie, 2007b). A similar pragmatist turn is also signalled by Muniesa (2007) – one of Callon's collaborators.

For MacKenzie, generic performativity is what Callon calls simply 'performativity', for example, when an aspect of economics, such as 'a procedure, a model, a theory, a data set' (2007a: 60) is used in practice. 'Effective performativity' is the ability to make a

difference through abstract representation. It happens when, for example, an aspect of economics is 'used in a way that has effects in the economic processes in question . . . The incorporation of the aspect of economics into the collective calculation devices *must make a difference*' (Ibid.; original emphasis).

McKenzie provides a convincing example of 'effective performativity' in his analysis of the Black-Scholes-Merton's model of option trading. As the use of the model spread in the 1970s, the discrepancies between the abstract model and the empirical observations of actual market behaviour diminished, even though some external factors helped this trend in the 1980s (for example, technological change brought transaction costs down, thus bringing them closer to one of the model's assumptions). At the same time, MacKenzie also shows that effective performativity is historically contingent. The 1987 stock market crash, possibly exacerbated by the rise of portfolio insurance (another application of option pricing theory), led to empirical patterns of option prices that no longer follow the Barnes-Scholes-Merton model.

While examining the historical contingencies of effective performativity is an intriguing analytical direction, Birch (2007) argues that more attention needs to be paid also to *the failures* of performativity. In recent work, this has been done in at least two realms. In an analysis of three decades of narratives and practices of supply chain management (referred to as 'purchasing'), Gibbon and Ponte (2008) show that purchasing managers (those who 'apply' SCM in practice) were able to change (some people's) representations, but did not seem to be able to radically transform corporate practice in

the US manufacturing sector. This contradicts Busch's (2007) representation of SCM as performative. Furthermore, they argue that corporate practice was never really properly measured, and when measured, the results did not fit expectations. This led to calls by purchasing managers for better measurement devices and/or further instigation to corporate managers to transform abstract models into reality. Paraphrasing MacKenzie, purchasing managers are trying to transform SCM performativity from generic to effective, so far without too much success.

Similarly, Birch (2007), in his analysis of the UK biotechnology industry, concludes that the 'biotech cluster' is a virtual abstraction of place. Birch argues that the cluster abstraction is built upon the identification of territorial innovation processes, which provides firms with an institutional identity even through they appear to be more tied to national and global knowledge networks than clusters. But Birch takes the criticism of performativity two steps further: (1) he highlights that the theory of performativity can not fail: 'everything can be seen as performance and therefore everything is performative, which means that nothing ever fails to perform and therefore nothing ever fails to be performative … [P]erformativity can only explain that which exists, but it cannot explain that which attempted to exist and 'failed' to do so' (Birch, 2007, pp. 91-92); and (2) he argues that examining the failure of performativity is important, because such failure 'can still produce economic practices in contrast to the claim that it is because economics 'works' that it is performative … [It is] through this very failure that we learn, adapt and change' (Birch, 2007, pp. 92, 84). In the rest of this article, I further explore a similar analytical direction.

From Boat to Plate: The 'Virtuality' of Food Safety and Sustainability

Ensuring food safety

Following the food scares of the 1990s, one of the most important political objectives of EU regulation has been ensuring food safety for EU consumers. Part of this effort has been directed towards requiring the EU-equivalence of food safety management systems in countries that export (or that seek to export) foodstuff to the EU. In a separate study, I analyze how the fish export industry in Uganda was transformed in the context of the so-called knowledge-based tightening of food safety standards for fishery (and other agro-food) imports into the EU (Ponte, 2007). While this is not the place to rehash the details of the case study, I suggest that its results speak to current discussions of KBBE, not directly to the mainstream (and normative) reading of KBBE as a vector for creating value out of biological innovation, but rather in terms of highlighting the limitations of managing a bio-economy. I also highlight that KBBE is likely to find its continuing legitimacy on the basis of measuring success in terms of matching 'systemic performance' objectives rather than outcomes.

Uganda's fish export industry started to operate in the late 1980s and early 1990s, registering impressive growth. From an export value of just over one million US$ in 1990, fish exports had earned the country over 45 million US$ just six years later. However, from 1997 to 2000, the industry experienced EU import bans that were

justified on the basis of 'fish safety failures'. Despite claims that the bans were based on scientific knowledge, the EU did not provide laboratory-based proof that fish was actually 'unsafe'. Rather, the poor performance of Uganda's regulatory and monitoring 'system' was used as a justification to impose the bans. Only by fixing 'the system' (of regulations and inspections) did the Ugandan industry regain its status as a 'safe' source of fish (ibid.).

Uganda's 'competent authority' worked very closely with fish exporters/processors to regain access to the EU market during the export bans of the late 1990s. Along the way, it developed a much more open attitude towards the commercial interests of the industry. In practice, it has sought to match objectives that are often in contrast with each other. First, the authority needs to facilitate efficient logistics *and* food safety. This means that the results of some product tests are available only after a shipment has been sent to Europe. Although a recall system is in place, commercial realities suggest that possible problems are solved contractually between seller and buyer, rather than by the EU authorities seizing consignments. Second, the Ugandan authority is asked to facilitate the matching of market demand (maximization of volume) *and* to preserve the resource ('sustainable' extraction, ban on catching and trading small fish), all in an environment of limited scientific information on stocks and especially on eco-system dynamics. These shortcomings, rather than being recognized, are masked behind increasingly complex documentation and procedural systems, where matching processes can distract attention from the failure of matching outcomes.

The schizophrenic exercises and compliance systems that the Ugandan authority had to put in place entail that at least some food safety-related operations are by necessity carried out as 'rituals of verification', as Power (1997) would have it. Fish safety management and traceability systems are in practice applied to only half of the Ugandan value chain – from selected landing sites to export. Even within this half of the value chain, cracks and inconsistencies abound. The quality of landing site inspections is uneven. The export quality assurance system is run on price adjustments, not seizure of consignments. While this is a reasonable development in view of previous experiences of Uganda with EU food safety authorities, it defies the principle of risk minimization upon which food safety regulation is based. This situation is not particularly 'African' per se – according to operators familiar with food safety procedures in some European fisheries – it reflects what happens within European boundaries as well (Ponte, 2007).

Busch & Tanaka (1996) have aptly described standards (including those erected by the EU on imports on the basis of assuring food safety) as instruments that are used to subject people and nature to 'rites of passage' in order to assess their 'goodness'. The different kinds of tests that come together with these rites have different consequences for behaviour and different effects on how power and status are (re)distributed among actors (both human and non-human). Tests (and associated standards) 'create, maintain, and change [commodities, while at the same time] monitor, control, and organize the behaviour of each of the actors' (ibid., p. 23). This approach, however, assumes that observed changes in behaviour 'make a difference' in actual practices (MacKenzie 2007a), as opposed to being virtual constructions that appear to match normative

expectations but in essence do not. Having a documentation system that certifies boat-level inspections, for example, is not the same as actually carrying out such inspections (they almost never are). The former without the latter entails a food safety management that is a virtual abstraction, not an instance of performativity. I will come back to this aspect in the conclusion.

For the time being, suffice it to say that the case study on food safety highlights how quality management systems provide a pretence of 'objectivity'; EU regulation changes often but is presented each time as a coherent, complete whole (Busch, 2000); and a system is put in place that is supposed to cover everything from boat to plate, while large chunks of it exist only on paper. Such a combination provides an aura of scientificity and proper systemic and risk management within the imagined European KBBE, a virtual food safety system that can be presented to an audience of regulators, politicians and consumers.

Achieving sustainability via ecolabelling

Wild fish stocks are self-renewing, but their capacity to do so depends on leaving enough fish in the sea to regenerate the stocks in subsequent years. In the last couple of decades, the Food and Agriculture Organization (FAO) and conservation groups have repeatedly highlighted the plight of over-exploitation of fish stocks around the world, and the impact of intensive fishing efforts on the overall aquatic environment. To address these challenges, several fishery management systems have been devised, such as: legal

instruments, including global conventions and national/local fisheries laws; soft instruments, such as the FAO Code of Conduct for Responsible Fisheries; and market and civil society initiatives, such as the ISO 14000 series of standards and the Marine Stewardship Council (MSC) label (Allison, 2001; Gardiner *et al*., 2004; Wessells *et al.*, 2001).

Eco-labeled fishery products are a small but fast growing segment of the fish industry. Their rise relates not only to growing concern with environmental issues, but also to increased competition in the retail sector, thus the search for additional properties in products to add profitability and/or market share. The history of voluntary labels before the advent of the MSC initiative was limited to two single-issue labels (neither of which was third-party certified), aiming at reducing by-catch of dolphin in tuna fishing (Bonanno & Constance, 1996) and of turtles in shrimp fishing. In both cases, the main issue was not one of over-fishing and over-capacity, but one of animal rights and the protection of endangered species (Allison, 2001).

MSC is the main independent third-party certified ecolabel that covers wild-catch fisheries (other fishery ecolabels have been developed in the last few years, such as Fairfish, Friends of the Sea, and by Naturland; but these have a much smaller and more selective market coverage than MSC). It was established in 1996 as a joint initiative of the World Wildlife Fund for Nature (WWF), the world's largest private non-profit organization, and Unilever, at the time the world's largest frozen fish buyer and processor. MSC became an independent initiative in 1999. The idea behind MSC is to

address world-wide decline in fish stocks by awarding sustainably-managed fisheries with a certification based on scientific criteria and a label that could be affixed to retail products.

MSC certification partly depends upon a chain of custody system that keeps 'sustainable' and 'other' fish separate from each other from catch to supermarket shelf or ice display. MSC allows, via its logo, consumers to promote sustainable fishing through a market-based (rather than regulation-based) mechanism by choosing the labelled product over the unlabeled product (Jaffry *et al.*, 2004). Certification is granted against a specific standard called the 'Principles and Criteria for Sustainable Fishing'. Assessment is carried out on a voluntary basis by accredited third-party certification bodies. The MSC standard is based on three principles, which are elaborated by a number of criteria:

1. *The status of the target fish stock*

   'A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery'.
2. *Impact of the fishery on the eco-system*

   'Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem … on which the fishery depends'.
3. *Performance of the fishery management system*

   'The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational

> frameworks that require use of the resource to be responsible and sustainable' (MSC, 2004, pp. 14-16).

At the catch level, certification is awarded to a 'fishery', not to individual operators. Individual operators in the trade, processing and retail sectors can apply for chain of custody certification and for the use of the MSC logo. Certification of fisheries and chain of custody is carried out by independent bodies that are accredited by the MSC Accreditation Committee. Certification of the fishery is knowledge- and systems-intensive and begins with a confidential pre-assessment by a certification body for a client or client group. If the results of the pre-assessment are such that the client decides to go ahead with a full scientific assessment, the certification body appoints an 'expert team'. This team develops performance indicators and scoring guide-points. The fishery is then scored against these indicators, which are aggregated to obtain a score for each of the three principles. Depending on the score, a fishery can be: rejected; asked to fulfil some pre-conditions before obtaining certification; certified with conditions that need to be addressed within a certain period; or certified with no conditions. Certified fisheries are subject to annual audits. After five years, they must be reassessed before continuing certification for five more years.

As of early 2009, MSC had certified 38 fisheries worldwide with many more in the pipeline. MSC certified products are an increasingly visible and important segment of fish retail, especially in countries such as the UK and Switzerland, but also in the US. Among these fisheries is South African hake, one of the most important 'white fish' species imported into Europe. MSC certification for this fishery was obtained in 2004. In

a separate article (Ponte, 2008), I show how certification in South Africa was sought in an environment of competition against other hake/hoki supplier countries to Northern fish importers and processors (especially Unilever), of internal divisions within the South African hake industry (between the trawling and long-lining sectors), and of fears of further quota losses due a post-apartheid, government-engineered attempt to 'transform' industrial fisheries. Contrary to what MSC claims (Howes, 2008), obtaining and subsequently managing the MSC label is not simply a non-political, neutral and scientific process in the fight against over-fishing and towards guaranteeing the sustainability of marine resources. In South Africa, it was achieved in the context of global and local competition, special interest battles, and local politics. Although couched in the scientific and managerial discourse of conservation, MSC certification was one of the instruments used to justify positions in debates that had race relations and possible redressing of past wrongs under apartheid as the main issues at stake.

In the dominant sustainability narrative, ecolabels tend to be seen as being 'good for the global commons' within a discourse of science, objectivity, independent verification of claims, and proper systems management. As certification systems generally move from a holistic and hands-on engagement with suppliers towards more hands-off, auditable, systemic and managerial approaches, expert knowledge comes to play an increasingly important role. Scientists (marine biologists in the case of MSC) and systems managers become key actors. Social scientists and to some extent even economists are relatively marginalized.

Ecolabelling (and other certification) schemes involve document flows, product inspections, reference indicators and data gathering supposedly based on scientific knowledge, laboratory tests, etc. There is often tension between different forms of expert knowledge that are enrolled to make sustainability claims, and contending political agendas are played out through them. This motivates activists to become 'expertised' as well. And if shortcomings arise in terms of stakeholder participation and/or barriers to entry, it is claimed that they can be fixed with more transparency, better management systems, and technical assistance (Potts, 2006).

Similarly to the case of food safety examined above, in ecolabelling conformity to system performance and specific rules can become more important than achieving the stated objectives of 'sustainability'. Verification in particular is explicitly constructed as a pedagogical exercise. It is not meant to exclude, but to teach management and better conformity (Power, 1997). Although this is implicit in the nature of auditing, it does not bode well for actually achieving sustainability. MSC can be sold to consumers as an important instrument to address the plight of overfishing because it is portrayed as being based on sound science and proper management. At the same time, in only a few instances has MSC certification shown a positive impact on sustainability, and in South Africa it was used for political motives and as an instrument of market competition. Rather than being performative of what good fishery management 'should be', MSC creates a virtual abstraction of sustainability.

Conclusion

Through the case studies of food safety management and ecolabelling, in this article I have argued that some aspects of the KBBE can be virtual abstractions used to fulfil political objectives. In this context, appearing to succeed is more important than succeeding, and failures of performativity (failing to shape the world according to normative models) abound, but are not acknowledged. In enacting the KBBE, some concepts are performed at the expense of others, and specific forms of knowledge, science and expertise shape 'reality' in their own image, while others do not. In other words, while KBBE may be self-fulfilling in some of its aspects, instances of failure of performativity also abound.

In the realm of food safety, the *appearance* of having a system in place which functions 'as if' it followed regulation on food safety is what counts for good performance when systems are evaluated for conformity against EU rules. Little attention is paid to actual practices on the ground or the outcomes of such functioning systems. In fishery ecolabels, matching systemic compliance (with appropriate documentary flows and organizational adjustments) is more important than fulfilling the original objective of sustainability, upon which these very systems were founded (see also Klooster, 2005; Ponte et al., 2007). While appearing to match food safety procedures and ecolabelling requirements does have substantive outcomes, these do not necessarily come along the lines of the official rationales. The failure of performativity can have negative

consequences – fish stocks are at critically low levels in both locations covered in the case studies.

On the basis of these observations, one can expect that some of the (putative and future) economic and social benefits of KBBE are unlikely to be evaluated against actual and measurable outcomes (even less vis à vis the costs sustained). Possible failures in delivering outcomes are likely to be justified on the basis of malfunctioning systems. Therefore, the EU's normative approach to KBBE is likely to be self-fulfilling only in relation to those aspects which outcomes are not measured, or when they are measured, the failure to produce results can be justified by moving the register of discussion from outcomes to process. The risk is that large amounts of EU public resources are allocated to subsidize or support KBBE-related initiatives without the necessary transparency and accountability.

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