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Hajderllari, Luljeta; Bosselmann, Aske Skovmand; Gylling, Morten

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DEPARTMENT OF FOOD AND RESOURCE ECONOMICS
UNIVERSITY OF COPENHAGEN

IFRO Commissioned Work

Compendium: Sustainability in the food sector

Luljeta Hajderllari
Aske Skovmand Bosselmann
Morten Gylling

2013 / 32

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Compendium: Sustainability in the food sector

Authors: Luljeta Hajderllari, Aske Skovmand Bosselmann, Morten Gylling

This compendium is prepared for the Danish Ministry of Food, Agriculture and Fisheries on the occasion of the 2013 Global Green Growth Forum pre-meeting in Copenhagen, 1-3 May 2013, as part of the agreement on public sector services between the Department of Food and Resource Economics and the Ministry. The compendium introduces a broad set of thematic areas of green growth and sustainability in the global food sector through a selection of reports, book chapters and scientific articles which are presented by an excerpt and a reference to the full work.

Department of Food and Resource Economics
University of Copenhagen
Rolighedsvej 25
DK-1958 Frederiksberg
www.ifro.ku.dk/english/

Introduction

In accordance with the agreement on research-based public service provision, The Danish Ministry of Food, Agriculture and Fisheries has asked the Department of Food and Resource Economics to prepare a compendium of the latest scientific articles and reports regarding sustainability in the food sector.

The Danish government is behind the initiative Global Green Growth Forum (3GF), a global partnership that brings together governments, leading global enterprises and international organizations in a common work for a transition towards an inclusive, green growth. In 2013, sustainability in the food sector is one of the focus areas for the 3GF meeting.

The demand for sustainably produced agricultural products and food products are increasing among consumers and retailer. As the middle classes in the BRICS countries continue to grow, an even higher increase in demand is expected in the future. This shows that that 'sustainability' is becoming an important vehicle for economic growth in the global food sector.

However, in order to benefit from the developing markets for sustainable products, actors in the global food supply chain must develop with them, or rather, ahead of them. To do this, current ‘best practices’ should be supported by existing certification schemes and industry standards and possibly translated into new schemes in order to ensure access to the new markets and higher prices.

The compendium is prepared for the Danish Ministry of Food, Agriculture and Fisheries on the occasion of the 2013 Global Green Growth Forum pre-meeting in Copenhagen. The compendium introduces the reader to a broad set of thematic areas of green growth and sustainability in the global food sector through selected reports, book chapters and scientific articles.

The collected material is divided into nine different sections, which capture different issues of the food chain, from the primary industry and food processing to customers, as well as assessments of the food supply chain as a whole. Additionally, focus is extended toward some of the vital issues of global food such as the role of government and nongovernment policies and certification. The latter is emphasized through case studies of certification schemes and a certified food company.

For each article or report an excerpt is provided, either an abstract and conclusion or a general summary. The full reference for each entry is provided above the excerpt, while a link to the full version is provided below the excerpt. Access to some of the articles and book chapters are restricted to subscribers. If a related report is freely accessible online, an alternative link is provided.

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1 The need for green growth in global food systems

The first section of this compendium introduces the reader to recent work on Green Growth which acts as a guide towards sustainable production and consumption via cost-effective and resource efficient ways. Departure is taken in green growth in sustainable development, before moving specifically to food systems.

1.1 Report: Inclusive Green Growth. The pathway to sustainable development.

World Bank (2013)

Foreword

Inclusive green growth is the pathway to sustainable development. Over the past 20 years economic growth has lifted more than 660 million people out of poverty and has raised the income levels of millions more, but growth has too often come at the expense of the environment. A variety of market, policy, and institutional failures mean that the earth's natural capital tends to be used in ways that are economically inefficient and wasteful, without sufficient reckoning of the true social costs of resource depletion and without adequate reinvestment in other forms of wealth. These failures threaten the long-term sustainability of growth and progress made on social welfare. Moreover, despite the gains from growth, 1.3 billion people still do not have access to electricity; 2.6 billion still have no access to sanitation, and 900 million lack safe, clean drinking water. Growth has not been inclusive enough. This report argues that sustained growth is necessary to achieve the urgent development needs of the world's poor and that there is substantial scope for growing cleaner without growing slower. Green growth is necessary, efficient, and affordable. It is the only way to reconcile the rapid growth required to bring developing countries to the level of prosperity to which they aspire with the needs of the more than 1 billion people still living in poverty and the imperative of a better managed environment. Indeed, green growth is a vital tool for achieving sustainable development. But sustainable development has three pillars: economic, environmental, and social sustainability. We cannot presume that green growth is inherently inclusive. Green growth policies must be carefully designed to maximize benefits for, and minimize costs to, the poor and most vulnerable, and policies and actions with irreversible negative impacts must be avoided. Green growth also requires improved indicators to monitor economic performance. National accounting indicators like GDP measure only short-term economic growth; whereas indicators like comprehensive wealth—including natural capital—help us determine if growth is sustainable in the long run. The Conference on Environment and Development, held in Rio in 1992, focused on inclusion and the environment but failed to mention growth. In the lead up to Rio+20, we are reminded that, in 1987, Gro Harlem Brundtland, then Prime Minister of Norway, framed the call for governments to change their approach to growth: "*What is needed now is a new era of economic growth— growth that is forceful and at the same time socially and environmentally sustainable*." Today, more than ever, we must pay attention to the triple bottom line. Inclusive growth must be green. Green growth must be inclusive.

Source online – full access:
http://siteresources.worldbank.org/EXTSDNET/Resources/Inclusive_Green_Growth_May_2012.pdf

1.2 Report: Putting green growth at the heart of development
OECD (2013)
Abstract
Sustainable development provides an important context for green growth. The concept of green growth is narrower in scope than is sustainable development, but entails a clear and workable policy agenda for concrete, measurable progress at the interface of the economy and the environment. In this concept, natural assets – including renewable and non-renewable resources and a stable climate – play a significant role in delivering production and welfare gains. The concept also provides a strong focus on the necessary conditions for innovation, investment and competition that can give rise to new sources of economic growth and resilient development.
The goal for many developing economies is to achieve diversified and sustainable growth to reduce poverty, increase well-being and bring major improvements to the quality of life of their citizens. This can be achieved by taking into account the full value of sustainably used natural capital and recognizing its essential role in economic growth. Green growth promotes a cost-effective and resource efficient way of guiding sustainable production and consumption

Source online – full access:
http://www.oecd.org/dac/SLM2013_issue%20paper%20green%20growth.pdf

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1.3 Report: A Green Growth Strategy for Food and Agriculture.
OECD (2011)
Conclusion
The food and agriculture sector is crucially important in the green growth context because it is the major user of land, water and marine resources and has important linkages with biodiversity. While the sector can cause environmental harm, it also provides valued ecosystem services. This is true notwithstanding the fact that it typically accounts for a small share of employment and GDP in most OECD countries, though much larger shares in many developing countries. The food and agriculture sector has been largely successful in meeting the demands of a world population that continues to grow in size and prosperity. Productivity growth has been strong, exceeding the population growth rate. Many farmers and fishers are aware of the importance of their economic dependence on conserving natural resources and ecosystems, and governments have started to re-orientate their policy priorities to take account of the environmental consequences of food and agriculture production, which has led to some improvements in environmental performance. Nevertheless, progress has been uneven and the future holds many new challenges.

In some countries and regions productivity growth in agriculture and fisheries has been low and there is an increasing awareness that some growth has not been sustainable. Pressure on land, water, marine ecosystems, forests, and the biodiversity resources that are fundamental to sustainable food production is already critical in some areas and is likely to grow. Agriculture and fisheries are particularly vulnerable to climate change and will need to adapt to changing patterns of precipitation, temperature and extreme weather events. Pursuing green growth cuts across many of the traditional categories governments use to organize their actions. Green growth implies that the whole set of policies becomes more coherent and compatible with respect to their growth and sustainability objectives.

More integrated and coherent policy approaches are beginning to take shape, involving a combination of policy instruments. This is evident with climate change, for example, as many countries have started to coordinate and integrate the previously separated policy domains of water, flood and drought control and the environment. For example, support has been provided for the restoration of land in flood plains by

planting trees, which has helped to reduce impacts of floods, improved water quality, and led to co-benefits such as restoring biodiversity and sequestering greenhouse gases. Tracking and measuring progress towards green growth in the food and agriculture sectors will not be easy. Not only are the links between the biophysical, economic and social relationships imperfectly understood, information on the state of the environment is difficult to collect and interpret. There is no single overarching indicator of environmental (or social) performance. While some indicators are available, the challenge will be to develop indicators that cover the food chain as a whole. From the analysis three priority areas for policy attention stand out: increasing productivity in a sustainable manner, in particular by according a higher priority to research, development, innovation, education, extension services and information; ensuring that well-functioning markets provide the right signals, and in particular that prices reflect the scarcity value of natural resources as well as the positive and negative environmental impacts of their use; and establishing and enforcing well defined property rights, so as to ensure sustainable resource use.

Moving beyond these general guidelines to more concrete policy proposals that illustrate – without prescribing – how alternative policy sets can contribute to a greener growth model for food and agriculture will require further consideration. In this context, particular attention will need to be paid – in collaboration with FAO – to the specific circumstances of developing countries. Ultimately, the objective would be to institute an ongoing process of policy monitoring and evaluation. Over time, this could become a tool to increase collective knowledge about how policies contribute to green growth. It would be a way for countries to measure their own progress relative to others and learn from the experience of others. Most importantly it would be a step towards reframing growth to better account for natural assets and the environmental risks that could ultimately undermine economic growth and development.

Source online – full access:
http://www.oecd.org/greengrowth/sustainable-agriculture/48224529.pdf

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2 State of Global Food Systems. Where do we stand and what will the future bring?

This section provides a brief overview of the state of the global food system as well as upcoming developments regarding sustainability of food production. The first article focuses on the present status and challenges of sustainable food, while the second and third articles focus on the future projection of global food systems where the main concept is intensification of agriculture. The last paper of this section discusses the importance of tightening feedback loops between ecosystems, actors in the food production chain and consumers.

2.1 Article: Food Security: The Challenge of Feeding 9 Billion People.

Charles, H., Godfray, J., et al. (2010). Science 327, pp. 812-818.

Abstract

Continuing population and consumption growth will mean that the global demand for food will increase for at least another 40 years. Growing competition for land, water, and energy, in addition to the overexploitation of fisheries, will affect our ability to produce food, as will the urgent requirement to reduce the impact of the food system on the environment. The effects of climate change are a further threat. But the world can produce more food and can ensure that it is used more efficiently and equitably. A multifaceted and linked global strategy is needed to ensure sustainable and equitable food security, different components of which are explored here.

There is no simple solution to sustainably feeding 9 billion people, especially as many become increasingly better off and converge on rich-country consumption patterns. A broad range of options, including those we have discussed here, needs to be pursued simultaneously. We are hopeful about scientific and technological innovation in the food system, but not as an excuse to delay difficult decisions today. Any optimism must be tempered by the enormous challenges of making food production sustainable while controlling greenhouse gas emission and conserving dwindling water supplies, as well as meeting the Millennium Development Goal of ending hunger. Moreover, we must avoid the temptation to further sacrifice Earth's already hugely depleted biodiversity for easy gains in food production, not only because biodiversity provides many of the public goods on which mankind relies but also because we do not have the right to deprive future generations of its economic and cultural benefits. Together, these challenges amount to a perfect storm.

Navigating the storm will require a revolution in the social and natural sciences concerned with food production, as well as a breaking down of barriers between fields. The goal is no longer simply to maximize productivity, but to optimize across a far more complex landscape of production, environmental, and social justice outcomes.

Source online – full access:
http://www.sciencemag.org/content/327/5967/812.full.html

2.2 Article: Global food demand and the sustainable intensification of agriculture.
Tilman, D., Balzer, C., Hill, J., Befort, B.L. (2011). Proc. Natl. Acad. Sci. 108, pp. 20260-20264.
Abstract/conclusion
Global food demand is increasing rapidly, as are the environmental impacts of agricultural expansion. Here, we project global demand for crop production in 2050 and evaluate the environmental impacts of alternative ways that this demand might be met. We find that per capita demand for crops, when measured as caloric or protein content of all crops combined, has been a similarly increasing function of per capita real income since 1960.This relationship forecasts a 100–110% increase in global crop demand from 2005 to 2050. Quantitative assessments show that the environmental impacts of meeting this demand depend on how global agriculture expands. If current trends of greater agricultural intensification in richer nations and greater land clearing (extensification) in poorer nations were to continue, 1 billion ha of land would be cleared globally by 2050, with CO2-C equivalent greenhouse gas emissions reaching ~3 Gt/year and N use ~250 Mt/year by then. In contrast, if 2050 crop demand was met by moderate intensification focused on existing croplands of under yielding nations, adaptation and transfer of high-yielding technologies to these croplands, and global technological improvements, our analyses forecast land clearing of only ~0.2 billion ha, greenhouse gas emissions of ~1 Gt/year, and global N use of ~225 Mt/year. Efficient management practices could substantially lower nitrogen use. Attainment of high yields on existing croplands of under yielding nations is of great importance if global crop demand is to be met with minimal environmental impacts.

Source online – full access.
http://www.pnas.org/content/early/2011/11/16/1116437108.full.pdf+html

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2.3 Article: The future of the global food system.

Charles, H., Godfray, J. Crute, R. I., Haddad, L., et al (2010). Phil. Trans. R. Soc. B 365, pp.2769–2777

Abstract

Although food prices in major world markets are at or near a historical low, there is increasing concern about food security—the ability of the world to provide healthy and environmentally sustainable diets for all its peoples. This article is an introduction to a collection of reviews whose authors were asked to explore the major drivers affecting the food system between now and 2050. A first set of papers explores the main factors affecting the demand for food (population growth, changes in consumption patterns, the effects on the food system of urbanization and the importance of understanding income distributions) with a second examining trends in future food supply (crops, livestock, fisheries and aquaculture, and 'wild food'). A third set explores exogenous factors affecting the food system (climate change, competition for water, energy and land, and how agriculture depends on and provides ecosystem services), while the final set explores cross-cutting themes (food system economics, food wastage and links with health). Two of the clearest conclusions that emerge from the collected papers are that major advances in sustainable food production and availability can be achieved with the concerted application of current technologies (given sufficient political will), and the importance of investing in research sooner rather than later to enable the food system to cope with both known and unknown challenges in the coming decades.

Source online – full access:
http://rstb.royalsocietypublishing.org/content/365/1554/2769.full.pdf+html

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2.4 Article: On the importance of tightening feedback loops for sustainable development of food systems.

Sundkvist, Å, Milestad,R, Jansson, A. (2005). Food Policy 30, pp. 224–239

Abstract

In the process of searching for sustainable trajectories in the food system, this paper reviews and discusses the importance of tightening feedback loops between ecosystems, actors in the food production chain and consumers. Intensification, specialization, distancing, concentration and homogenization are trends identified as major constraints for tightened feedback loops. These trends can mask or make it possible to disregard feedback signals from unhealthy ecosystems and weaken communication in the food chain. We explore possibilities for improved feedback management on local to global scales and present examples where feedback loops have been tightened. Enhanced communication between the actors in the food system and consciousness of ecological feedback, through e.g., increased reliance on local resources, are possibilities for improvement. However, where distances between resource and resource user are too large, feedback has to be directed through institutions on an overarching level, e.g., policy measures or environmental and social labelling of products.

Source online – restricted access:
http://www.sciencedirect.com/science/article/pii/S0306919205000072

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3 Sustainability in the Food Processing Industry

This section focuses on the processing stage of the supply chain and provides information regarding the latest developments in the sustainable food industry. The first article is a comparative study of US and EU laws and policies regarding sustainable food processing. The second article analyzes the impact that different methods such as life cycle analysis (LCA) and environmental certifications have on environmental, social and economic performance. The last article is an example of how sustainability in the food sector also includes the transformation of waste to energy.

3.1 Book chapter: Comparison of EU and US Law on Sustainable Food Processing.

Robertsa T.M., Leibovitch, H. E. (2010). In Proctor, A. (ed). Alternatives to Conventional Food Processing. RCS Publishing, pp. 11-92

Abstract

Sustainability is beginning to transform the food industry with environmental, economic and social factors being considered, evaluated and implemented throughout the supply chain. The driving concern in the supply chain is that a tipping point is being reached in the balance between exploitation of natural resources and satisfaction of human wants and needs. Modern food processing, especially on a broad scale, requires inputs, materials and energy. Sustainability objectives reflect concerns over these requirements in the following statement: Processing food with minimal inputs including raw materials, water and energy will reduce the total impact of food processing. This also includes consideration of the impact of each raw material, finding alternatives when feasible. An aim should be toward using renewable energy or even processing wastes to produce energy. Further, processing food with zero waste (solid, liquid and emissions) is achievable and should be practiced. A basic question is whether these sustainability objectives in food processing can be accomplished by government regulation, especially in the current global regulatory framework that oversees an increasingly rich array of diverse products and ingredients that are sourced internationally. The structure of this framework, the political environment in which it operates and recent developments all make it difficult to reach these objectives.

While sustainability also includes economic and social values, this comparative analysis confines itself to environmental values. The EU and US food regulatory systems dominate the global food system and reflect strong differences that have resulted in high-profile trade, science and cultural conflicts between the two involving genetically modified crops and the use of hormones in beef. Differences are also evident in regulatory approaches to sustainability in processing. Even though sustainability has gained traction in the US as an important issue in the food sector, sustainability has resonated more profoundly in the EU food chain and regulatory objectives are more focused. The reasons for these different regulatory approaches are often difficult to ascertain.

An important tool in drawing conclusions involves a methodic comparative approach between the two giant regulatory systems. Comparative law is not a body of rules and principles. It is a legal discipline that has its own unique methodology and theory. As noted: It is primarily a method, a way of looking at legal problems, legal institution and entire legal systems. By the use of the method of comparison, it becomes possible to make observations and to gain insights that would be denied to one whose study is limited to the law of a single country. In the context of sustainability, this is an important point. Notwithstanding the differences of regulatory theories, attitudes and approaches, the EU and the US should be able to borrow regulatory approaches from each other to provide useful regulatory guideposts in their dealings with sustainability concerns in food processing. The first stopping point in this comparative analysis is a basic understanding of the respective EU and US regulatory systems. There is an increasing dependence on

statutory law and administrative law, especially in the regulation of food. It is important to note that sustainability regulations do not appear in the EU or US because they are suddenly a good idea. There is a process in both the EU and US in which new regulations and regulatory trends gain traction and develop into enforceable rules. This process is best understood within the larger context of how the EU and US food regulatory systems function. Certain regulatory patterns, tendencies and perceptions that are similar and different between the two systems will be explored. The chapter will next introduce the concept of sustainability and the emerging 'green processing' in the EU and US. The complexities involved in defining traceability will be accounted. Also reviewed will be the history and development of sustainability and its application to agriculture and food processing in the EU and US. The policy goals and objectives in these two regulatory regimes will be analyzed, and also the current applicable regulations. In addition to government measures, this chapter will also address private standards that have emerged in the past decade in both the EU and US to promote and regulate sustainability in food processing. The relationship between the sustainability movement and private standards will be explained. Examples of relevant private standard schemes will be provided. Concerns in the EU and US over the use of private standards that affect food processors will be evaluated, including the international trade implications. The chapter will conclude with observations from this comparison of EU and US regulatory approaches to sustainability in food processing. This comparison will show differences and similarities. The objective is to derive insights that will enable a careful, methodical approach to the development of regulation that will lead to a balanced, common-sense application of sustainability values to the processing of food. A further objective is to align this application with that of private standards and to coordinate and harmonize efforts in the public and private sectors for both regulatory systems. Even a start on these objectives is a step in the right direction in order to build true sustainability in the processing of foods.

In sum, although both the US and the EU are conscious of the need for sustainability in food production practices, their legal philosophy and cultural history make them approach this issue differently at the public standards level. Private sustainability standards, on the other hand, are so far much more similarly addressed. These differences and similarities also show that a gap still exists between the regulatory framework provided by governmental entities and what the private sector feels it needs to achieve in terms of food processing sustainability in order to retain consumer confidence. The greatest challenge remains to balance practices that are environment conscious while remaining realistically profitable and beneficial for all parties involved.

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http://pubs.rsc.org/en/content/chapter/9781849730976-00011/978-1-84973-037-2/unauth

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3.2 Article: Sustainable operations: Their impact on the triple bottom line.

Gimenez, C., Sierra, C., Rodon, J. (2012). International Journal of Production Economics. 140, pp. 149–159

Abstract

Different firms have implemented environmental programmes (such as design to recycle, life cycle analysis or environmental certification) and social practices (such as programmes aimed to improve employees' working conditions or projects to support the external community). This study aims to analyse the impact of these programmes on each dimension of the triple bottom line (environmental, social and economic performance). It extends the extant literature by (1) considering environmental and social initiatives in the same study, (2) analysing their impact on the three pillars of the triple bottom line, (3) comparing the

impact of internal and external programmes, and (4) analysing sustainable operational projects at the plant level. The data used were obtained from the fifth (2009) round of the International Manufacturing Strategy Survey (IMSS) which includes responses from manufacturing plants within the assembly industry in 19 countries. Our findings suggest that internal environmental programmes have a positive impact on the three components of the triple bottom line, whereas internal social initiatives have a positive impact on only two components: Social and environmental performance. It seems that firms still need to achieve positive financial gains from these social programmes. Finally, regarding the external or supply chain initiatives, our results show that supply chain assessment has no impact on the triple bottom line, unlike supply chain collaboration which contributes to improve all three elements. Two important managerial contributions can be derived from this study: (1) Managers have to be aware of the possible negative effects (on the short term) of social practices on manufacturing costs, and (2) they need to implement collaborative practices with their supply chain partners, as assessment alone has been found not to have any impact on the triple bottom line.

Source online – restricted access:
http://www.sciencedirect.com/science/article/pii/S0925527312000503
Source online – request full access:
http://www.researchgate.net/publication/232734842_Sustainable_Operations_Their_impact_on_the_triple_bottom_line

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3.3 Article: Energy from waste and the food processing industry.
Hall, M.G., Howe, J. (2012). Process Safety and Environmental Protection 90, pp. 203–212.
Abstract
The provision of a secure, continuous energy supply is becoming an issue for all sectors of society and the food processing industry as a major energy user must address these issues. This paper identifies an aerobic digestion as an opportunity to go some way to achieving energy security in a sustainable manner. However, a number of energy management and waste reduction concepts must also be brought into play if the environmental, social and economic aspects of sustainability are to be balanced. The reporting of such activity will help to promote the green credentials of the industry. Cleaner production, supply chain and life cycle assessment approaches all have a part to play as tools supporting a new vision for integrated energy and waste management. Our reliance on high-energy processing, such as canning and freezing/chill storage, might also need re-assessment together with processing based on hurdle technology. Finally, the concepts of energy and power management for a distributed energy generation system must be brought into the food processing industry.

Source online – restricted access:
http://www.sciencedirect.com/science/article/pii/S0957582011001005

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4 Consumers perception and willingness to pay

This section concerns consumers' perceptions and preferences for food labels, and their willingness to pay. Though emphasis is on organic labels, the general findings are expected to be similar for other types of food labels. The fourth and last article focuses on the role and value of food packaging in relation to consumer perception.

4.1 Article: Consumers' perceptions of individual and combined sustainable food labels: a UK pilot investigation.

L. Sirieix, M. Delanchy, L. Zepeda, H. Remaud, P. Gurviez (2013). International Journal of Consumer Studies 37, pp. 143–151.

Abstract

Consumers are faced with an increasing number of sustainable food labels. These different labels may be complementary or add to the increasing competition of product information in consumers' minds. We investigate: (1) the perceptions that consumers in the UK have about sustainable labels vs. other labels, such as origin or nutrition labels; and (2) consumers' reactions to combinations of different sustainable labels. Overall, the findings from two focus groups conducted in the UK indicate that consumers have positive perceptions of organic and fair trade labels but tend to be sceptical about unfamiliar labels and general claims such as 'climate friendly'. The results also indicate the importance of familiarity, trust and fit between combinations of labels as well as between associating a label with a brand. While the combination of certain labels can enhance the value of a food product, this study also indicates that other label combinations (e.g. private and sustainable label) can detract from a label's value. Implications and recommendations are suggested for managers to counter the image of greenwashing, and for policy makers to facilitate sustainable food choices.

Source online – restricted access:
http://onlinelibrary.wiley.com/doi/10.1111/j.1470-6431.2012.01109.x/full

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4.2 Article: Product labelling in the market for organic food: Consumer preferences and willingness-to-pay for different organic certification logos.

Janssen, M., Hamm, U. (2012). Food Quality and Preference 25, pp. 9–22

Abstract

Product labelling with organic certification logos is a tool for signalling consumers that a product is a certified organic product. In many European countries, several different organic labelling schemes exist in the market. The aim of this paper is to elicit whether consumers prefer certain organic labelling schemes over others, to give recommendations for market actors in the organic sector. By means of choice experiments and structured interviews with 2441 consumers of organic food in six European countries, consumer preferences and willingness-to-pay (WTP) for different organic logos were analysed. The results of the random parameter logit models showed that the WTP differed considerably between the tested logos. Consumer perceptions of organic labelling schemes turned out to be of subjective nature and in many cases not based on objective knowledge. We conclude that it is advisable to label organic products with well-known organic certification logos that consumers trust. Organisations owning an organic labeling scheme should put effort into measures for increasing consumer awareness of the logo and forming consumer perceptions and attitudes regarding the underlying scheme in terms of standards and control.

Source online – restricted access:
http://www.sciencedirect.com/science/article/pii/S0950329311002631

4.3 Article: Country Differences in Sustainable Consumption: The Case of Organic Food.
Thøgersen, J. (2010). Journal of Macromarketing 30, pp. 171-185.

Abstract

In a sustainability perspective, consumption research has an unfortunate individualizing bias, which means that macro and structural causes of unsustainable consumption tend to be ignored. Hence, a comprehensive model of determinants of the sustainability of consumption is developed and applied on a specific case: organic food consumption. The analyzed data are published research on why consumer purchase of organic food products differs between countries. As expected, organic food's share of total food consumption depends heavily on political regulation, including legal definitions and standards, financial support to farmers, and a national labeling system. Other important structural factors are soil conditions, an effective and efficient distribution system, and the size of the premium price demanded for organic food products. Macro factors such as the food culture and the culture's level of postmaterialism and environmental concern play an additional role. The evidence suggests that, together, macro and structural factors such as these are more, and probably considerably more, important for the sustainability of food consumption than are individual-level attitudinal variables. This study sets out to establish the importance of opportunity structures for consumer activism. Political consumption is an individualized form of collective action manifested in boycott participation and 'positive' buying of goods with certain ethical, political or environmental qualities. To overcome 'the unfortunate individualistic and individualizing bias' of existing research (Thøgersen, 2010: 171), explanations relying on individuals' resources and motivations have been extended by social movement theories of economic, political and cultural opportunities as well as a globalization hypothesis. On the actor level I find support for the impact of individual resources and motivations. However, individual decisions to consume politically are embedded in economic structures and political institutions. Thus, as I show, more affluent countries, by providing higher financial degrees of freedom and a higher variety of products, enable political consumption behaviour. Fragmented retailing structures, by increasing citizens' transaction costs, constrain both positive buying and boycotting. Furthermore, the supply of labelled goods increases citizens' ability to engage in positive buying. The results lend strong support to the importance of economic opportunity structures in market-directed collective action (Wahlstrom and Peterson, 2006). Historically-shaped statist forms of collective agency, as one dimension of the political opportunity structure, decreases citizens' willingness to buy politically. Yet, contrary to an argument by Holzer (2006), I find that social movement organizations affect neither positive buying nor boycotting. In addition, neither the importance of post-materialism (Sønderskov, 2009) nor that of a civic culture of trust (Neilson and Paxton, 2010) has been confirmed after controlling for economic opportunities. Furthermore, neither national levels of economic globalization nor its increase drive critical consumption. Finally, the results lend support to the low-cost hypothesis showing that an affluent context provides the opportunity to draw on value orientations in consumption decisions.
In sum, economic opportunities and statist political institutions are the most central contextual determinants of political consumerism in Europe. These results provide important insights into the limitations of political consumerism as a way of economic governance, and help us understand the underlying economic and political structures that drive political consumption in some countries and constrain it in others. Furthermore, they shift the focus from the dominating cultural explanations to the underlying economic conditions which empower consumers to voice their interest through the market

Source online – restricted access:
http://jmk.sagepub.com/content/30/2/171.abstract

4.4 Article: Food and sustainability: Do consumers recognize, understand and value on-package information on production standards?
Hoogland, C. T., de Boer, J., Boersema, J. J. (2007). Appetite 49, pp. 47–57.
Abstract/Conclusion
We tested how consumers recognize, understand and value on-package information about food production methods that may contribute to a more sustainable agriculture. Nine copy tests were formed, each containing one out of three products and one out of three panels of information. The products were (1) fillet of chicken, (2) semi-skimmed milk and (3) fillet of salmon. The panels of information were (a) a certified organic logo and details about the animal welfare standards of organic products, (b) just the logo, or (c) a statement in which the product was attributed to the world market. About 371 customers of a supermarket in the city of Amsterdam filled in a questionnaire, which included a subset of three copy tests. The results showed that many consumers did not realize that the organic logo already covers all the standards. They were inclined to underestimate the distinctive advantage of the logo; products with logo and details got higher ratings of positive attributes but were also considered more expensive. As a consequence, the detailed information panels enabled consumers to choose more in agreement with their personal values but the net impacts on purchase intentions were small.

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http://www.sciencedirect.com/science/article/pii/S0195666307000049

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5 Sustainability of the Food Supply Chain

This section focuses on the different methods that are used to measure sustainability such as life cycle analysis (LCA). LCA is one of the most common tools used to assess sustainability in supply chains, though emphasis of an LCA is often on environmental impacts. The articles concern the application and assessment of a method such as LCA in the food supply chain. The last three articles are examples of applications of LCA for different food products.

5.1 Article: Life cycle assessment across the food supply chain.
Mogensen, L., Hermansen, J.E., Halberg, N., Dalgaard, R., (2009). In: Baldwin, C.J. (Ed.), Sustainability in the Food Chain. Blackwell Publishing, Ames, IA, pp. 115–144.
Abstract/Conclusion
From the food product life cycle research conducted globally, agriculture production is generally the largest contributor to the life cycle impact compared with other compartments such as transport and processing. Further, animal products have greater impact than plant products— producing 1 kg of animal products like meat produce much more greenhouse gas emissions than producing 1 kg of plant-based products like cereal or potatoes. This is due to the animal feed conversion rate and feed impacts themselves and to the emissions of nutrients and GHG from the livestock. However, certain ways of production can increase plant

product's impact, as was demonstrated with greenhouse growth of tomatoes being similar in impact to animal products. Organic production is most often more energy efficient and has lower GHG emissions compared with conventional while nutrient losses are lower per ha but not always per FU. The supposed environmental benefits of non-use of pesticides in organic systems are usually not included in LCA's due to methodological difficulties. Thus, comparing the two systems using State-of-art LCA is not fully satisfactory. Besides this, there is large variation in environmental impact between farmers and farming systems producing the same livestock output. LCA methodology may be used to benchmark the better performing systems and product chains in and to demonstrate the relative importance of the feed production external to the livestock farm itself. Downstream compartments have relatively lower impacts, but can range depending on the product. Even more important, the relative high proportion of food wasted in households adds significantly to the environmental burden per kg of food actually consumed. Consumer transport to purchase food can be a significant impact. And finally, consumer use of the food, when including cooking, can be a major contributor to the life cycle impact. In general, following to a high degree current health advice regarding diet composition, especially eating a high proportion of basic vegetables will also minimise the environmental impact per meal. Thus, changing diets are potentially one of the most powerful ways of reducing the environmental impact per capita.

Source online – restricted access:
http://onlinelibrary.wiley.com/doi/10.1002/9781118467589.ch5/summary

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5.2 Article: The impact of food processing on the sustainability of the food supply chain.
Sellahewa, N.J, Martindale, W. (2010). Aspects of Applied Biology 102, pp. 91-98

Abstract
The demand for high quality, safe, nutritious processed foods will continue to increase as the global population and affluence increases. This imposes an enormous burden on the environment and the food processing industry has responded by making progress in reducing the carbon and water footprints of products and the amount of waste generated. However, environmental sustainability cannot be considered in isolation because economic and social sustainability are essential to the industry. To ensure that the food processing industry is economically and environmentally sustainable, it is important to take an integrated approach of the whole food supply chain including farm and post operations. Life Cycle Assessment (LCA) is a tool that facilitates this approach and will enable meaningful environmental messages to be communicated to consumers who are becoming increasingly aware of the environmental impact of the products that they purchase. As the food processing industry becomes more globalised it is important that analyses use standardised social and economic factors in environmental assessment so that meaningful comparisons can be made for monitoring environmental performance, regulatory compliance and consumer communication. As well as technological advances to enable the reduction of the environmental footprints of processed foods, it is necessary to change consumer behaviour to reduce consumption to ensure that the global food processing system is sustainable.

Source online – full access:
http://www.shu.ac.uk/_assets/pdf/foodinnov-wm-impact-processing-sustainability-food-supply-chain.pdf

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5.3 Article: The sustainability of communicative packaging concepts in the food supply chain. A case study: Life cycle costing and sustainability assessment

Dobon, A., Cordero, P., Kreft, F. et al. (2011). International Journal of Life Cycle Assess 16, pp. 537–547.

Abstract

This paper is dealing with the sustainability evaluation of a new communicative packaging concept. The communicative packaging concept includes a device that allows changing the expiry date of the product as function of temperature during transport and storage: a flexible best-before-date (FBBD). Such device was analysed in a consumer unit consisting of a nanoclay-based polylactic acid tray filled with pork chops.
An economic assessment was made through the use of life cycle costing (LCC) methodology proposed by Bovea and Vidal (Resources, Conservation and Recycling Volume 41, Issue 2, May 2004, Pages 133–145) where both internal and external costs were considered. Furthermore, the social aspects were analysed using a contingent valuation (CV) of the willingness to pay (WTP). The sustainability assessment of FBBD was made through the combination of life cycle assessment (LCA) and LCC results, together with the CV of the WTP according to the method proposed by Bovea and Vidal. It was assumed that the use of the FBBD minimizes the food losses from 3.5% to 0.5%.

LCC results show that internal costs related to pork chops and logistic supply chain life cycle represent more than 90% of life cycle cost. The use of FBBD communicative device could increase pork chop selling price between 0.01 and 0.1€ since the purchasing cost of this communicative device is included in this price. WTP results show that FBBD purchasing cost for consumer acceptance is estimated as 0.05€/FBBD. Therefore, only pork chop selling price for scenarios 1 (0.05€/device) and 3 (0.01€/device) could be accepted by consumers. The most sustainable situation is reached when the cost of the FBBD is as less as possible (0.01€).
The use of FBBD communicative device has economic advantages for perishable products since it contributes to the increase in the economic savings due to the reduction of food losses. However, these economic savings represent a small percentage over pork chop selling price, and therefore, an FBBD price less than 0.02€/device is required. If a lower price for the communicative device is reached, satisfying the WTP of consumers (0.05€/FBBD), the communicative package will be much more sustainable.

Source online – restricted access:
http://link.springer.com/content/pdf/10.1007%2Fs11367-011-0291-9.pdf

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5.4 Article: A review of modeling approaches for sustainable supply chain management

Seuring, S. (2012).Decision Support Systems, 54, pp. 1699-1710.

Abstract

More than 300 papers have been published in the last 15 years on the topic of green or sustainable (forward) supply chains. Looking at the research methodologies employed, only 36 papers apply quantitative models. This is in contrast to, for example, the neighboring field of reverse or closed-loop supply chains where several reviews on respective quantitative models have already been provided. The paper summarizes research on quantitative models for forward supply chains and thereby contributes to the further substantiation of the field. While different kinds of models are applied, it is evident that the social side of sustainability is not taken into account. On the environmental side, life-cycle assessment based approaches and impact criteria clearly dominate. On the modeling side there are three dominant

approaches: equilibrium models, multicriteria decision making and analytical hierarchy process. There has been only limited empirical research so far. The paper ends with suggestions for future research.

Source online – restricted access:
http://www.sciencedirect.com/science/article/pii/S0167923612001741

5.5 Article: LCA of Soybean Meal.

Dalgaard R, Schmidt J, Halberg N,Christensen P, Thrane M, Pengue WA (2008). International Journal of Life Cycle Assess, 15, pp. 183–19713, pp. 240–254

Abstract

Soybean meal is an important protein input to the European livestock production, with Argentina being an important supplier. The area cultivated with soybeans is still increasing globally, and so are the numbers of LCAs where the production of soybean meal forms part of the product chain. In recent years there has been increasing focus on how soybean production affects the environment. The purpose of the study was to estimate the environmental consequences of soybean meal consumption using a consequential LCA approach. The functional unit is 'one kg of soybean meal produced in Argentina and delivered to Rotterdam Harbor.

Soybean meal has the co-product soybean oil. In this study, the consequential LCA method was applied, and co-product allocation was thereby avoided through system expansion. In this context, system expansion implies that the inputs and outputs are entirely ascribed to soybean meal, and the product system is subsequently expanded to include the avoided production of palm oil. Presently, the marginal vegetable oil on the world market is palm oil but, to be prepared for fluctuations in market demands, an alternative product system with rapeseed oil as the marginal vegetable oil has been established. EDIP97 was used for LCIA and the following impact categories were included: Global warming, eutrophication, acidification, ozone depletion and photochemical smog.

Two soybean loops were established to demonstrate how an increased demand for soybean meal affects the palm oil and rapeseed oil production, respectively. The characterized results from LCA on soybean meal (with palm oil as marginal oil) were 721 g CO2 eq. for global warming potential, 0.3 mg CFC11 eq. for ozone depletion potential, 3.1 g SO2 eq. for acidification potential, –2 g NO3 eq. for eutrophication potential and 0.4 g ethene eq. for photochemical smog potential per kg soybean meal. The average area per kg soybean meal consumed was 3.6 m2year. Attributional results, calculated by economic and mass allocation, are also presented. Normalised results show that the most dominating impact categories were: global warming, eutrophication and acidification. The 'hot spot' in relation to global warming, was 'soybean cultivation, dominated by N2O emissions from degradation of crop residues (e.g., straw) and during biological.

Consequential LCAs were successfully performed on soybean meal and LCA data on soybean meal are now available for consequential (or attributional) LCAs on livestock products. The study clearly shows that consequential LCAs are quite easy to handle, even though it has been necessary to include production of palm oil, rapeseed and spring barley, as these production systems are affected by the soybean oil co-product.

Source online – full access:
http://users.ugent.be/~jdewulf/Rodrigo%20Alvarenga/Dalgaard%20et%20al%202005l.pdf

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5.6 Article: Role of life cycle assessment in sustainable aquaculture.
Cao, L., Diana, S. J., Keoleian, A.G. (2013). Reviews in Aquaculture 4, pp. 1–11.
Abstract
As an alternative food source to wild fisheries, aquaculture shows a great potential to help meet the growing demand for seafood and animal protein. The expansion of aquaculture has been achieved partly by system intensification, which has drawn vast criticisms of aquaculture for its environmental, social and economic sustainability issues. Life cycle assessment (LCA) has become the leading tool for identifying key environmental impacts of seafood production systems. A LCA evaluates the sustainability of diverse aquaculture systems quantitatively from a cradle-to-grave perspective. It provides a scientific basis for analyzing system improvement and the development of certification and eco-labelling criteria. Current efforts focus on integrating local ecological and socio-economic impacts into the LCA framework. A LCA can play an important role in informing decision makers in order to achieve more sustainable seafood production and consumption. This article reviews recent applications of LCA in aquaculture, compares the environmental performance of different aquaculture production systems, explores the potential of including biodiversity issues into LCA analysis and examines the potential of LCA in setting criteria for certification and eco-labelling.

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http://onlinelibrary.wiley.com/doi/10.1111/j.1753-5131.2012.01080.x/pdf

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6 Governments, NGOs and Policy in Sustainable Foods

This section deals with the governmental and non-governmental strategies toward sustainable foods. The first, second and third papers provide an overview of strategies that the food industry should focus on in the future. The fourth paper explores different case studies where private and public sectors cooperate on building sustainable green global value chains. The fifth paper focuses specifically on the food value chain, using European food companies as case studies. The last paper deals with corporate engagement with NGOs and the outcomes of this engagement vis-à-vis corporate sustainability.

6.1 Policy paper: Food Industry Sustainability Strategy.
Department for Environment, Food & Rural Affairs, UK Government, (2011) pp. 124.
Abstract/Conclusion
The central challenge of SCP set out in the UK Sustainability Strategy ‘Securing the future’, is to break the link between economic growth and environmental impacts. There are absolute limits to the earth’s capacity to absorb pollution and provide natural resources. Indeed, it is already recognized that developed country patterns of consumption and production could not be replicated worldwide: some calculations suggest that such patterns could require three planet’s worth of resources. We need a major shift to deliver new products and services with lower environmental impacts across their lifecycle – and new business models that meet this challenge while boosting competitiveness. In practical terms this means ‘getting more from less’ through:
• better products and services;
• cleaner, more efficient production processes; and
• shifts in consumption towards goods and services with lower impacts.

Alongside household energy and water consumption, travel and tourism, food consumption is one of the largest and fastest growing sources of pressures on the environment. To achieve significant progress on SCP, action needs to be taken throughout

Source online – full access:
https://www.gov.uk/government/publications/food-industry-sustainability-strategy-fiss

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6.2 Report: Sustainable food consumption and production in a resource-constrained world.
European Commission – Standing Committee on Agricultural Research (SCAR) (2011). 3rd SCAR Foresight Exercise, pp. 150

Introduction

Between now and 2050, growth in global population and changing diets in emerging countries are projected to bring about a 70% increase in food demand as an average of the different possible scenarios analyzed. Simultaneously, depletion of fossil hydrocarbons will increase the demand for biofuels and industrial materials, which may compete with food for biomass. At the same time, natural resources are being depleted and climate change is pressing the agenda. Sustainable development considerations still remain under-represented in the policy-making process. Thus, the question remains as to how best create a systematic and iterative method within the policy process for ensuring that resource consumption and pressures on the environment do not increase at rates which will eventually result in human and environmental catastrophes. This is the background against which the EU Standing Committee on Agriculture Research (SCAR) decided in 2010 to appoint an Expert Group (FEG3) to undertake a foresight study which would analyze expected environmental and resource issues impacting on long-term food security and the implications for future agricultural research in Europe. The objectives of the study are as following.1) Provide long-term assessment and analysis of expected environmental and resource issues and their meaning for future agricultural research. 2) Prepare the ground for a smooth transition towards a world with resource constraints. 3) Consider the role the Knowledge-Based Bioeconomy (KBBE) can play in addressing these challenges. 4) Assemble basic building blocks for a long-term vision of more resilient and sustainable agriculture systems able to feed nine billion people by 2050.

Conclusions

The fundamental building block of a vision for 2050 is that of “a world that is able to guarantee access and control of a growing population to safe, nutritious and culturally acceptable food and to manage the necessary balance between food demand, health and nutrition requirements and natural resources”. Global systems for producing and distributing food must also be more resilient, more sustainable, and more equitable. On the basis of the conclusions emerging from the analysis conducted in the foregoing chapters, we have derived a set of principles upon which our food system in general and research concerning our agriculture and food system in particular should be based:

1. Well-being and high quality of life of all stakeholders involved in food and agricultural systems, from producers to consumers.
2. Resource use efficiency and optimality by avoiding waste, recycling and reducing our footprint and by applying the cascading principle of resource contribution.
3. Resource conservation: to avoid the irreversible loss of natural resources, critical natural resources, including biodiversity, land and water should be maintained, taking into account the interaction between scarcities. Resources conservation does not only imply an increase of productivity in their use, but also a shift towards sufficiency.

4. Diversity and inclusion: food and agricultural systems should reflect the territorial diversity present within the EU and worldwide to ensure resilience and equity.
5. Transdisciplinarity: research and innovation underpinning future food and agricultural systems should fully integrate the various sciences, including the social sciences and humanities, but be also transdisciplinary, that is, fully integrating the end user into research and innovation.
6. Experimentation: research should be diverse, that is, ranging from blue sky research (fundamental research with no immediate applications) to applied research, but also based on different paradigms and narratives.
7. Coordination and impact evaluation: research should be better coordinated across thematic domains as well as Member States. At the same time, research impacts should be better monitored and evaluated.
8. Public involvement: strong public investment into research remains crucial to safeguard all of the previous principles.

A radical change in food consumption and production in Europe is unavoidable to meet the challenges of scarcities and to make the European agro-food system more resilient in times of increasing instability and surprise. Inspired by the fact that Europe is taking up the climate change challenge in industry and is intending to make new energy technologies a win-win-win strategy for market, labour and human welfare, the agro-food sector should now consider that there is an opportunity to positively take the challenge and be the first to win the world market for how to sustainably produce healthy food in a world of scarcities and uncertainty.

Source online – full access:
http://ec.europa.eu/research/agriculture/scar/pdf/scar_feg3_final_report_01_02_2011.pdf

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6.3 Report: Beyond business as usual. Toward a sustainable food system.
Food Ethics Council (2013), Brighton, UK. pp. 64.

Summary
Adapting to the profound effects of climate change, lifting one billion starving people out of hunger, addressing the escalating obesity crisis – these are just three of the many formidable economic, social and environmental challenges confronting the food system. One thing is clear: if society is going to successfully meet these challenges, something has to change – 'business as usual is not an option'. This assessment – a key message from our 2010 report *Food Justice* – has gained widespread, cross-sectoral endorsement in recent years. To date, however, this growing consensus has not been translated into the transformative policy and practice that is urgently required. What, exactly, does getting beyond business as usual mean in practical terms? That is the question the Food Ethics Council's *Beyond Business As Usual* project has sought to answer. We conducted an extensive dialogue with senior business figures, key public servants, civil society campaigners and academics. We asked them to tell us about the main barriers to achieving a fair, healthy and environmentally sustainable food system, and to identify what needs to be done to overcome them. And once we had considered stakeholders' responses to these questions, we convened a series of roundtable discussions to explore in detail the most pressing challenges and the most promising solutions.

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http://www.foodethicscouncil.org/system/files/BBAU%20FINAL%20web%20version_1.pdf

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6.4 Report: Building Green Global Value Chains.
IDH - The Sustainable Trade Initiative, (2013). Pp. 15.
Abstract
In this paper we explore why and how the private sector is working in partnerships with the public sector on building green global value chains. The findings and insights are based on the experiences of the companies associated in the Dutch Sustainable Growth Coalition and five years of intensive work of driving green growth in supply chains through IDH (The Sustainable Trade Initiative). The Sustainable Trade Initiative was set up with support of the Dutch and Danish governments to build coalitions of companies, governments and NGOs that would transform markets towards sustainability at scale. This paper provides key lessons how to drive such change effectively.
We have made the point that by partnering with a limited number of leading companies we can work to change the practices of 1.5 billion producers and 7 billion consumers. Naturally there is a short-term cost before long-term gain and sustainability will only be achieved when brown economies decline at a faster rate than the increase of the green economies. We have provided substantial evidence that the greening of global value chains provides a powerful opportunity to merge public and private interests. Our key message is for governments to innovate and seek to leverage the enormous drive and investments of the private sector in earning both their license to operate and their long-term security of supply.

Source online – full access:
http://www.greengrowthknowledge.org/SiteCollectionDocuments/Paris%20Conference/Building%20Green%20Global%20Value%20Chains%20-%20IDH.pdf

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6.5 Article: Changing governance patterns in European food chains: the rise of a new divide between global players and regional producers
Palpacuer, F Tozanli, S (2008).Transnational Corporations, 17, No. 1

Conclusion
Unlike most of the GVC literature, this article deals with changes taking place in a Northern setting, in the midst of regulatory reforms that are likely to promote global sourcing and significantly reshape the geography of food production for the European market. It provided evidence of a growing divide between major players at the downstream end of European chains, which have engaged in globalization and financialization strategies since the late 1980s and have strong incentives to shift from European to lower-cost global sourcing, and upstream producers, which have maintained regional mass production schemes under CAP protection with North-South relationships in GVCs, and conditions under which suppliers located in developing countries could improve their position by following trajectories of “industrial upgrading” so that their participation in global production could contribute to economic development in these countries.

Source online – full access:
http://unctad.org/en/docs/iteiit20081a4_en.pdf

6.6 Article: Types of corporate responsibility and engagement with NGOs: an exploration of business and societal outcomes

Kourula, A; Halme, M. (2008). Corporate Governance 8, pp. 557 – 570.

Abstract

This paper aims to classify different corporate responsibility (CR) actions into three types – philanthropy, CR integration and CR innovation – and examines different forms of corporate engagement with nongovernmental organizations (NGOs) through this categorization. The focus is on the societal and business outcomes of engagement. The study analyzes 20 business-NGO collaborations of three case companies – Hindustan Unilever, Nokia and Stora Enso. Cases are chosen based on revelatory sampling and data are gathered through documentary research of corporate sustainability reports, project reports and websites. Data analysis focuses on engagement forms, business and societal outcomes of engagement and utilizes a categorization of CR.

Different CR types involve different forms of cooperation ranging from sponsorship to partnership. Furthermore, CR integration and CR innovation seem to have more potential for long-term positive business outcomes than philanthropy. In terms of societal outcomes, CR innovation seems to have the highest potential in creating local income-generating mechanisms and supporting local self-sufficiency. A main suggestion of the study is that more in-depth case studies of CR projects should be conducted to develop and improve indicators for business and societal outcomes.

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http://www.emeraldinsight.com/journals.htm?articleid=1740735&show=abstract

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7 Certification and food labels

This section introduces the reader to the use of standards in sustainable food systems and further focuses on the role that certification and food labels play in creating alternative practices that are more sustainable.

7.1 Working paper: The Role of Standards in promoting Food System Sustainability.

King, R.P., Backus, G. (2011). The Food Industry Center, University of Minnesota, pp. 20.

Excerpts

The terms *sustainable* and *food system* are often used without explicit definitions. In this paper, we define a food system as an interconnected set of biological, technological, economic, and social activities and processes that nourish human populations and provide livelihood and satisfaction to the people who participate in it. A food system encompasses activities that extend from the provision of inputs for primary food production through farming, food processing and manufacturing, food distribution, food consumption, and post-consumption food waste. A food system is sustainable if it can maintain or improve its performance over the long term. This means that the system operates in a manner that does not degrade the fundamental environmental, human, and societal resources that support it.

Efforts to develop standards that measure and guide progress toward a more sustainable food system have been proliferating in recent years. There are concerns that the multiplicity of indicators, standards, certifications, and labels is leading to confusion for consumers and to increasing costs for suppliers who are trying to conform to or qualify for them. There is a need for diverse standards and measures, since

there is great variation in the sustainability drivers associated with different food products and processes. However, there is also a need for higher level, overarching standards that serve as meaningful measures of sustainability for an entire supply chain, for a retail outlet that sells products originating from many supply chains, or for an entire food system.

We believe this kind of confusion impedes discussion, development, and implementation of food system sustainability standards. In this paper we identify three possible purposes for sustainability standards: (1) assessment and monitoring, (2) informing and influencing, and (3) regulating and controlling.

Indicators: As tools for monitoring and assessment, sustainability indicators can be used to characterize the current state of the food system and to measure changes in its state over time. Systems of food system indicators are usually maintained by government agencies or by nonprofit organizations. Reliance on publicly available data lowers costs and increases transparency. Indicator systems help the public understand the food system and how it is changing, but they do little to directly influence activities within the food system. Food system indicator systems are an important class of standards that help monitor and assess progress toward sustainability, but they do little to encourage sustainable behavior by food system participants. The next two sections discuss standards that can more significantly influence progress toward sustainability.

Labels: As tools for informing and influencing, sustainability standards embodied in labels and certification systems are designed to efficiently communicate information about the sustainability attributes of products or of business processes. Fair trade and organic certification are familiar examples of such standards. They are visible at the point of sale and convey information that would be costly for consumers to collect or verify. Sustainability label and certification schemes typically encourage sustainable practices in the production and distribution of food through a self-imposed enforcement mechanism. Firms voluntarily link their products to a label or certification, almost always incurring some cost in doing so. By publicly announcing their commitment to a label or certification, they provide assurances that they adhere to the standards associated with it. Failure to abide by those standards would result in sanctions that could damage the brand image of the firm's products.

Consumers find it difficult to identify sustainable food products. Individuals may value a sustainable lifestyle, but information acquisition may be too costly because consumers only have the luxury of a few seconds to make their choice while in a food store. Labels and certificates are intended to make it easy to take these concerns into account when purchasing food items. Because they are usually linked to specific products of processes, sustainability labels and certificates are often not well suited for measuring overall food system sustainability and so are not necessarily effective complements to sustainability indicators used for assessment and monitoring.
The proliferation of standards and labels for organic, fair-trade, regional, and healthy food products risks creating confusion and information overload among consumers. The Green Claims Guidance aims to help businesses and customers make more informed decisions about what they buy and prevent misleading claims in the marketplace. This effort aims to reduce the number of claims that may be misleading while protecting consumers and businesses from unfair marketing.

Source online – full access:

http://foodindustrycenter.umn.edu/prod/groups/cfans/@pub/@cfans/@tfic/documents/content/cfans_content_353244.pdf

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7.2 Article: Third-party certification in the global agrifood system.

Hatanaka, M., Bain, C., Busch, L. (2005). Food Policy 30, pp. 354–369.

Abstract

Recently, third-party certification (TPC) has emerged as a significant regulatory mechanism in the global agrifood system. It reflects a broader shift from public to private governance. Traditionally, government agencies were responsible for monitoring food safety and quality standards. However, the globalization of the agrifood system, the consolidation of the food retail industry, and the rise in private retailer standards have precipitated a shift in responsibility for this task to third-party certifiers. This development is reconfiguring social, political, and economic relations throughout the contemporary agrifood system. In discussing the rise of TPC, this paper focuses on the role and implications for three key stakeholder groups: supermarket chains, producers, and non-governmental organizations. We conclude that TPC reflects the growing power of supermarkets to regulate the global agrifood system. At the same time, TPC also offers opportunities to create alternative practices that are more socially and environmentally sustainable.

Source online – full access:
ftp://ftp.whrc.org/tamingagroindustry/Nepstad/Hatanaka_et_al_2005.pdf

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7.3 Report: Toward sustainability. The Roles and Limitations of Certification.

Steering Committee of the State-of-Knowledge Assessment of Standards and Certification. (2012). Washington, DC: RESOLVE, Inc., pp. 115.

Summary

In today's marketplace, consumers facing an in-store or online display of products typically have to choose from among items produced in distant places under unknown conditions. High-profile cases of contaminated food, child labor, animal welfare problems, and the collapse of fisheries and other resources have raised consumer concerns about how products are made or harvested. Companies also face challenges in assuring that their sources of supply will be available over the long term and that their brands and reputations will thrive. Major global brands have been called into question concerning practices associated with their products. Certified products—such as sustainable seafood, organic food, fair trade coffee, and responsibly harvested wood—are often presented as part of the solution. But are certified products really better for the environment? Are they better for people and communities? Can they catalyze more sustainable production and consumption across whole sectors? Under what circumstances do they promote sustainable practices? The only certainty is that things will change. While no one can predict what changes are likely in the next 10 years, much less the next 40, anticipating change and reacting to it more effectively are important. The goal of this chapter is to help identify the types of issues that are likely to affect certification and standards systems directly, as well as those that are likely to affect the overall political, social, economic, and environmental context in which certification systems operate. The intent of this discussion is to help readers understand *how* to think about certification and the factors that will likely affect it going forward, rather than what to think about them.

The key trends that will have the most indirect impacts on certification programs are likely to be population growth, economic growth, increases in income, and concomitant increases in consumption. And, climate change has the potential to rewrite the ground rules for most certification systems. However, if per capita consumption doubles globally as many analysts predict (Clay, 2010), and production does not expand accordingly around the world, then production per unit of input will need to be intensified. Thus productivity will be a key indicator of sustainability. And as yet no certification program has productivity as a criterion. In the near term, to be more sustainable and to protect natural habitat, we will have to produce more with less. This is the challenge not only for certification programs but for all production.

Source online – full access:
http://www.resolv.org/site-assessment/towardsustainability/

7.4 The Evidence Base for Environmental and Socioeconomic Impacts of "Sustainable" Certification
Blackman, A and Rivera, J. (2010). Environment for Development. Discussion Paper series.
Abstract
Initiatives certifying that farms and firms adhere to predefined environmental and social welfare production standards are increasingly popular. According to proponents, they create financial incentives for farms and firms to improve their environmental and socioeconomic performance. This paper reviews the evidence on whether sustainable certification of agricultural commodities and tourism operations actually has such benefits. It identifies empirical *ex post* farm-level studies of certification, classifies them on the basis of whether they use methods likely to generate credible results, summarizes their findings, and considers the implications for future research. We conclude that empirical evidence that sustainable certification has significant benefits is limited. We identify just 37 relevant studies, only 14 of which use methods likely to generate credible results. Of these 14 studies, only 6 find that certification has environmental or socioeconomic benefits. This evidence can be expanded by incorporating rigorous, independent evaluation into the design and implementation of projects promoting sustainable certification.

Source online – full access:
http://www.rff.org/RFF/Documents/EfD-DP-10-10.pdf

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8 Case studies

Science based case studies of sustainably certified food products and companies are yet very limited. This section gathers a few studies on the certification Marine Stewardship Council, beginning with the MSC organizations own account of outcomes. This is followed by two scientific studies with differing views of the effectiveness of MSC. The fourth paper presents the case of sustainable certification of one of the world's largest Tea brands, while the last article focuses on Unilever's progress towards agricultural sustainability.

8.1 Report: Sea Change: 10 years of the Marine Stewardship Council.
Marine Stewardship Council report (2009). pp. 37.
Overview
Ever since 1999, when the first fisheries joined its embryonic program, the Marine Stewardship Council (MSC) has helped bring to our attention an astonishing and sustainable resource. On the eve of the

organization's 10th anniversary year, there were over 2,000 products and close to 2.5 million tons of sustainable seafood carrying the MSC ecolabel. Measurable improvements have occurred under MSC certification. One notable example is the New Zealand Hoki fishery, where historically low stock levels have this year recovered due to a raft of management measures. These include a stock rebuilding plan proposed by certifiers as part of MSC certification. In another case, gains came as a direct result of "chain of custody" certification – through which all seafood carrying the MSC logo is traceable all the way back to the certified fishery.

Most fisheries say the MSC label has helped them retain existing markets and gain access to new ones, geographically or in terms of opportunities arising from new product category developments. The Bering Sea and Aleutian Islands Alaska cod fishery has achieved both. Before, its main sales were in dried cod and wet salted fillets. Since certification, it has broken into the double-frozen, value-added, breaded-and-battered market and has expanded its market to include countries in Europe. Some fishers reported price premiums. The main beneficiaries have been smaller-scale, artisanal fisheries – many of which have survived and prospered as a result of more favorable prices. In Australia, the Lakes and Coorong fishery says it regularly commands premiums of 30 to 50 per cent for MSC certified versus non-certified seafood sold to restaurants in Sydney and Melbourne. The Western Australia rock lobster fishery (page 8) is a good example of how fisheries can experience economic benefits beyond price premiums. When the Australian government implemented legislation requiring businesses to be audited and certified in order to export seafood, MSC certification was accepted as an alternative mechanism to meet this requirement, saving the fishery the costs of export certification.

Certification can also bring social benefits. If fishery resources are managed sustainably, this should improve the security of the livelihoods of the fishing communities who depend upon them. The Mexican red rock lobster fishery provides a powerful example of MSC certification contributing to the delivery of wider social benefits through community empowerment. Engagement in the MSC program put the ten villages supported by this small, community-based fishery on the federal government's map. This resulted in increased government attention and better provision of essential services, such as a $20 million grant for electricity and government help with infrastructure, access roads and drinking water. In Europe, where most of the major herring fisheries are either MSC certified or under assessment, their critical mass has changed the mood of EU fishing negotiations. Quotas and other business are now handled in a more precautionary way, with the judgment of the MSC certifiers in mind. It all goes to show that, over the past 10 years, the MSC program has been helping in ways that go way beyond the simple measure of a price premium. Here, the MSC's true advocates tell the complex, enthralling story of an industry's transformation – what can only be described as a sea change.

Source online – full access:
http://www.msc.org/documents/email/Net-Benefits-report.pdf

8.2 Article: An Evaluation of Environmental Changes within Fisheries Involved in the Marine Stewardship Council Certification Scheme.

Martin, S.M., Cambridge, T.A., Grieve, C., Nimmo, F.M., Agnew, D.J. (2012). Reviews in Fisheries Science 20, pp. 61-69.

Abstract

There is ongoing debate regarding the value of market-based instruments, such as certification schemes, as an approach to improving the environmental impact of fisheries. This article evaluates the effects of the Marine Stewardship Council on the environmental performance of fisheries over the period before and after certification. A large number of fisheries (n = 447) have undertaken pre-assessments, and in most cases (83%), the auditors recommended that significant improvements should be made before entering full assessment. In cases where substantial improvements were required, the proportion of performance indicators scoring over 80 (considered by the Marine Stewardship Council to be the point of best practice) increased by 22% between pre-assessment and certification. Significant improvements continued after certification, characterized by a 16% increase in the proportion of performance indicators scoring over 80 over a period of five years. Increases in scores assigned by auditors were significantly correlated with increases in real environmental performance (such as increases in stock biomass or the development of protected areas) and improvements in information, which led to increasing certainty that impacts were within sustainable limits. Although results show that certification is associated with real environmental benefits, most improvements are made by fisheries that require significant changes to enter the program.

Source online – restricted access:
http://www.tandfonline.com/doi/pdf/10.1080/10641262.2011.654287

8.3 Article: The Marine Stewardship Council (MSC) and the Making of a Market for 'Sustainable Fish'

Ponte, S. (2012). Journal of Agrarian Change 12, pp. 300-315.

Abstract

Market-based instruments of fishery governance have been promoted in the past two decades on the basis of two widespread expectations: that complying with sustainability standards will lead to environmental benefits; and that certifications will not discriminate against specific social groups, countries or regions. This paper assesses whether these assumptions hold through the analysis of how the Marine Stewardship Council (MSC) label for capture fisheries has managed 'supply', 'demand' and 'civic' concerns in the market for sustainability certifications. The MSC has created and now dominates the market for 'sustainable fish', but success has been accompanied by serious challenges. The MSC has so far failed to convincingly show that its certification system has positive environmental impacts, and it has marginalized Southern fisheries, especially in low-income countries. As an institutional solution to the global fishery crisis, the MSC seems to be better tuned to the creation of a market for 'sustainable fish' rather than 'sustainable fisheries'.

The MSC has been successful in becoming the main reference in the market for sustainability certifications in capture fisheries. It did so by enrolling large fisheries in its program (addressing supply concerns) and by working aggressively with major retailers and catering business to find a consumption outlet for 'sustainable fish' (addressing demand concerns). The MSC's attempts to address civic concerns have focused mainly on procedural improvements that have not yet led to documented positive impacts on the environment. The MSC is still excluding labor and socio-economic conditions of production from its standard. And its enrolment of developing-country fisheries lags behind – only a few Southern fisheries, and only one in a lower-middle-income country, have been certified so far. No fisheries in low-income

countries have been certified so far or are undergoing certification. By not being able to seriously address the issue of Southern exclusion, however, the MSC is limiting its long-term prospects of further expansion and is exposing itself to potential competition from other initiatives in the market for sustainability standards, such as the FOS certification system.

Source online – restricted access:
http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0366.2011.00345.x/pdf
Related research environment:
http://www.diis.dk/sw116670.asp

8.4 Case paper: Sustainable Tea at Unilever.
Henderson, R.M., Nellemann, F. (2011). Harvard Business School Publishing, Boston, pp. 26.
Excerpts
In 2010 Unilever announced its commitment to a new "Sustainable Living Plan", a document that set wide-ranging company-wide goals for improving the health and well-being of consumers, reducing environmental impact, and, perhaps most ambitiously, sourcing 100% of agricultural raw material sustainably by 2020. Such a goal implied a massive transformation of a supply chain that sourced close to 8 million tons of commodities across 50 different crops. Unilever CEO Paul Polman believed that the company's ambitious goals could drive savings, product innovation, and differentiation across the company's portfolio of products. But more importantly, it would create a company better suited to survive in the future.

The changes happening at Lipton, Unilever's €3.5 billion tea brand, were an important corner stone of Unilever's plan. For over five years, Michiel Leijnse, the global brand director for Lipton Tea, and the Unilever Procurement team had led the transformation of the Lipton brand and its supply chain towards a goal of 100% sustainable sourcing….Unilever's goal was to have all of the tea in Lipton teabags sourced from Rainforest Alliance Certified farms by 2015, and to have every kilogram of Unilever tea sustainably sourced by 2020. Unilever first established a set of good agriculture practice guidelines in 1998. The guidelines outlined sustainable farming practices for the suppliers of its major crops, including tea, palm oil and tomatoes, and included 10 key indicators of environmental, social, and economic performance, each with their own sub-parameters (see Exhibit 7b for more details). The guide was not imposed on external suppliers, but it was shared with them and with the broader public. This was the first move of this kind in the industry.

Leijnse and his team decided to pursue certification for the brand, and chose the Rainforest Alliance, a founding member and secretariat of the Sustainable Agriculture Network (SAN), as its certification partner. There was significant overlap in both Unilever's and Rainforest Alliance's approach to sustainable agriculture practices, in that both focused on environmental, economic, and social factors. Further, the Rainforest Alliance focused on market-based premiums rather than fixed price supports (characteristic, for example, of FairTrade products) as the best way to create change. Rainforest Alliance certification evaluated farms according to 10 principles covering issues such as worker welfare, farm management, and environmental protection, each with its own criteria. While independent farmers bore the costs of complying with the Rainforest Alliance standards, Unilever also incurred costs in choosing to buy certified tea. First, Unilever paid a premium for the tea. In 2011, this was approximately €0.08 per kilogram of tea. In 2010, the average market price per kilogram of tea was €1.69. In the market for certified coffee, price

premiums of 15% had been seen. From 2011, Unilever had to pay the Rainforest Alliance a participation fee in order to carry the organization's frog logo on its pack.. This fee was €0.0089 per kilogram of tea. Unilever's Procurement organization devoted six full-time equivalent people to work on the roll-out of global certification education and spent approximately €200,000 per year on the development and deployment of farmer training in conjunction with the Rainforest Alliance.

Certifying the 500,000 Kenyan smallholders from which Unilever purchased tea was a critical component of the Rainforest Alliance roll-out since East Africa alone accounted for nearly one third of Unilever's total tea requirement. Fortunately, Unilever was able to work with the Kenyan Tea Development Agency (KTDA) and with the IDH, the Dutch Sustainable Trade Initiative, to design a program that "trained the trainers" and led to the rapid diffusion of sustainable farming practices across the country. By 2011 the Rainforest Alliance had successfully certified over one-third of the smallholder farmers in Kenya, and Unilever was confident that eventually all Kenyan smallholders would gain certification.

Rainforest Alliance certification was launched with full-scale marketing campaigns for all of Unilever's biggest Western European and Australian tea brands, including Lipton Yellow Label, PG tips, and Lyons. In some markets the campaigns met with significant success. In others, however, the impact was much more limited:
UK: Sales of PG tips increased by 6%. Surveys suggested that there had been a steady increase in the perception of PG tips as an ethical brand following the launch of the campaign.
Australia: Relative to the same test period the year before the campaign, sales were up 11% and Lipton's market share rose by 158 basis points from 24.2% to 25.8%. Average purchase value per occasion rose from €3.11 to €3.23. The only area where the Lipton brand did not improve was on perceptions of quality, which decreased slightly during the campaign.
Italy: Following the first year of the campaign in 2008, Lipton saw sales of its Yellow Label brand increase by 10.5% and market share increase by over 2 full percentage points. It also witnessed an increase in its buyer base, which came mostly from younger and more upmarket consumers.
France: Lipton market share remained flat and awareness of the brand did not increase. Further, the campaign was not successful in linking Lipton to Rainforest Alliance, and Lipton was not seen as more ethical than other tea brands.
USA: Unilever did not see any significant effect on overall market share for Lipton or the Rainforest Alliance certified-green tea.

A few years after the launch of the certification scheme many of Unilever's major competitors responded with their own certification programs. Tetley, Twinings, and Yorkshire Tea all made arrangements for some or all of their tea suppliers to obtain Rainforest Alliance certification, while Pickwick and Carmien Tea opted to use UTZ, a certification scheme originating in The Netherlands. Yorkshire Tea announced a goal of selling 100% Rainforest Alliance certified tea by 2015.34 Twinings had goals of 100% certification by 2015 for its Everyday brand tea. Tata's Tetley Tea vowed to have 100% of its branded tea certified by 2016, a year after Lipton. The surge in demand placed pressure on the Rainforest Alliance, who expected to be certifying close to 20%-25% of the world's tea supply by 2015.
With competitors committing to third party certification, sustainable tea at Unilever faced a number of challenges going forward. On the supply side the company had to improve farming practices in some very difficult markets in order to meet the company's targets. On the marketing side, Leijnse and his colleagues had to decide how to proceed in emerging markets. Could consumers in countries like Turkey, Russia or

India be persuaded to value certified tea? If so, how? And how could Lipton maintain a point of difference in countries where competitor brands had followed suit?

Source online – full access:
http://www.bordbia.ie/industryservices/information/publications/CorporatePublications/PathwaysforGrowth2012/1%20Unilever.pdf

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8.5 Article: Multi-year assessment of Unilever's progress towards agricultural sustainability : outcomes for peas (UK), spinach (Germany, Italy), tomatoes (Australia, Brazil, Greece, USA), tea (Kenya, Tanzania, India) and oil palm (Ghana)

Pretty, J., Smith, G., Gouldingc, K.W.T., Grovesd, S. J., Hendersone, I. et al (2011). International Journal of Agricultural Sustainability 6, pp. 63-88

Abstract

The foods, home and personal care company, Unilever, is a large user of raw materials from agriculture, and a major buyer of goods on world markets. The continued supply of these materials is seen as an important component in the business's long-term success. The company has a long history of seeking to farm responsibly on company farms and for directly contracted raw materials, but it became clear that an approach based solely on suppliers' good agricultural practice would not safeguard supplies where increasing social and environmental pressures on agriculture were growing, or where increasing consumer concerns about the food chain could undermine markets and brands. Both threats suggested the need for a more radical approach. This resulted in the development of a mission statement, the agreement of four principles for sustainable agriculture, the identification of ten sustainable agriculture indicators (later 11), and the selection of five key crops the sustainable supply of which was significant to the company.

This paper summarizes progress towards the sustainable supply of these crops by reporting on selected sustainability indicators for the crops (peas, spinach, tomatoes, tea and oil palm) in 11 countries. Some of the businesses using these products have been subsequently sold, but these are reported here because the aim is to explore how responsive are different indicators of sustainability to management action in different crops in widely differing locations. This paper focuses on a selection of findings for each of the 10 indicators, in order to illustrate the extent of changes that have been observed over time. These also indicate some of the difficulties faced in making improvements on the ground. The gathering of data on sustainability indicators is closely tied to the development of alternative practices that should quickly deliver improvements in a variety of outcomes. An assessment is also made of the key changes that have occurred for each of the main five crops as a result of adopting the sustainability indicator system and associated new management practices.

Multi-year assessments were conceived as the way to understand and demonstrate progress towards more sustainable agriculture. The important developments were of systems that combined ensuring that agricultural suppliers performed to an acceptable set of criteria, and then had the capacity and willingness to identify the most critical areas where further progress was required. The challenge for the company is now to encourage others to adopt their approach to making supply chains more sustainable, both for their customers and the consumers of their branded goods.

Source online – restricted access:
http://www.tandfonline.com/doi/abs/10.3763/ijas.2007.0323

8.6 Report: Olam International and Rainforest Alliance Case Study. Reducing Risk: Landscape Approaches to Sustainable Sourcing.

Brasser, A., 2013. DC. EcoAgriculture Partners, on behalf of the Landscapes for People, Food and Nature Initiative, Washington, p. 20.

Executive summary

Olam is a global integrated supply chain manager of agricultural products and food ingredients, sourcing 20 products, with a direct presence in 64 countries. In Ghana it sources 80.000 Mt cocoa per year, of which four-percent (4%) originates from the western Bia/ Juabeso region, representing USD 6 million market value. Olam started its operation in the region by conducting a standard risk assessment. Primary risks identified included community and operational related to farmers' ability to dependably supply Olam and to deforestation and impacts on cocoa production due to climate change. The company recognized that the regular producer support programme was unable to mitigate climate change and other resource risks. Therefore, in 2011, Olam partnered with the Rainforest Alliance, to start the "Climate Cocoa Partnership for REDD+ Preparation" project. The main focus of the project is to break the link between cocoa production and deforestation and build cocoa production areas mixed with forest lands to become more resilient to moisture and temperature changes due to climate change. Additionally, the project aims to allow Olam to be the first company to bring climate-friendly cocoa to market, diversify opportunities and increase income for farmers, build efficient value chains, and serve as a learning model for future expansion of the project.

The partnership has worked with stakeholders at all levels through a variety of means in order to accomplish these goals. With farmers, the partnership has been instrumental in training them to be certified under the Sustainable Agriculture Network standard including the additional climate module thus ensuring that both sustainable and climate smart methods of agriculture are followed. Such certification allows for farmers to increase their incomes by not only being paid more for higher quality cocoa but also promotes the intercropping, and maintaining of carbon stocks as supplementary income sources. Additionally, the partnership has been working closely with the Forestry Commission, traditional authorities and private concession holders on partially or wholly devolving land rights to local communities who can then support sustainable forest management practices and develop these resources into REDD projects. Though the project is to last until 2014, there are already results and lessons learned being drawn from the experience. At the end of 2012, there were 833 farmers and 1,259 farms certified, which contributed to an estimated yield of 1,295 metric tons of certified beans sold for US$2.4 million. Sourcing is expected to increase to 3000 metric tons by 2014 and continue to rise over time. While this project represents almost double the cost of a normal business venture of this scale for Olam, the company intends to reduce costs as they learn from mistakes and the project matures. If a success, Olam looks to eventually apply these methods to other cocoa sourcing areas as well to other tree crops, such as coffee.

Source online – full access:
http://landscapes.ecoagriculture.org/documents/files/reducing_risk_landscape_approaches_to_sustainable_sourcing__olam_and_rainforest_alliance_case_study.pdf

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9 Book references

This section will provide the reader with the recent books that focus on sustainable food.

The role of Biotechnology in a Sustainable Food Supply.

Popp, J.S., Jahn, M.M., Matlock, M.D., Kemper, N.P. (eds.) (2012). Cambridge University Press, New York, pp. 296.

Introduction

One of the main challenges of our generation is the creation of an efficient system that provides sustainable food, feed, fiber, and fuel from the land while also preserving biodiversity and ecosystems. This edited volume - which includes contributions from leading scholars in many different fields - discusses the many factors in the use of agricultural and food biotechnology as we work toward sustainable food production systems. The focus includes diverse perspectives on the challenges, opportunities, success stories, barriers, and risks associated with biotechnology. Further studies on the effects of biotechnology on the environment are summarized. The book also discusses relevant ethical and moral issues, potential changes to government policies and economics, and other social implications of agricultural biotechnology. This comprehensive and interdisciplinary book will be of great interest to students, professionals, and researchers in various fields - from bioengineering, agriculture, and ecosystem science, to economics and political science.

Online reference – Google Books:
http://books.google.dk/books/about/The_Role_of_Biotechnology_in_a_Sustainab.html

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Sustainability in the Food Industry.

Baldwin, C.J. (ed.) (2009). Wiley-Blackwell, Iowa, pp. 280.

Introduction

Sustainability is beginning to transform the food industry with environmental, economic and social factors being considered, evaluated and implemented throughout the supply chain like never before. Sustainability in the Food Industry defines sustainability with a comprehensive review of the industry's current approach to balancing environmental, economic and social considerations throughout the supply chain. In addition, tools and information are provided to enhance future progress. To achieve this, the book combines technical research summaries, case studies and marketing information. Coverage includes sustainability as it relates to: agricultural practices, food processing, distribution, waste management, packaging, life cycle analysis, food safety and health, environmental labeling, consumer insight and market demand, product development, practices in food manufacturing companies, food retailing and food service. An international group of authors covers the information from a global perspective. Sustainability in the Food Industry offers an overview of sustainable sources of impact and improvement, how they relate to the key sectors of the food industry and how programs may be implemented for further improvement.

Online reference – Google Books:
http://books.google.dk/books/about/Sustainability_in_the_Food_Industry.html?id=bplcz7P2rLUC&redir_esc=y

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Handbook of Sustainability for the Food Sciences.
Morawicki, R.O. (2012). Wiley-Blackwell, Oxford, pp. 375.
Introduction
Many books on sustainability have been written in the last decade, most of them dealing with agricultural systems, communities, and general business practices. In contrast, Handbook of Sustainability for the Food Sciences presents the concept of sustainability as it applies to the food supply chain from farm to fork but with a special emphasis on processing.
Structured in four sections, Handbook of Sustainability for the Food Sciences first covers the basic concepts of environmental sustainability and provides a detailed account of all the impacts of the food supply chain. Part two introduces the management principles of sustainability and the tools required to evaluate the environmental impacts of products and services as well as environmental claims and declarations. Part three looks at ways to alleviate food chain environmental impacts and includes chapters on air emissions, water and wastewater, solid waste, energy, packaging, and transportation. The final part summarizes the concepts presented in the book and looks at the measures that will be required in the near future to guarantee long term sustainability of the food supply chain. Handbook of Sustainability for the Food Sciences is aimed at food science professionals including food engineers, food scientists, product developers, managers, educators, and decision makers. It will also be of interest to students of food science.

Online reference – Google Books:
http://books.google.dk/books/about/Handbook_of_Sustainability_for_the_Food.html?id=gi0QzPIS4_AC&redir_esc=y

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Toward Sustainability. The Roles and Limitations of Certification.
Steering Committee of the State-of-Knowledge Assessment of Standards and Certification. (2012). Washington, DC: RESOLVE, Inc. pp. 427.
Introduction:
This final Assessment report is a significant contribution to a field that is already making tangible contributions and could bring about significant progress toward a sustainable economy. The report provides usable knowledge that can inform firms, governments, and civil society in their continuing search for more sustainable practices. In particular, the report helps to answer questions such as the following:
▪ What factors do businesses, governments, NGOs, foundations, and consumers take into account when using or deciding whether to use or support certification?
▪ What is known about the environmental, social, and economic impacts of voluntary standards and certification systems?
▪ How do other forces—such as government regulation—interact with certification systems, and how do those interactions affect outcomes?
Our intent in publishing this Assessment report is for businesses, governments, foundations, and NGOs to make use of its findings and recommendations in their decision making and investments. We also hope the Assessment spurs research that will further expand learning, leading to better use of certification and other tools to induce more sustainable production and consumption.
Online – full access:
http://www.rainforest-alliance.org/sites/default/files/publication/pdf/Toward-Sustainability-report-summary-and-appendicesv2.pdf#page=168

Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, and Build Competitive Advantage

Esti, D., Winston A. (2009). John Wiley & Sons, Inc ., Hoboken, New Jersey.

Introduction

In the weeks before Christmas 2001, the Sony Corporation faced a nightmare. The Dutch government was blocking Sony's entire European shipment of PlayStation game systems. More than 1.3 million boxes were sitting in a warehouse instead of flying off store shelves. Was this a trade war or an embargo against violent video games? Sony executives probably wished it were something that easy to fix. So why was Sony at risk of missing the critical holiday rush? Because a small, but legally unacceptable, amount of the toxic element cadmium was found in the cables of the game controls. Sony rushed in replacements to swap out the tainted wires. It also tried to track down the source of the problem—an eighteen-month search that included inspecting over 6,000 factories and resulted in a new supplier management system. The total cost of this "little" environmental problem: over $130 million. In Green to Gold, we take you inside leading companies, across industries, and around the world. We show you the real costs, hard choices, and trade-offs companies face when they make environmental thinking part of their core business strategy. Pundits who dismiss the natural world as an issue—or commentators on the other "side" who underestimate the difficulties businesses face in executing environmental strategies—do neither the business world nor the planet any favors. By systematically analyzing the experiences of dozens of companies, we've been able to extract the key strategies, tactics, and tools that are needed to establish an environmentally based competitive advantage. In a marketplace where other points of competitive differentiation, such as capital or labor costs, are flattening, the environmental advantage looms larger as a decisive element of business strategy. Indeed, no company can afford to ignore green issues. Those who manage them with skill will build stronger, more profitable, longer-lasting businesses—and a healthier, more livable planet.

Online reference – Google Books:
http://books.google.dk/books/about/Green_to_Gold.html?id=HxSV_2WTJFcC&redir_esc=y

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Sustainable dairy production

de Jong,P. (2013). Wiley Blackwell, Chichester, UK.

Introduction

The book offers a comprehensive overview of the state of the art in sustainable dairy production, helping the industry to develop more sustainable dairy products, through new technologies, implementing life cycle analysis, and upgrading and optimization of their current production lines. It aims to stimulate process innovations, taking into account environmental, economic and public relations benefits for companies. Topics covered include: how to set up a sustainable dairy production line; How to quantify the carbon foot print of a dairy product by using life cycle analysis; Current technologies to improve the carbon foot print; and much more.

Online reference – Google Books:
http://books.google.dk/books/about/Sustainable_Dairy_Production.html?id=ohnMiOxCuHIC&redir_esc=y

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Imagining sustainable food systems
Blay-Palmer, A. (2010). Ashgate Publishing, Surrey. pp. 251.
Introduction
What defines a sustainable food system? How can it be more inclusive? How do local and global scales interact and how does power flow within food systems? How to encourage an interdisciplinary approach to realizing sustainable food systems? And how to activate change? These questions are considered by EU and North American academics and practitioners in this book. Using a wide range of case studies, it provides a critical overview, showing how and where theory and practice can converge to produce more sustainable food systems

Online reference – Google Books:
http://books.google.dk/books/about/Imagining_Sustainable_Food_Systems.html?id=53tMeaZBtQkC&redir_esc=y

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10 Initiatives related to sustainable food systems

This section gives an overview of future initiatives regarding sustainable food systems. The focus is placed on important events such as congresses, forthcoming conferences, some forums and research institutions that deal mainly with the issue of sustainable food.

Congress: Global Challenges: Achieving Sustainability.
IARU Sustainability Science Congress. Copenhagen, Denmark from October 22nd - 24th 2014.
The Sustainability Science Congress puts global focus on research related to global sustainability issues, including climate change. The congress is a follow-up from the inaugural climate congress held in 2009 in conjunction with COP-15 in Copenhagen. The congress aims to achieve a strong turnout of participants, appeal to the scientific community, and to spark a broader conversation about sustainability. The congress is expected to attract 800 participants with representatives from academia, private enterprise, policy makers and media.

Website: http://sustainability.ku.dk/iarucongress2014/

Conference: Ninth International Life Cycle Assessment of Foods Conference
The American Center for Life Cycle Assessment ACLCA. San Francisco, California in October 2014.
This dynamic event – globally known as the LCA Foods 2014 – unites the scientific community with food industry professionals, researches, academics and policy makers. This will be the first time the conference is being held outside of Europe and it is an opportunity to enhance US agriculture through sustainability. The Vision of the LCA of Foods Conference is to combine the scientific academic focus of the conference with a food expo to demonstrate that sustainability is measurable and therefore doable, thus providing consumers choices, which CAN drive the sustainability of our food systems.

Website: http://www.lcacenter.org/lca-of-foods-2014.aspx

Conference: First International Conference on Global Food Security
Elsevier, NH Conference Centre Leeuwenhorst, The Netherlands: 29 September - 2 October 2013,
The First International Conference on Global Food Security aims to deliver state-of-the-art analysis, inspiring visions and innovative research methods arising from interdisciplinary research. Join us in this exciting opportunity to ensure that the best science is garnered to support the emergence of the Sustainable Development Goals. Achieving global food security whilst reconciling demands on the environment is the greatest challenge faced by mankind. By 2050 we will need to feed 9 billion people. The urgency of the issue has led to huge scientific strides forwards; making it difficult to keep up with the rapidly expanding volume of scientific research. We aim to better understand economic, social, biophysical, technological and institutional drivers of current and future global food security. The conference will address food production and access, and the trade-offs between competing environmental, economic or social objectives and outcomes.

Website:http://www.globalfoodsecurityconference.com/conference-venue.html#

Conference: Cracking the Nut 2013: Sustainable Sourcing for Agricultural Supply Chains
AZMJ, Dresden, Germany, June 25 - June 26, 2013

AZMJ is pleased to announce the launch of the third annual Cracking the Nut conference, which will give an exclusive look into the successes and challenges involved in global supply chains. We will be focusing on companies that are creating long-term social and economic value through their sustainability initiatives. As a private sector led discussion, the conference will highlight best practices for sustainable sourcing to help participating companies, along with development and finance organizations, to align their initiatives in a way that leverages resources for increasing social impact. The conference will also feature a dynamic panel session where leading impact investors will go head to head with agricultural entrepreneurs to provide insight into how they assess real investment opportunities aligned with sustainable sourcing.

Website: http://www.crackingthenutconference.com/

Conference: Tenth International Conference on Environmental, Cultural, Economic, and Social Sustainability
The University of Split, Split, Croatia. 22-24 January 2014.
The conference will work in a multidisciplinary way across the various fields and perspectives through which we can address the fundamental and related questions of sustainability. This interdisciplinary forum is for scholars, teachers, and practitioners from any professional discipline who share an interest in—and concern for— sustainability in an holistic perspective, where environmental, cultural, economic and social concerns intersect.

Website: http://onsustainability.com/the-conference/call-for-papers

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International summit: 5th European Sustainable Foods Summit.
Amsterdam on 6-7th June 2013.
The Sustainable Foods Summit is a series of international summits that focuses on the leading issues the food industry faces concerning sustainability and eco-labels, such as Organic, Fair Trade, Rainforest Alliance, UTZ Certified, etc. The aim of the Sustainable Foods Summit is to explore new horizons for eco-labels and sustainability in the food industry by discussing key industry issues. What impact do organic, fair trade and other eco-labels have on sustainability? Will there ever be a single sustainability standard for food products? How can sustainability performance be measured? Case studies will be given of food companies and ingredient firms that are successfully pushing the boundaries of eco-labels and / or sustainability.

Website: http://www.sustainablefoodssummit.com/aboutthesummit.htm

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Forum: World Economic Forum
Greening economic growth is the only way in which sustainable, inclusive development can be achieved that will satisfy the basic needs of 9 billion people and provide them with equal rights to material prosperity. A key challenge is the urgent need to reduce carbon emissions to avoid the catastrophic impacts of global warming. Another imperative is the need to increase natural resource productivity to meet unprecedented demands for clean water, food and urban development. The World Economic Forum's Climate Change Initiatives are addressing these needs through convening public, private and civil society leaders to advance innovative public-private solutions. We then share these new models with international processes and national governments to accelerate scale-up and replication.

Website http://www.weforum.org/issues/climate-change-and-green-growth

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Forum: Product Sustainability Forum
The Product Sustainability Forum (PSF) is a collaboration of 80+ organisations made up of grocery and home improvement retailers and suppliers, academics, NGOs and UK Government representatives.
It provides a platform for these organisations to work together to measure, reduce and communicate the environmental performance of the grocery and home improvement products. WRAP provides the Secretariat for the forum.

Website: http://www.wrap.org.uk/content/product-sustainability-forum

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Research Institute: The Institute for Environment and Sustainability
The Institute for Environment and Sustainability (IES) is one of the seven scientific institutes of the European Commission's Joint Research Centre (JRC). Its mission is to provide scientific and technical support to EU policies for the protection of the European and global environment. The IES plays an active role in partnerships within the EU and global scientific communities, which are a prerequisite for finding sustainable solutions to today's global environmental challenges.

Website: http://ies.jrc.ec.europa.eu/

Research institute: Sustainable Food Initiative, University of Alberta

The objective of this initiative is to develop a proposal for the SU General Manager and next year's SU Executive that contains a labelling system for the food produced and sold by all of the SU businesses on campus, including Cram Dunk, Juicy, L'Express, SubMart, RATT, and Dewey's. The labelling system is intended to provide the student customers with more information about the food options that are available to them on campus, and to help demystify the ingredients, nutritional information, potential allergens, environmental impact, and sources of the food being sold to them. It is also intended to help the SU businesses market themselves much better to a large population of students, lower customer confusion and/or alienation, and show consideration for the customers by demonstrating that they are striving to better accommodate different dietary needs.This labelling proposal will also contain labelling definitions and standards, labelling graphics and symbols, as well as strategies for implementation for each of the different businesses to ensure its success. Through the implementation of in-store product labelling, menu labelling, and online information specific to each SU business, we can lift the veil between campus consumers and their food so that they can make informed decisions from a wide variety of food options

Website: http://www.sustainablefooduofa.ca/?page_id=21