

Sustainable food supply systems

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Introduction

Understanding the dynamics of food and sustainability are pressing academic and public policy concerns. The food system in developed countries, especially that of the UK, often seems to be bedevilled by alarms, for example, about the safety of food, its nutritional value or its impacts on the environment. As a result, geographers have become engaged in debates on food miles, food and health, food and climate change, the environmental impacts of food products, food and trade, alternative food systems, and food security.

Much of the concern about food relates to the way in which the dominant system operates. Increasing attention has therefore been devoted to finding out to what extent are current dominant food systems capable of becoming more sustainable? What is the potential for, perhaps, the key alternative food system, organic production, to engender change in the broader food system? And how sustainable are the food products that we consume?

Findings

Food supply chains and globalisation

Since the mid-1980s increasing demands of consumers in the developed world have resulted in highly flexible supply chains. For example, all year round consumer demands for fresh fruit mean that they are becoming less aware of the seasonality of products. A number of commentators have highlighted the role of retailers, especially in Europe (such as Tesco (UK), Arhold (Netherlands) and Carrefour (France)), in restructuring and directing food supply chains.

Concerns over price volatility and the availability of supply have driven retailers to forge more direct relationships with farmers. In environmental terms, this has meant retailers have started to work proactively with farmers to promote more sustainable practices such as a reduction in pesticides, controls of emission in dairy/meat farming, improvement in animal welfare standards and increased traceability from farm to fork. Meanwhile Tesco now have well over 100 products with a carbon footprint label.

Despite this, there still remain huge swathes of the food chain and the farming base which are not included in these types of initiatives. For example, there is a lack of diversification in commodities produced in the UK (e.g. cereals take up 50% of the UK's arable land) and while retailers have driven much waste out of their immediate operations, it is difficult to see whether systemic waste throughout the system (e.g. product rejected due to aesthetic reasons) has been addressed. Also, there is still significant disconnection between the retailers and the farmers, which has meant that issues such as efficient resource use (e.g. water), soil management and bio-diversity are not being sufficiently addressed.

It seems that the current direction of travel for the food system points to incremental change (an adaptation of the food system) rather than innovative and radical restructuring. Alternative, sustainable approaches to agriculture are characterised by organic, conservation, and biological systems. To explore the reasons why alternative and potentially more sustainable food systems do not 'break through' we outline the nature of the food system.

Food supply chains and food systems

We see a 'food system' as a sequence of activities, starting with the production of plant seed, eggs or new-born animals. The sequence continues from production through intermediate processing and various distribution steps to generic retail or foodservice: these activities are carried out or controlled by a number of "core" organizations. The system ends with consumption of food products by individuals. Since the system encompasses both production and consumption and examines inputs and outputs to the system as well as the regulatory and policy context, it has been termed a Food Production and Consumption System (FCPS).

The creation of alternative food supply chains, such as local (e.g. drawn from ideas from the Slow Food movement) or organic, might alter the course of the dominant conventional food supply chain towards greater sustainability. This is because a local food supply chain is smaller, which has a positive economic impact on local and national food producers and processors. Furthermore, transport costs are considerably reduced and energy resources are saved. Since food has to travel less, the local food supply chain could also operate faster. A local food supply chain will strengthen the structure of local business interactions and should favour small and medium size businesses that would enhance the diversity of the chain. Overall, a local food supply chain could have a positive sustainability impact.

Organic food and system change

In theory it would be possible to construct an alternative, organic, food system to challenge the current conventional system. Agricultural production is, perhaps, the easiest stage to conceptualize the system differences since organic agriculture has to be certified to show that there is an absence of defined substances in the production process. Organic production, since it promotes itself as a healthier and more environmentally friendly alternative, is likely to seek to reduce the amount of energy used in the manufacturing, retailing and consumption of food. These demands may make themselves felt in a reluctance to engage with conventional manufacturing and retailing companies and to promote the virtues of seasonality and product variability since they arise from a 'natural' production process.

However, in practice there are signs of absorption of organic product supply chains within the conventional model. For example, some potato packers, who primarily deal with conventional potatoes, have also moved on to the organic

potato market and now also pack organic potatoes for their customers. Where once they were marginal, organic food production and distribution has now been adopted by large mainstream producers, processors and retailers as part of their diversification strategy: it has become, essentially, a "branded" – and profitable – form of production. A number of organic brands have been acquired by giant food processors such as General Mills, Kraft (Philip Morris) and Kellogg.

The food system and environmental impacts

One of the most comprehensive attempts to determine what evidence is available relating to the environmental impacts that occur in the life cycles of a range of food products was a DEFRA funded project (Foster et al 2006), the so-called 'shopping trolley' study. The range of foods in the study includes both fresh and processed goods, organic and conventionally grown produce, locally-sourced and globally-sourced foods. The food sample is a trolley of food types representative of the foods on a list of 150 highest-selling items provided by one large retailer. Overall, the review found that environmental impacts arising across the entire life-cycle (including consumer activities and waste disposal) have been studied in detail for very few basic foods and even fewer processed foods. Some general conclusions emerge:

1. Organic vs. conventionally-grown foods: There is no doubt that, for many foods, the environmental impacts of organic agriculture are lower than for the equivalent conventionally-grown food. However, it is not true for all foods (e.g. wheat, milk and meat) and appears seldom to be true for all classes of environmental impact. There is no clear-cut answer to the question: which 'trolley' has a lower environmental impact - the organic one or the conventional one?
2. Local trolley vs. globally-sourced trolley: Evidence for a lower environmental impact of local preference in food supply and consumption overall is weak; the evidence for the environmental impact of bulk haulage, is not decisive. Since there is a wide variation in the agricultural impacts of food grown in different parts of the world (e.g. in the amounts of water consumed), global sourcing could be a better environmental option for particular foods.

Conclusions

- Global population growth is predicted to increase demand for food by 70% by 2050. This is coupled with ecological concerns over the impact of agriculture, the availability of resources and the threat of climate change. This has prompted calls for new agri-food systems that recognise the multi-functionality of food; its social and environmental contributions in addition to its economic ones. In this environment, 'business as usual' models could at worst fail, and at best be poor preparation for the coming period. New food systems will need to be shaped to withstand greater volatility and uncertainty and will need to operate within ecological limits, remain competitive while delivering fairer returns and greater social benefit.

- Developing new food systems is highly problematic. By adopting a system perspective that links together production and consumption we can begin to appreciate that changes on the farm, in the processing and manufacturing arenas must be accompanied by changes in consumption practices. Innovation in the food industry is influenced by greater consumption of processed foods. The UK has very high ownership of freezers, fridges and microwave ovens that have attached to them particular cooking practices. This has changed the way products are treated within the processing industry. For example, today, potatoes and chickens are becoming ingredients within complex ready meals, while before they were a major component in their own right of a household meal. Production of ready meals is an assembly process, where parts are sourced from various suppliers and competition over price drives manufacturers to source from abroad, thus changing further the economic and spatial geography of the food production systems.
- From an environmental perspective there are several major areas, such as waste, energy and resource use, and air pollution, where the food supply chain is having major impacts. Important technologies upon which the functioning of the modern food supply chain is based include refrigeration, transport and packaging. Penetration of these technologies at every stage of the supply chain and their wide use leads to high consumption of fuels, electric energy and materials, and leads to large amount of waste and high volumes of greenhouse emissions. The food supply chain is very wasteful, not only with losses of harvests and food along the supply chain especially within the process and consumption stages, but also with increased use of packaging.
- Since sustainability is a contested concept there is no one version of a sustainable food system. Rather there are competing interpretations of food sustainability (e.g. organic foods, foods grown for local or regional markets). Alongside alternative versions of sustainability, individual foods have their own internal dynamic and potential for transition. We thus have to work with complex and multi-layered notion of food systems and sustainability.



References

- Foster C, Green K, Bleda M, Dewick P, Flynn A, and Mylan J (2006) Environmental Impacts of Food Production and Consumption: A report to the Department for the Environment, Food and Rural Affairs, Manchester Business School, Defra: London

Further Information

- <http://sustainablefoodtrust.org/>