Institution:	University of Northumbria at Newcastle
Unit of Assessment:	19 - Business and Management Studies

Title of case study: Directing policy interventions around local food markets and challenging assumptions around food localisation agendas

1. Summary of the impact

Research from Northumbria University's Business School into environmental issues surrounding food supply chains has informed national policy in relation to local food systems. Research showed that the argument for supporting local food systems to achieve greater environmental benefits through reduced "food miles" was misconceived particularly in light of an almost uncontested notion that the more "local" food produce is, the better it must be for the environment. Our research has challenged this notion, showing that deliberately localising the supply of any product when economies of scale are available defies basic theories of comparative advantage and creates greater, not less, environmental burden. This informed the Department for Food and Rural Affairs' (Defra) decision in 2010 not to implement policy interventions that would promote a more local food supply.

2. Underpinning research

The UoA has a history of research in logistics and supply chain management dating back to 2006 that placed it in a strong position to respond to Defra's call for bids to conduct a study into potential unintended consequences of food localisation. The notion of food miles had led to many initiatives to localise food networks (instead of large-scale distribution) in the belief that there would be environmental benefit arising from a reduction in transport miles. This call followed several national reports where the carbon footprint of imported produce to the UK from overseas was shown to be *lower* than that of similar domestic produce (e.g. Kenyan flowers, New Zealand lamb).

The critical research underpinning the impact of this work included research that secured the initial funding together with research that was carried out during the project as a result of the data gathered. The project was led by David Oglethorpe (Professor of Logistics and Supply Chain Management 2006-2012) together with Graeme Heron (Senior Lecturer in Logistics and Supply Chain Management 2007- date) who was research manager. This project (2007-2009) gathered extensive geographically-representative evidence through their analysis of 27 different case studies. The research explored where the benefits of local produce lie and which policy interventions may be needed to correct any market failure in delivering these benefits. Key research insights and findings included:

1. Our operational and economic analyses of natural resources, food production and associated environmental externalities, helped us understand the theoretical underpinnings of why producers and consumers may require the environmental credentials of food products to be known (Oglethorpe, 2010).
2. Policy intervention would normally be supported in line with the economic concept of market failure. Counter intuitively to the perceptions of the time, the food miles debate was misplaced as there was no underlying market failure. These findings had the impact of preventing further directly supported policy interventions to promote local food supply by the Government.
3. Evaluations of relationships, influences and power within the surveyed supply chains allowed for an appreciation in different contexts as to how the theories of environmental economics may be played out by actors at different parts of supply hierarchies (Heron & Oglethorpe, 2013). In other words, businesses make choices that affect other businesses in ways which are not readily reflected or accounted for in price. Thus the small businesses and their customer bases taken together create pollution but do not consider that pollution impact upon others as they only "see" their part of the chain. With less environmental management in "local" systems, the total pollution exceeds that produced by larger scale, more efficient systems.
4. Oglethorpe (2010) and Oglethorpe & Heron (2011) explained how economies of scale prevailed through large scale operations and how resource intensity matched scale

economy flows; transporting goods through scale distribution networks used lower levels of fuel per unit of produce. Simply put, our research demonstrated that HGVs, although less fuel efficient than a car, can transport up to 35 tonnes of goods between nodes in a food supply network. Thus, fuel consumption per unit of produce is much less in large scale supply networks, suggesting that larger vehicles and home deliveries can reduce greenhouse gas emissions.

5. The Defra work also informed logistics management research in the food sector as reported in Oglethorpe and Heron (2011) - they mapped the functional linkages that enabled discrete parts of the supply chain to operate. This provided a context for how data relating to transport use and performance metrics should be interpreted. Thus by understanding the economies of scale and associated environmental benefits of national transport networks and large operations, we were able to design more effective routing that would result in resource efficiency and greater sustainability.

An important final area of this cost-benefit research acknowledged the existence of trade-offs between both the social and economic dimensions of food localisation when consideration is also given to knowledge about local produce networks, health factors and impact on employment. Re-connection with food and community vibrancy was enhanced through the existence of local food networks; additional evidence suggested that margins per product and sales volumes for local suppliers were also improved. However, set against this in some instances, the health impacts of local food were found to be negative, particularly with respect to sugar and fat content of products. These were often higher in local food products where they were produced in response to more indulgent and luxurious food tastes rather than merely reflecting the availability of local, seasonal food. This paper (Oglethorpe, 2010) developed a mathematical model that was applicable in the economic, environmental and social (EES) spheres, the triple bottom line of sustainable production. This model allows for the use of decision variables in relation to supply chain strategies, water consumption, health impacts such as fat content, sales, jobs etc. by allowing the user to prioritise through the "weighting" of variables in relation to EES factors.

It should also be noted that other researchers within the UoA have extended this work into a different context by examining consumer attitudes towards food labelling more generally in relation to non-market environmental and social attributes which found that carbon labelling did not affect purchasing behaviour (Gadema and Oglethorpe, 2011). Indeed, carbon labelling is less evident, despite the introduction of mandatory carbon reporting within annual reports from October 1 this year for all UK quoted companies.

3. References to the research

Heron, G. and Oglethorpe, D. (2013) 'Testing the Theory of Constraints in UK Local Food Supply Chains', *International Journal of Operations & Production Management*, 33 (10). DOI: 10.1108/IJOPM-05-2011-0192.

Oglethorpe, D. and Heron, G. (2011) 'Sensible operational choices for the climate change agenda' *International Journal of Logistics Management*, 21(3) pp538-557. DOI: 10.1108/09574091011089844. Available at: http://dx.doi.org/10.1108/09574091011089844

Heron, G. and Oglethorpe, D. (2011) 'Standing At The Crossroads: A Comparative Analysis of Logistics, Supply Chain Mechanisms, Collaboration and Customer Fulfillment Strategies at Farmers Markets in the North-East Of England and the State Of Delaware Between May and October 2011'**,** *CILT Seed Corn Research Grant Report*, ISBN 978-1-904564-39-3 Report available at: http://www.ciltuk.org.uk/Portals/0/Documents/PD/SeedCornOglethorpe.pdf

Gadema, Z. and Oglethorpe, D. (2011) 'Consumer attitudes to environmental labelling', *Food Policy*, 36 (6) pp815-822. DOI: 10.1016/j.foodpol.2011.08.00. DOI: 10.1016/j.foodpol.2011.08.001

Oglethorpe, D. (2010) Optimising economic, environmental and social objectives: A goal programming approach in the food sector, *Environment & Planning A* 42(5) pp1239-1254. Available at: http://dx.doi.org/10.1068/a42292

Defra (2009) FO0104 Investigating the Practicalities and Benefits of Local Food Production and

Identifying Any Unintended Effects and Trade-offs. London, Defra. Report available at: http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=ProjectList&Completed=0&FOSID=13 or from Northumbria University on request.

Grants

Title: "*Investigating the Practicalities and Benefits of Local Food Production",* Project FO0104. Awarded to University of Northumbria, PI Professor David Oglethorpe, lead researcher Graeme Heron, Sponsor: Defra, June 2007-June 2009, Total grant value: £179,259

Title: *"Standing at the crossroads: A comparative analysis of logistics, supply chain mechanisms, collaboration and customer fulfilment strategies at farmers' markets in the North East of England & the State of Delaware".* Awarded to University of Northumbria, PI Dr Graeme Heron. Sponsor: The Chartered Institute of Logistics & Transport, November 2010-December 2011

4. Details of the impact

The purpose of the research was to inform the debate on the localisation of food supply and specifically to challenge the notion that localisation would reduce the environmental burden of food supply. It had previously been believed that large-scale food networks were creating market failure in the form of negative environmental externalities. Defra was considering making market or policy interventions to correct the perceived market failure represented by the food miles debate that would positively promote local food production. Before it did this, it required evidence to ensure this was indeed the right course of action. The research undertaken within the UoA clearly demonstrated that the greater "food miles" attributed to nationally- or internationally-sourced products in comparison to local food products did not correlate with negative environmental externalities.

Impact on formation of public policy

The impact of this research was the formulation of evidence-based public policy, aligned to delivering appropriate benefits from any intervention in local food supply chains. The research eschewed misconceptions about "food miles", demonstrating that suspected market failure in large-scale food networks did not necessarily exist, and that policy intervention to promote more localised food supply was thus not required. The influence of the research can be evidenced in the development of Defra's Food 2030 strategy, the UK's first food strategy in 50 years. The Economic Advisor at Defra, recognises Northumbria's role in establishing the position taken in the strategy not to promote local food systems as solution to the challenge of reducing the environmental cost of food: *"Whilst previous work had been done by Defra to challenge some of these claims, the Northumbria project was the first to look directly at the logistics of domestic local supply chains and highlight the fallacies of the food miles argument in a domestic context…Based on empirical research and the expertise of economists, food industry and logistics experts, it sent a clear message to Defra that the economic and environmental case for Government intervention in this area was very weak. The Brown Government's "Food 2030 Strategy" published in January 2010 did not seek to promote local food systems as a solution to the more fundamental challenges of carbon emissions, waste, resource efficiency, poor diet and food chain resilience. Indeed the Strategy highlighted the flaws in the food miles argument (pp. 47), drawing upon this and other research"* (Source 1).

Contribution to the development of international carbon labelling policy

Our work informed the development of international carbon labelling policy and recommended mandatory policy interventions, whereby switching from softer voluntary policies to a system which encourages uptake through mandatory measures amongst food supply chain actors is necessary to ensure a widespread and simultaneous uptake. This has led to a common position where producers' claims of carbon consumption is commonplace, irrespective of price or channel, giving the customer more opportunities to differentiate meaningful carbon footprints within the same product categories. This work was selected by a European Commission Policy Unit and added to their case study bank at Case Study 10 within "Science for Environmental Policy" (Source 5).

Impact on practitioners and professional services

We expunged the food miles myth so that sensible operational choices could be made; the research reveals the joint positive relationship between economic and environmental efficiency:

lean is green. Indeed, these arguments could be taken further to suggest that environmental efficiency could be achieved wherever economies of scale are available in food production, processing, manufacture, preparation, consumption and disposal (Sources 2 and 7).

In accepting that the food miles debate is based on over-simplification, we acknowledge that there will always be a local food agenda, and that its benefits may extend beyond economic or financial advantage to the producer, into areas such as skills, employment and reconnection with farming by the general public. Nevertheless, we also identify that intermediary organisations/businesses hold a key role for a more resource efficient collection and distribution transport system, for the onwards sale of local foods to reach a broader customer base, while allowing the smaller producer to manage with only one point of contact for sale, invoicing and shorter cash-to-cash cycles for their products.

It is also noted that the research has migrated in to other areas of Defra research that acknowledges and reaffirms our findings. Research project FO0430: *Evidence to define the sustainability of a healthy diet*. This study also confirmed that evidence to support the role of farmers' markets towards the sustainability of a healthy diet is "weak" (Source 3).

5. Sources to corroborate the impact

1. Defra Economic Adviser, Ecosystems, Strategy and Evidence, can be contacted to corroborate claims concerning the impact on policy
2. Principle public domain research report (Defra FO0104): "Investigating the Practicalities and Benefits of Local Food Production". Principle End-User for corroboration: Colin Smith, Defra. Report available at: http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=ProjectList&Completed=0&FOSID=13
3. Migration of research into further Defra researches: Making the food and farming industry more competitive while protecting the environment. Website and report available at: https://www.gov.uk/government/policies/making-the-food-and-farming-industry-more-competitive-while-protecting-the-environment
4. Defra FO0430: Evidence to define the sustainability of a healthy diet.
5. International press interest (over 100 enquiries) in wake of Gadema and Oglethorpe (2011) paper which has also been adapted as a research summary (study reference 10) in the European Commission's publication, *Science for Environment Policy*. Website available at: http://ec.europa.eu/environment/integration/research/newsalert/research_repository/sustainable-consumption-production/consumption-behaviour.htm#sthash.xFQ4injv.dpuf
6. Media contribution to clarification of the purpose of carbon labelling including trade and popular press, national radio, YouTube and internet blogging sites – 499 hits (at 13 January 2013) on http://www.youtube.com/watch?v=voujfKUMDfE
7. Food 2030: How we get there. http://archive.defra.gov.uk/foodfarm/food/pdf/food2030strategy-summary.pdf also
8. http://webarchive.nationalarchives.gov.uk/20100111085422/http:/www.defra.gov.uk/news/latest/2010/food-0105.htm
9. Media outputs:
   Carbon – Does every label helps? The Environmentalist, December 2008, pp. 22-23.
   Local Food – Miles Better? European Supply Chain Management, 2008 (1) pp. 12-15.
   Radio 4: Costing the Earth, broadcast 24 January 2008;
   Reducing Carbon Footprint, Farmers Weekly Interactive, 16 May 2008.
   Radio 4: Farming today this week, broadcast 17 November 2007.