



Environmental impacts of food retail: a framework method and case application



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ABSTRACT

The food retail sector is the gatekeeper between consumers and producers and has substantial influence on consumption and production choices via procurement and provision decisions. Food provision and consumption systems embody huge environmental impacts worldwide. Food retailers as gatekeepers have a key role to play to enable sustainable consumption and provision to become common practice. In this paper, a framework to attribute emissions and water use to individual and all food retail businesses and their products by geographical area and postcode of cities is presented. As far as the current authors are aware, such a framework has not been generated for food retail sector businesses before, primarily due to barriers to input–output modelling of the sector. The scientific value added is that a novel approach to overcome barriers is presented as well as the required framework. The framework is illustrated for Southampton, but can be applied in other regions of the world where similar data exist. The value of a business's product emissions estimates (generated by the framework) is they can be a first step in informing product prioritisation for focussing information searches or more detailed life cycle analysis to make sustainable procurement and choice editing decisions. The approach has value to government, businesses and non-government organisations (NGOs) in developing strategy and planning sustainable provision and procurement; by helping benchmark sustainable shopping provision, prioritisation of retail businesses and product categories for sustainable procurement/choice editing.

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1. Introduction and background

Environmental impacts of food products such as CO₂ and water use are a global issue and critical to living within threshold values for key global environmental pressures that society must observe to stay within a safe operating space for humanity (Garnett, 2008; Rockström et al., 2009; Beddington et al., 2011). In the UK and Europe, food provision plays a key role in the generation of greenhouse gases (GHGs). The food chain produces GHG emissions at all stages in the life cycle, including farming and its inputs, manufacture, distribution, refrigeration, retailing, food preparation in the home and waste disposal (Garnett, 2011). Food provision also strongly implicates water use, for example, the total water footprint of the UK is 102 Gm³ per year, nine times the annual flow of the

river Thames, the majority, 74.8 GM³/yr of this is embodied in agricultural products (WWF, 2008).

Food retailers globally have a key role in determining consumption and sustainable production choices in our food systems and therefore associated environmental impacts. On this basis, the aim of this paper is twofold: 1.) To present a method for overcoming barriers in applying input–output to investigate environmental impacts embodied in food product provision by the food retail sector. 2.) To present a framework for enabling comprehensive GHG emissions and water use estimates/accounts for individual and all food retail businesses within a city and with resolution to individual products; this can be used to help prioritise products on which to focus sustainable procurement as well as provision within an area.

1.1. Background

Sustainable consumption has the potential to play a key role in reducing GHGs and water use associated with meeting food related needs and wants globally (UNEDSA, 2007; Garnett, 2008, 2011; Audsley et al., 2009). In order to bring about changes in

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consumption toward lower embodied GHG products, institutions have developed systems for carbon footprint labelling such as PAS2050. It is however, not a given that information and labelling of products available in some shops will give rise to more sustainable products or large scale shifts in consumption towards lower embodied GHG or water products (Sustainable Consumption Roundtable, 2006; Vittersø and Tangeland, 2014; Akenji, 2014 amongst others). Once information is provided, there is a need for consumers to acknowledge information and actively alter consumption towards lower impacting products (Berry et al., 2008). The success of labelling in bringing about the transition to lower carbon or lower water food provision rests on the notion that consumer purchasing habits will switch to low impacting alternatives and that these will be available (Gadema and Oglethorpe, 2011). In relation to consumer choice however, Clark et al. (2006) identify that there appears to be a notable degree of stability in many shopping practices over time, and further that attitudinally, the underlying factors determining store choice are broadly the same in 2002 as they were 20 years earlier in 1982. Gadema and Oglethorpe (2011) provide empirical evidence on the attributes that determine consumer choice of products (in stores). They identify that carbon embodied in food is fairly low down the priority list in terms of attributes that determine the consumers' decisions within shops, other attributes such as quality, nutrition, price etc. are generally considered more important.¹ The UK Sustainable Development Commission (2007) states that most people expect products brought to be environmentally and socially responsible, similarly as they expect safety of products to be a pre-requisite, research by the Green Alliance (2010) also support this view.

In relation to availability, Clark et al. (2006) also provide challenging information here, they identify the difficulties that consumers can sometimes face in terms of consumer choice, both shop and product availability are affected by locality and geography which are key aspects that effect consumer choice. Jackson et al. (2006a) conclude (from their research) that quality and price are crucial attributes of choice *within* stores, but importantly also identify the concepts of consumer convenience and accessibility as playing a key role in consumer choice *between* stores. This concept/differentiation of *between* and *within* stores is likely to be important in sustainable consumption and therefore a potential fruitful area for further research. From reading Jackson et al. (2006a) it is clear that local shopping provision within a given locality is influenced by the businesses that are available within an area. Due to locality, some consumers have limited choice and in this way their choice is "locked in" to certain shops and available products (often less sustainable) due to the context of their life situation.

The research above as well as others such as Broken and Allwood (2012) and Vörösmarty et al. (2011), suggests a strong role for retail businesses but also government/NGOs in ensuring availability and provision of sustainable products within an area as a pre-requisite. Retailers have a key role to play in monitoring the emissions and water use of the products they choose to sell and actively procuring out or alternatively, warning against the most environmentally damaging products (in their shops). In this way they help ensure more sustainable choices by consumers. In this sense, food retailers have a role as gatekeepers to the

environmental sustainability of consumer choices and enablers of sustainable consumption.

In order to help retailers in this role and encourage provision of sustainable products within a local area, perspectives and frameworks that can help retailers efficiently produce proxy benchmarks for their businesses and products are urgently needed. Building on the literature above, frameworks should also provide a comprehensive geographical referenced benchmarking to allow government to estimate impacts (GHGs, water use etc.) and opportunities for sustainable shopping provision within an area. When focussing on estimates to inform sustainable procurement and choice editing, impacts attributable to provision should be identified (as opposed to emissions attributed to consumption or production); see Bradley et al. (2013) for a detailed discussion and justification.

Until now, the desired framework discussed above has been missing for the food retail sector therefore leading to one of the aims of this paper. Benchmarks from such a framework can help illustrate impacts and prioritise product categories and areas for monitoring and choice editing, therefore not just leaving all the decisions and action up to consumers. Importantly, such benchmarks need to be efficient and enable a businesses to quickly prioritise the most important products (in terms of environmental impacts) for further attention, for their business, as it is clear from even large food retailers experience that businesses struggle with resource required to estimate their environmental impacts embodied in provision (Guardian, 2012). Tesco recently started leading in this area, pledging to label all its products with their carbon footprint. In 2012 however they dropped their carbon label pledge citing that too much work was involved and that other retailers failed to follow their lead (Guardian, 2012).

An efficient benchmarking method to apply in estimating 'starting' or 'proxy' business benchmarks is the application of Leontief's input–output analysis (Matthews and Lave, 2003; Lenzen et al., 2006). Input–output however, cannot be applied to estimate environmental impacts embodied in provision (using the provision perspective as outlined in Bradley et al., 2013) of the food retail sector, due to the way that I–O accounts are constructed in UK and other countries such as Australia and the USA, see Australian Bureau of Statistics (2000) and the USA (BEA, 2009). This forms a substantial barrier to efficient environmental estimations for this sector. This is because within the national input–output accounts, food product transactions for the Retail sector are stripped out and put within the sectors that produce the products. So for Food retail, the product transactions are put within the Manufacturing of food products and beverages subsectors. This is done when putting together the input–output tables. The transactions in all subsectors of Manufacturing of food products and beverages, appear as intermediate and final demand. A method is documented in this paper to overcome this issue, addressing the first aim of this paper and enabling environmental I–O modelling to generate provision estimates for the food retail sector, as well as the development of the desired framework for this important sector. The framework is applied to a case study for the UK.

The framework for CLARE is described in Section 2. Section 2.4 demonstrates the framework for food retail businesses in Southampton (UK). Discussions and conclusions are conducted in Section 3.

2. The framework method

The framework developed to address the aims of this paper is called the Commercial Local Area Resource and Emissions model (CLARE). CLARE is composed of two sub frameworks: CLARE-direct for direct emissions and water use and CLARE-indirect for indirect emissions and water use estimation as seen in Fig. 1. In this study direct emissions are the emissions that occur

¹ Gadema and Oglethorpe (2011) found that free range was the fourth most important attribute after price. Free range is likely to align with emotional concerns over animal welfare and/or health, this is aligned with past research that shows that sustainable consumption has only occurred at scale for products that have emotional resonance or connections to health benefits (Sustainable Consumption Roundtable, 2006).

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