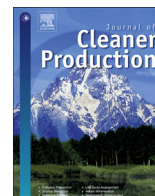




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The food waste hierarchy as a framework for the management of food surplus and food waste

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ABSTRACT

The unprecedented scale of food waste in global food supply chains is attracting increasing attention due to its environmental, social and economic impacts. Drawing on interviews with food waste specialists, this study construes the boundaries between food surplus and food waste, avoidable and unavoidable food waste, and between waste prevention and waste management. This study suggests that the first step towards a more sustainable resolution of the food waste issue is to adopt a sustainable production and consumption approach and tackle food surplus and waste throughout the global food supply chain. The authors examine the factors that give rise to food waste throughout the food supply chain, and propose a framework to identify and prioritize the most appropriate options for prevention and management of food waste. The proposed framework interprets and applies the waste hierarchy in the context of food waste. It considers the three dimensions of sustainability (environmental, economic, and social), offering a more holistic approach in addressing food waste. Additionally, it considers the materiality and temporality of food. The food waste hierarchy posits that prevention, through minimization of food surplus and avoidable food waste, is the most attractive option. The second most attractive option involves the distribution of food surplus to groups affected by food poverty, followed by the option of converting food waste to animal feed. Although the proposed food waste hierarchy requires a fundamental re-think of the current practices and systems in place, it has the potential to deliver substantial environmental, social and economic benefits.

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1. Introduction

Appropriate waste management is recognised as an essential prerequisite for sustainable development (UNEP, 2011; UNHSP, 2010). Historically, in urban contexts, public waste management focused on removing potentially harmful substances or materials away from human settlements (Wilson et al., 2012; Velis et al., 2009). As the environmental, social and financial implications of unsustainable use of raw materials and growing waste generation in the short and long term became apparent (The Government

Office for Science, 2011a; Stern, 2006), waste management began to shift from a mere pollution prevention and control exercise, towards a more holistic approach.

Frameworks and concepts, such as the waste hierarchy (Fig. 3), the '3Rs' (Reduce, Re-use, Recycle), extended producer responsibility, polluter pays principle (Engel et al., 2008), life cycle assessment and Sustainable Consumption and Production (SCP) (Pires et al., 2011), were introduced and the paradigm of 'sustainable resource management' was developed (Barton et al., 1996). Sustainable resource management is grounded on the notion that 'waste' can be a 'resource' (Bringezu and Bleischwitz, 2009). Restricting resource use to more sustainable levels and applying resource efficiency can effectively reduce Greenhouse Gas (GHG) emissions linked to climate change, as well as offer other benefits of economic and social nature (Barrett and Scott, 2012; Defra, 2011; WRAP, 2010).

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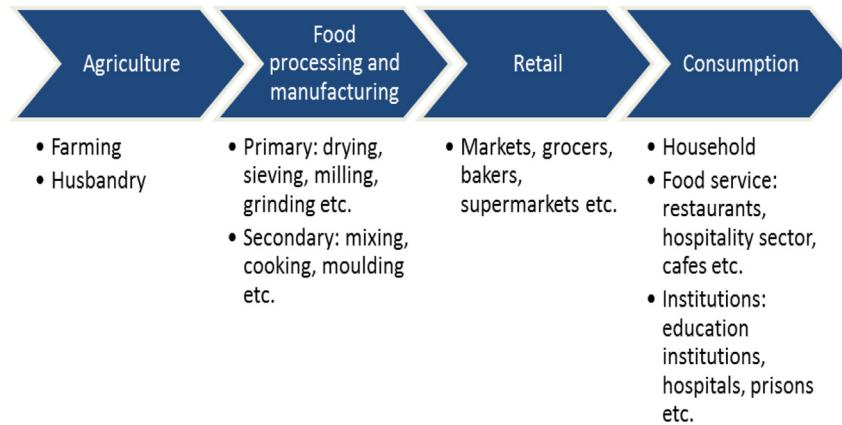


Fig. 1. Activities giving rise to food losses and waste in the food supply chain. Source: Adapted from Parfitt et al., 2010; Smil 2004; Lundqvist et al., 2008.

In the evolving waste management field, a waste stream receiving growing attention is food waste. As the scale of food waste's negative environmental, social and economic impacts are becoming more apparent, and global food security is becoming more pressing, food waste is increasingly recognised as being central to a more sustainable resolution of the global waste challenge (EPA., 2012; Defra, 2011; Government of South Australia, 2010). Recognizing the significance of food waste, this study aims to address the following research question: 'how can food surplus and food waste be managed more sustainably?'

Building on the expertise of food waste specialists, the authors conducted a number of interviews that provide insights into the current practices, future trends, barriers and opportunities for more sustainable management of food surplus and food waste. The key themes that emerged from the interviews inform and shape the development of a comprehensive framework for the management of food surplus and waste throughout the Food Supply Chain (FSC) through the use of Grounded Theory (GT). This framework conceptualizes food waste, and builds on this to interpret and apply the waste hierarchy in the context of food waste. The resulting food waste hierarchy aims to act as a guide in establishing the most

appropriate options for dealing with the mounting food waste challenge.

The remainder of this paper is structured as follows. Sections 2 and 3 provide the context by offering a brief overview of the scale of the food waste challenge, and relevant waste and sustainability concepts. Section 4 presents the methods employed for data collection and analysis. Section 5 provides a discussion on the findings of this study and proposes the food surplus and food waste framework. Finally, the conclusions of this research are presented in Section 6, along with the implications of the study.

2. The global food waste challenge

In response to concerns over escalating GHG emissions and other environmental impacts associated with food waste (Garnett and Wilkes, 2014), a growing number of national and regional policies identify food waste as a priority waste stream (EPA., 2012; Defra, 2011; Government of South Australia, 2010). Food security is an increasingly pressing global issue (The Government Office for Science, 2011b; UNEP, 2009; FAO, 1981) and it raises questions

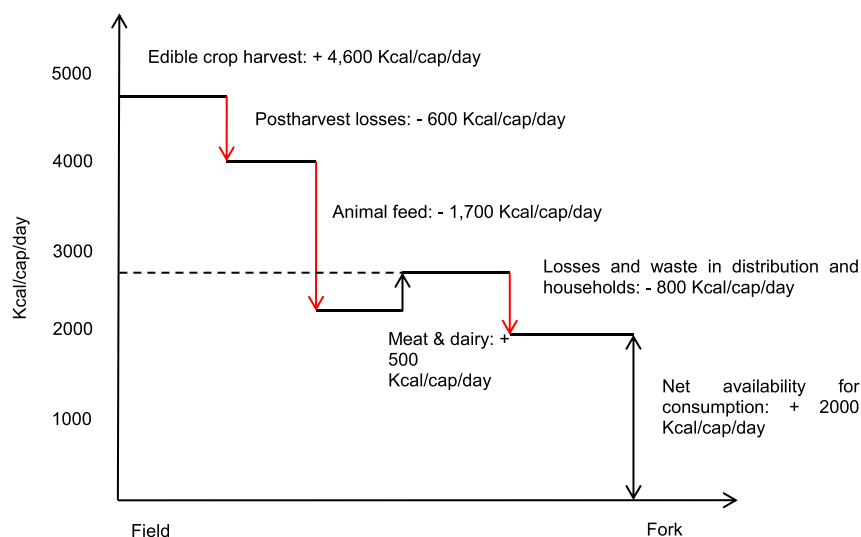


Fig. 2. Amount of food produced at field level globally and estimates of the losses and wastage in the food supply chain. Source: Adapted from Lundqvist et al., 2008 and Smil, 2000.

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