



Key characteristics and success factors of supply chain initiatives tackling consumer-related food waste – A multiple case study



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ABSTRACT

Food waste accounts for a considerable share of the environmental impact of the food sector. Therefore, strategies that aim to reduce food waste have great potential to improve sustainability of the agricultural and food supply chains. Consumer-related food waste is a complex issue that needs collaboration between various supply chain actors and sector stakeholders. Although a range of initiatives from various actors already exists internationally, there is still a lack of knowledge on which lessons can be derived from such cases. The current multiple case study provides insights into how to successfully design future actions, by analysing common and distinct key success factors in 26 existing initiatives to reduce consumer-related food waste. The findings reveal that collaboration between stakeholders, timing and sequence of initiatives, competencies that the initiative is built on, and a large scale of operations are key success factors. Success factors are identified for the primary design, for the development and maintenance phase, and for reaching out to consumers. There are three general types of initiatives that differ in their aims and characteristics: information and capacity building, redistribution, and retail and supply chain alteration. The first type focuses most strongly on motivating consumer food waste avoidance behaviour and strengthening consumer abilities, while the second and third focus primarily on altering consumer food choice context, but combine this with aspects of raising awareness. Recommendations are derived for future initiatives which should take inspiration from existing initiatives, especially considering the right partners, competencies involved, timing the start of the initiative right, and aim to soon achieve a large scale.

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1. Introduction

It is increasingly acknowledged that current human natural resource use exceeds the planetary limits (Steffen et al., 2015). Using more resources than the carrying capacity allows and running the risk of moving beyond certain thresholds endangers sustainable development. That is, it endangers the certainty that

the needs of current as well as future generations can be fulfilled (UN, 1987). Therefore, more sustainable and cleaner production and consumption is called for. Respective efforts in resource efficiency gains (Weizsäcker et al., 2009), reduction of toxics (Braungart et al., 2007), circular economy approaches (Ingebrigtsen and Jakobsen, 2007), and decoupling resource use from growth need to be sufficiently scaled up in order to meet the current sustainability challenges (Pacala and Socolow, 2004). In addition, the idea of 'growth' as such needs to be questioned (Jackson, 2009) and materialistic lifestyles transformed, to which revitalising the concept of 'sufficiency' might contribute (Weizsäcker et al., 2009).

The food sector is of crucial relevance (Godfray et al., 2010; Foley et al., 2011), but rather complex when compared to the other major

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sectors of human activity that cause the greatest environmental impact: Housing and heating, transporting and travelling. Agriculture and food supply chains impact all of the planetary systems that are considered to be past safe thresholds (Rockström et al., 2009; Cordell et al., 2009). While some parts of the world are characterized by malnutrition, food insecurity, and natural resources under strain of population growth and climate change (Food and Agriculture Organization of the United Nations, FAO et al., 2015), other parts, where food is taking up only a minor share of household budgets, are challenged by over-supply and obesity (WHO, 2014, 2015).¹ These imbalances and unethical inequalities (Gjerres and Gaiani, 2013) have triggered research on possible solutions, international organizations to call for action, and food supply chain, public and societal stakeholders to start initiatives.

Food loss and food waste have received increasing public and research attention in recent years (Aschemann-Witzel, 2016; Chen et al., 2017). The FAO assessed food losses and waste to account for around a third of agricultural production (FAO, 2011). An analysis of worldwide crop production and consumption found that a fourth of the crops are lost or wasted (Kummu et al., 2012). Food losses are typically defined as loss or damage in early parts of the supply chain, as for example during harvesting, transport or storage. Food waste refers to food items ready for human consumption but not consumed, as for example when processed foods or meals are wasted in retail, catering, or in the consumer household.

Not all food waste is avoidable. Some surplus production is needed, but minimization of the current high scale of wastage is regarded as the best option, followed by redistribution of surplus to population in need (Papargyropoulou et al., 2014). Converting food to animal feed (Papargyropoulou et al., 2014), or recovering value in some way or other (Garrone et al., 2014) is considered as less favourable compared to food waste avoidance, and (because it is deviating the food to non-human consumption), still considered food wastage (Parfitt et al., 2010; Fusions, 2014). Yet, recovering value is still preferable over mere disposal from a perspective of efficient resource use. Food waste research has focused on waste treatment issues (Bernstad Saraiva Schott et al., 2016), waste sorting (Miliute-Plepiene and Plepys, 2015), valorisation (Mirabella et al., 2014), and innovation (Chen et al., 2017). It contributes to our understanding of how to achieve food production and supply chains that can 'close the loop' and move closer to the concepts of industrial ecology (Clift and Druckman, 2016), circular economy (Ingebrigtsen and Jakobsen, 2007), and cradle to cradle (Braungart et al., 2007).

While developing countries more likely experience loss in early stages of the supply chain due to supply chain inefficiencies, developed countries typically experience waste at the end of the supply chain (Parfitt et al., 2010; Cuéllar and Webber, 2010). Food waste at the end of the supply chain mostly occurs at the wholesaler/retailer-consumer interface (Stuart, 2009), due to interactions between factors at the retailer and the consumer stage, as for example aesthetic standards and marketing activities. Consumer household food waste accounts for around 40% of food waste in Europe (EC, 2010), and individual consumers are wasting approximately 10%–30% of the food they buy (Gjerres and Gaiani, 2013; Quedsted et al., 2013; Buzby and Hyman, 2012). As a study in Finland showed, this can be as much as 23 kg per capita a year (Katajajuuri et al., 2014). Tackling the problem of consumer-related food waste, however, is very complex. Food may be wasted due to a

number of structural, economic, personal or social issues, such as packaging (too large unit sizes, not allowing fully emptying the content, etc. Williams et al., 2012), inability to interpret the date label (van Boxtael et al., 2014), lack of managing skills and routines to deal with shopping and leftovers (Stancu et al., 2016), feelings of disgust towards the thought of food going 'bad', anxieties about food safety (Watson and Meah, 2013), or because the consumer prioritises family preferences over re-using leftovers (Graham-Rowe et al., 2014; Cappellini and Parsons, 2012). These examples show that consumer-level food waste is influenced by supply chain decisions about product packages and food marketing, by regulations and standards, and by societal trends in lifestyle and food. Consumers typically do not plan to waste and some even feel guilty when wasting (Evans, 2012). Nevertheless, it is the daily commercial transactions, interactions and household practices that cause food to end in the bin (Evans, 2014).

Thus, there are a multitude of macro- and micro-environmental factors that cause and influence consumer waste behaviour (Watson and Meah, 2013; Graham-Rowe et al., 2014). These factors also impact the interactions in the supply chain (Göbel et al., 2015), and between the supply chain and consumers (for an overview, see Aschemann-Witzel et al., 2015; Fusions, 2014; Quedsted et al., 2013). To tackle food waste, collaborative action is needed and called for, similarly to other sustainability issues (Bostrom et al., 2015). Indeed, existing initiatives targeting food waste use collaboration and synergized actions between supply chain actors, public bodies and societal actors. However, little research has focused on the business or management side of food waste initiatives (Chen et al., 2017). Single case studies have been conducted that explore, for example, the amount of food waste generated by a specific retailer (Cicatiello et al., 2016), by a municipality's food waste collection (Miliute-Plepiene and Plepys, 2015), and through a city's waste management scenarios (Eriksson et al., 2015), case studies on stakeholder views on the elements of success in a residential food waste sorting program (Xu et al., 2016), or on supermarket actions against food waste (Aschemann-Witzel et al., 2016). Therefore, empirical, comparative research on success factors of multiple food waste reductions initiatives across different actors is currently lacking. It is thus unclear which factors influence the success of these initiatives, how these factors are influential, and, not least, how future consumer-related food waste initiatives may be developed based on these findings. Thus, further research into food waste and supply chain collaborative action is called for (Niesten and Lozano, 2015).

The present study explores the common or distinct characteristics of 26 existing initiatives that strive to reduce consumer-related food waste with the aim of determining key success factors of these initiatives. It suggests that useful lessons can be learnt from the initiatives, and identifies questions, or concerns, that need to be addressed by future initiatives. Given the complex nature of the food waste issue, the research applies a multiple-case study approach based on qualitative analysis of interviews and case materials. As such, this research is the first multiple-case study focusing on key characteristics and success factors of consumer-related food waste initiatives. The unique contribution lies in both analysing a multiple set of cases, as well as in identifying emerging concerns and offering recommendations for future initiatives. In sum, the study contributes to an improved understanding of how the challenges of increasing amounts of food waste can be met to develop more sustainable and cleaner food supply chains.

2. Theory

The research is based on the concept of 'key success factors' in

¹ Notwithstanding the even more complicating fact that a number of developing or emerging countries face a 'double-burden' of both malnutrition and obesity, while there are also citizens in developed countries for whom economic constraints mean that they have difficulties securing a sufficiently nutritious diet.

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