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**THE POTATO WASTERS:
A SOCIOLOGICAL STUDY OF THE UK POTATO INDUSTRY**

A thesis submitted to the University of Manchester for the degree of
Doctor of Philosophy in the Faculty of Humanities

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ABSTRACT

This thesis records a sociological study of the United Kingdom's potato industry with a focus on waste. Combining two dominant approaches in sociological research on food waste, political economy and posthumanism, it presents a critical single commodity study of the potato. Drawing on an actor-network theory methodology, ethnographic fieldwork at different sites across the potato industry and secondary data are combined to analyse and describe the political economic shifts in the potato industry. In turn, these shifts are subjected to a critical interpretation from a posthumanist approach. In doing so, this research presents the concept of a 'potato regime' as a critical alternative to the 'potato industry' or the 'potato supply chain'. Focussing on waste, the dominant, intuitive and common-sense conceptualisations of food chains are questioned and critiqued. A conceptual framework is developed to interpret and understand the complex commodity flows of the potato under hyper-globalisation; three core conceptual parameters of power, efficiency and materiality are synthesised with enabling concepts to provide a rich and interpretive understanding of how waste is generated and managed. Paying attention to human/nonhuman relations, and specifically human/potato relations, this research emphasises the symbiotic relations between people and potatoes; how biological characteristics of the potato shape, and are shaped by, the relations, processes and practices within a contemporary potato regime that is structured to overproduce and waste. Understanding how complex meanings of potato waste are negotiated by potato regime actors, this research focusses on the role of 'supply-side' or industry actors in the semiotic contestations of waste. As such, this study 'moves beyond the household' to counter dominant perspectives in academic and non-academic research and policy interventions that focus on consumption. Contributing to sociological research on food waste, three notions of waste are put forward: disguise, transfer and deferment. Coupled with strategies for the management of waste, these notions are used to document the significant role of industry and production in fuelling the waste stream and the unequal distribution of responsibilities in response to a 'crisis of waste'. In conclusion, 'The Potato Wasters' is presented and discussed, emphasising the intimate and interconnected waste relations across the potato regime which lead to accumulation and overproduction.

DECLARATION

No portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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Diolch yn fawr iawn / go raibh maith agat / thank you.

1. INTRODUCTION

1.1. Opening Remarks

The aim of this study is to achieve a combined political economic and posthumanist understanding and interpretation of food waste by studying the UK potato industry.

The motivations for my research stem from issues surrounding food waste and its role in the future of food provisioning. The production, distribution and consumption of food is recognised as one of the major global issues with an estimated 40% of food produced going to waste (FAO 2011) and 800 million people chronically undernourished (UN 2017). Each wasted burger made from cows could have provided enough water to shower for 90 minutes; the UK wastes enough food per year to fill Wembley stadium five times over; the world produces enough food to feed its population twice over (Stuart 2009). In an epoch of increasing climate instability, resource depletion and population growth, food waste presents itself as an important entry point into a variety of classical and contemporary sociological themes and discussions: the role of accumulation in capitalism (Perelman 2000; O'Brien 2013), the production and circulation of surplus (Schnaiberg 1980; Moore 2015), and the presence of simultaneous scarcity and abundance (McGoey 2018).

Food waste is often represented and imagined as a contemporary problem (WRAP 2007). Since the 1960's, the global production of food crops has increased from 2 billion tonnes to 8 billion tonnes (FAOSTAT 2017). The key developments in the rapid growth of yields and the supply of food are considered to be: technological innovation including transportation, genetics, storage, communications and machinery; the financialisation of crops including commodity speculation and futures markets; and the establishment of supermarkets and retailers as key players in a global food system (McMahon 2013). Alongside these, the development of affluent consumer societies (Galbraith 1958) and the mass availability of cheap food (Patel & Moore 2018) create the sense that food waste and surpluses arise from the moral, economic, political, cultural and social norms and values of the present day. Present day excessiveness and overproduction are often seen as characteristics of what is described as the 'throwaway society' – a consumer society fuelling a perceived natural predisposition of wastefulness and gluttony.

However, recent research into food waste and surplus has questioned its contemporaneousness and whether modern societies can be characterised as being 'throwaway' (Evans 2012). Investigating the history and development of food waste and surpluses within a longer history of accumulation,

agriculture and capitalism, rather than seeing food waste as a problem of rampant consumerism, my focus is on the production and circulation of commodities through economy and society. Rather than placing emphasis and investigation on consumption, though the links between production and consumption are heavily debated in food scholarship (Goodman & Dupuis 2002), greater attention is placed on the production and manufacturing aspects of the food waste regime (Gille 2013). As such, my focus is on agri-businesses who produce, distribute and sell the majority of food in the United Kingdom, focussing on the dominant providers of food in what has been called the ‘corporate food regime’ (McMichael 2009). Indeed, focussing on the production, processing and manufacturing areas of the food system is an area in need of further investigation and understanding in how food becomes ‘not food’ through processes of wasting and disposal (Evans 2014).

Understanding the phenomenon of food waste is still under-researched despite growing awareness and strategies across the world (Alexander et al 2013). The two dominant strategies in addressing the phenomenon of food waste involve changing behaviours of consumers to become more ‘sustainable’ and creating more efficient and productive food supply chains (Welch et al 2018). Responding to this increase in public awareness, organisations, institutions and governments have accepted that food waste is an important issue across economy and society, acknowledging the responsibilities of *everyone* in reducing food waste (WRAP 2017). The recent rise in concern about food waste on a global scale has drawn attention to what is often referred to as a ‘problem’, ‘scandal’ and ‘crisis’ (O’Brien 2008). The ‘Food Waste Pyramid’ (Figure 1) that is commonly used across civil society organisations,

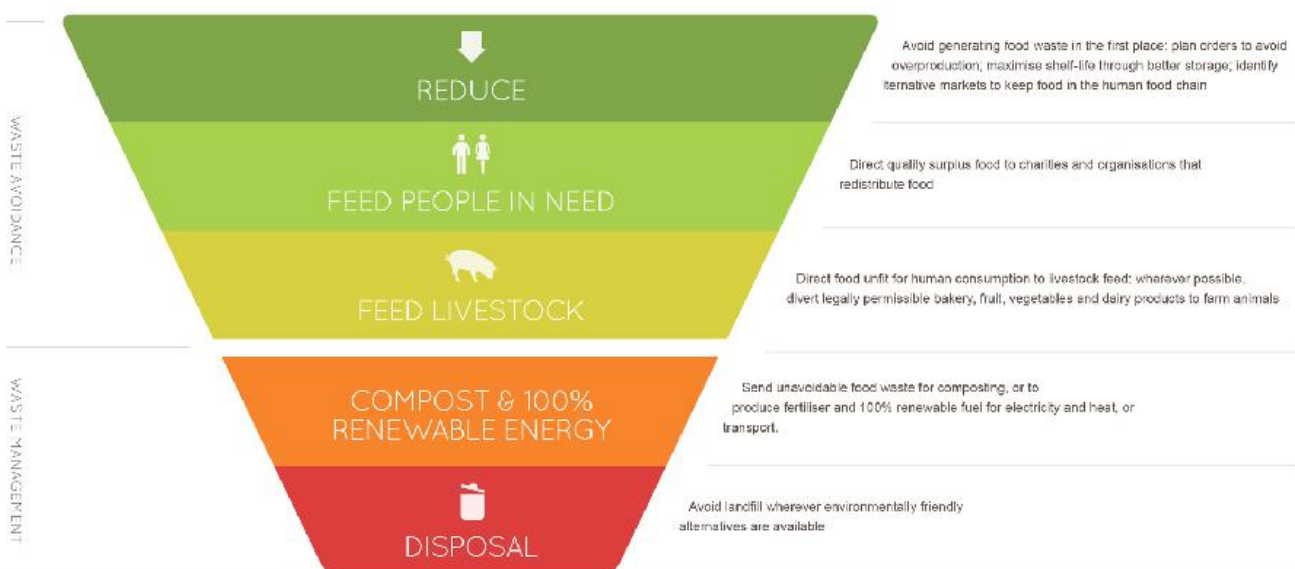


Figure 1: *Food Waste Pyramid*
(Stuart 2009)

industry and government, points towards a resource use preference scale ranging from ‘waste avoidance’ to ‘waste management’. Ideally, no food is wasted in the first place and thus the problem is avoided. If food does become ‘waste’ or surplus to requirements, then the first priority is that it is redirected to the increasing number of charities that run food redistribution schemes that usually take unsold food from retailers and distribute it from so-called ‘food banks’. Next, food waste can be diverted to feed animals that will be used for human consumption. Into the waste management realm, wasted food can be composted or converted into energy through processes such as anaerobic digestion. Lastly, and least desirable, is sending food waste to landfill.

Whilst models that prioritise the ‘Three R’s’ – Reduce, Reuse, and Recycle – have gained popularity across different organisations and institutions involved in food (WRAP 2014), providing a framework for identifying areas of the food supply chain that need intervention and improvement, such approaches and conceptualisations of food waste necessitate the simplification of complex webs of commodities in contemporary food systems. For example, whilst much attention is placed on food waste itself, ‘waste’ is only one subset of the surpluses of food production. That is, there are a number of other classifications for the surplus of food: waste, loss, discards, leftovers and by-products (Krzywoszynska 2013). These models often invoke the idea of supply chains, or ‘farm-to-fork’ conceptions of the production, circulation, distribution and consumption of food. Expanding upon and understanding the uses of commodities through the food system and how they end up being used in non-food products through extending the life cycle of commodities is under-researched within the field of food scholarship and waste studies (Corvellec 2014; Le Heron et al 2016).

One way of studying the extended lives and roles of commodities which circulate within a highly complex food system is to study a singular food commodity and trace its political, economic, cultural and social influences. Focussing on waste specifically and the myriad of ways in which it is produced and transformed, this thesis understands the sociological phenomenon of food waste in contemporary society through the potato. The potato is used as a device through which these concepts can be further understood and investigated within the context of the potato industry in the United Kingdom. From Van Gogh’s famous *The Potato Eaters* (Figure 2) which illustrated peasantry relations with the potato, my thesis modernises this to ‘The Potato Wasters’ which interprets and understands contemporary relations within the potato regime.



Figure 2: Vincent Van Gogh's *The Potato Eaters* (1885)

1.2. Three Potato Stories

The three stories which follow can be thought of as vignettes that assist in framing some fundamentals of the study, notably the perspectives used in relation to content, underlying logic and analysis. In showcasing the social life of the potato as both food and non-food, the stories also present an introduction to the discourse that influenced the sociological imagination of this thesis.

I

The first documented record of the potato in Britain is considered to be John Gerard's *Catalogue* in 1596 where he describes *Papus orbiculatus* (bastard potatoes) which he believed to originate from Virginia, thus preserving a centuries long myth of potatoes originating from the Eastern seaboard of North America. Gerard's enthusiasm for botany and herbals did not quite match his expertise or rigour however and much of his work was later discredited. However, it is known that somehow or other, Gerard obtained a potato plant for use in his three gardens located in central London, donated to him at the behest of King James I and Lord Burghley.

But what use did Gerard have for his potato plants? Was it their “round balls, some oval or egge fashion, some longer, others shorter: which knobbie rootes are fastened unto the stalks with an infinite number of threddie strings”? No, it was their ‘very faire and pleasant flowers’ whose colour was ‘hard to expresse’ but of a ‘light purple colour’.

As the colonial agricultural system in the New World boomed with fertility and abundance, Europe struggled with famine and scarcity. In the private grounds of European elites, potatoes were used for their pretty flowers. The context in which the potato arrived in Britain and the peoples whose hands it passed through and in whose gardens it grew, would give an indication as to its ownership and who would control it in future events. It took two centuries however before the potato became one of the staple foods in Britain.

II

In 1947, two years after the end of the Second World War, potatoes were rationed in Britain. Flooding and potato-blight combined with poor planning and forecasting led the Minister of Food to ration a food considered ‘un-rationable’ by the British public. The rationing of the potato only lasted a year, but it wasn’t until 1954 that Britain ended a period of rationing that lasted fourteen years.

Two years before the end of rationing in the UK, over in the United States, inventor George Lerner had teamed up with Hasbro toy makers to produce a Mr Potato Head toy. We are all familiar with the idea of Mr Potato Head – customisation, individuality and so on. Mr Potato Head was a number of firsts, the first toy to be included in children’s cereal boxes and the first toy to be advertised directly to children on television.

At first, very few toy manufacturers were keen on the idea of using food as a toy; such was the spectre of rationing. Even when Mr Potato Head was released, there was considerable backlash against the toy; critics argued that food is for eating, not for children to play games with. At first, Lerner’s idea was to use any fruit or vegetable, but the potato came out on top, continuing its contrasting symbol of scarcity and abundance.

III

The final story is one from my childhood. I went to a small primary school in South Wales of no more than 50 children. We ate school dinners intermittently and our lunch boxes were usually made up of peanut butter sandwiches and crisps. One day, however, with an abundance of a crop from the garden, my brothers and I were given a thermos flask of freshly boiled *blue congo* potatoes.

As my brother twisted the cap and steam billowed from the top, we sat eating our potatoes and bread with the rest of the children. At which point, a dinner lady came over to inspect our food. “You can’t eat *them!*” she exclaimed, “they’re gone *off!*” My brothers and I looked at each other confused, explaining to the dinner lady that they were just a different variety and nothing wrong with them, there was, in fact, hundreds of varieties!

However, she wasn’t having any of it and took them away from us and put them in the bin. We ate chips instead and never took our *blue congos* back to school.

1.3. Linking Stories and Knowledge

In terms of content, these three stories open up opportunities in understanding the potato beyond its conceptualisation as a simple economic commodity within a political economy paradigm. Further, and most crucially, the stories help introduce posthumanism as a perspective that treats the potato as a ‘contested cultural object’, with implications for potato waste.

In the first story, the potato appears first as a plant that produces flowers that are the source of its value. For sure, the ‘potato as flower’ could have evolved into a tradable commodity in a similar way to tulips or other nightshade plants. But such commodity fetishism contrasts strongly with the common-or-garden use of the potato as food especially in a context of scarcity or famine. This juxtaposing of flower/food reflects the respective social class orientations and their underlying cultural biases and is illustrative of the contested socio-cultural history of the potato.

The second story throws into even sharper relief the contrast between the potato as a food commodity and the potato as an object capable of being used and transformed – the potato in late capitalism is subjected to the interlinked economic drives and cultural influences of commodification and individualism characteristic of liquid modernity (Bauman 2000). That “Mr Potato Head” generated such strong negative reactions is indicative of the fact that in the social world, people’s cultural responses go well beyond that of a one dimensional commodity. The strict utilitarian demands of product utilisation would frame the potato purely as food for calorific intake

that matches the demands of societies, yet in late capitalism the utilitarian drive to extract use and purpose meets the social and cultural and transforms simple plants into part of a complex lifeworld.

So, the first two vignettes frame the study's concern with the comparative simplicity of the potato's commodity and economic status set against the potato's complex status as a cultural object.

The third vignette indicates just how complex this cultural status can be. For, in the third vignette the cultural contestation of the potato appears in one place and at one time – whereas the first two are more diffused in that respect. Effectively, my primary school experience with *blue congos* was a culture clash between the 'alternative life-style' of my parents who railed against the uniformity of potato consumerism and the regimented institutionalism of the kitchen staff. More prosaically, the actions of the kitchen staff exemplify 'waste through ignorance.'

The stories also generate questions about the potato and potato waste; examples include:

- How are potatoes wasted?
- What forms does potato waste take?
- Why are potatoes wasted?
- Is the potato just a simple food staple?
- How have the varieties of use of the potato changed over time – and with what consequences for waste?
- What happens to potato waste?

Although these naive questions are based in popular culture and the lived experience, they are substantive and can be used to inform their formal analogues.

1.4. Towards the Formal Research Agenda – Initial Questions

So far this introduction contains two types of writing. First, there are the opening remarks based on the research, academic and policy discourses. Second, there are the stories based on lifeworld experiences – stories subjected to commentary / discussion / interpretation using a form of critical theory. This sets out one pattern for the study as a whole: lifeworld experiences are observed and recorded, and then interpreted in a research framework. In this respect, the naïve questions serve the purpose of a first iteration of what eventually becomes the research aims. The naïve questions

also pose challenges for the Literature Review in identifying existing knowledge relevant to addressing those questions and where any knowledge gaps lie. Those challenges will be taken up in the next chapter.

The main purpose of this introduction is drawn to a close by linking the opening remarks and the naive questions by raising four general questions and providing an indication of how the relevant issues are addressed in the thesis.

How is contemporary food wasting situated within a historical trend of accumulation and surplus?

For millennia human societies have attempted to achieve surplus and abundance in agriculture. Today, over 40% – and likely to be a higher percentage – of food produced is wasted. However, the abundance of food has distinct geographies – where there is abundance there is also scarcity. The unequal and uneven distribution of food is always a significant political, social and environmental issue. How to manage, store and profit from surpluses has been an essential component in the formation of societies and in particular, agricultural societies and capitalist societies. I attempt to understand how processes of accumulation within the contemporary food regime may share similarities, or not, to previous food regimes. For example, increasing industrialisation and ‘green technologies’ of a technologically and financially driven contemporary food regime are argued to not only meet the future food demands but to create a more efficient food system, the traditional problems of producing too little have been replaced by producing too much – accumulation strategies will therefore change, for example through ‘lean’, ‘flexible’ or ‘adaptive’ production, manufacturing and distribution, but how do people working and operating within the UK potato industry imagine and understand these developments?

In what ways is the concept of supply chains in food scholarship open to challenge?

Within food scholarship there is much debate and discussion around the use and concept of supply chains to understand contemporary food systems. The supply chain has become common parlance in business and wider society to describe the production, distribution and consumption of food from ‘farm-to-fork’. By studying food waste and by-products, and potatoes in particular, I aim to test existing scholarly work that favours networked models for thinking about and working through food and waste regimes.

How are relations mediated and experienced through objects and things (i.e. the potato)?

In studying the potato, I aim to understand how relations between people interact with the objects and things that surround, and give meaning to, their lives. Drawing upon posthumanist theories, I aim to understand and explore how the biological characteristics of potatoes lend themselves towards overproduction and accumulation within contemporary food regimes.

What are the processes behind 'food' becoming 'non-food' or 'waste'?

The classifications and definitions over what is classified as food 'waste' is complicated and problematic. Food that does not meet quality standards at packing, for example, is classified as 'loss', whereas food that is disposed of in household bins is 'waste'. Legal and regulatory texts detail what, where, when and how food becomes waste, and this also includes by-products, residues and leftovers. My research unpacks and understands how and why these classifications and terminologies exist in the ways they do.

1.5. Towards the Formal Research Agenda – Research Aims

Following the naïve and initial questions, I now provide the aims which structure, guide and provide coherence to the thesis. These are repeated at the end of the Literature Review (Section 2.10.) and beginning of the Methodology (Section 3.1.) to remind and aid the reader as the thesis progresses.

1. To present an account of shifts in the UK potato industry with reference to waste and the processes of hyper-globalisation.
2. To subject that account to critical interpretation using a posthumanist perspective with a view to:
 - (2.1.) Understanding how human/nonhuman relations influence overproduction with consequences for waste and accumulation;
 - (2.2.) Describing how network actors define, negotiate and contest different meanings of food waste; and,
 - (2.3.) Contributing to the sociological discourse on waste, notably in respect of single commodity studies and a critique of the food/waste chain concept.

1.6. Thesis Structure

Including this introduction, this thesis is structured as eight chapters.

Chapter 2: *Literature Review*. The Literature Review begins with a broad introduction to the study of food and waste within a global political economy, presenting approaches that utilise concepts of chains, networks and regimes (Section 2.2.). As I utilise the potato as a single commodity to study, a review of political economy and posthumanist approaches to the study of single commodities is presented (Section 2.3.). Research on the potato is discussed along with a brief social history of the potato; justifications on why the potato was chosen as the single commodity to study are also provided (Section 2.4.). Further developing the conceptual base, theorisations of food waste are reviewed (Section 2.5.). In a spatial detour, the geographical representations of waste are discussed (Section 2.6.). Returning to the theorisations of waste to develop the conceptual base, selected scholars and concepts within the sociology of waste are discussed (Section 2.7.). Completing the review of sociological waste scholarship, I identify key scholars and concepts (Section 2.8.). Building towards the conceptual framework, I discuss key conceptual parameters (Section 2.9.). Pulling together the strands of the Literature Review, I justify and explain my extended conceptual framework and provide research aims (Section 2.10.).

Chapter 3: *Methodology*. The methodology chapter begins with a restating of the aims and a locating of the research within sociological methodologies and understandings (Section 3.1.1.). The Research Strategy is clearly explained (Section 3.1.2) and what elements of an actor-network theory (ANT) methodological framework have been utilised (Section 3.1.3). Detailing the data collection, how the research was conducted and participants gathered is explained at length (Section 3.2.). Focussing on primary data (Section 3.2.1.), I identify the risks associated with social research in rural locations, how the interview schedule was designed and implemented in the fieldwork, how the interviews were conducted and the use of a research diary as a form of reflexivity is also discussed. The following section discusses the secondary data that is used to supplement my research (Section 3.2.2.). The final section provides explanations on the analysis, synthesis and representation of the methodological approach. I provide an discussion of the Research Strategy (Section 3.3.), a glossary of key methodological terms (Section 3.3.2.), a detailed explanation of analytic techniques applied (Section 3.3.3), how the data was synthesised in the empirical chapters (Section 3.3.4.) and a final statement on the importance of visual and textual representation (Section 3.3.5.).

Chapter 4: *Growers*. The first of the empirical chapters, the chapter begins with a poem by Patrick Kavanagh to further illustrate the shifting representations of potatoes. The major changes found in the growing of potatoes in the UK are provided (Section 4.2.). The following three subsections discuss the fieldwork conducted at different potato farms across the UK (Sections 4.4. – 4.6.). Following these discussions and explanations of the growers fieldwork, they are subject a reflexive

review, critical interpretation and understanding (Section 4.7. – 4.11.), synthesising the key findings and relating them to the conceptual framework developed. I introduce my notions of waste disguise, waste transfer and waste deferment that are carried through each empirical chapter and the Conclusion. A final distillation of the key understandings and findings is provided to aid the reader which is replicated across each empirical chapter to provide coherence and consistency (Section 4.12.).

Chapter 5: *Manufacturers*. The second of the empirical chapters, the potato is followed into the expanding world of manufacturing. The introduction develops my approach to the manufacturers chapter (Section 5.1.). The development of by-products and waste are explored, how terminologies and taxonomies influence the relations, processes and practices of potato waste (Sections 5.2. – 5.3.). The wide variety of food and non-food uses of potato by-products are listed, along with explanations of how these have developed and changed in the manufacturing of potatoes over time (Section 5.4.). The rise of manufacturing in the potato industry is discussed and how this has important implications on the generation and management of waste (Section 5.5.). Following on, I provide an in-depth account of fieldwork with a major manufacturer (Section 5.7.) and a shorter account with another multinational food conglomerate (Section 5.8). As with the previous empirical chapter, and in order to bring coherence and integration between the chapters, I subject the chapter to a reflexive review, critical interpretation and understanding (Sections 5.9. – 5.14.) which synthesises key findings related to the conceptual framework developed. Distillations of key understandings and findings are provided as a reference point for the reader (Section 5.14.)

Chapter 6: *Retailers*. The third empirical chapter begins with a brief introduction on the significance of retailers (Section 6.1.). I introduce my idea of supermarkets as ‘penumbral spaces’ which illuminate and obfuscate food commodities (Section 6.2.). The development of retailers within contemporary food systems is provided (Section 6.3.). Key processes are identified and explored: focussing on standards, traceability and transparency (Section 6.4.), yields (Section 6.5.) and contracts (Section 6.6.). Fieldwork conducted at a major UK retailer is discussed in the context of a shifting potato industry and wider retail context (Sections 6.7. – 6.8.). The discussion is extended to all retailers in how they generate waste and their approaches to managing it (Sections 6.9. – 6.10). Drawing the chapter to an end, a reflexive review, critical interpretation and understanding is discussed at length (Sections 6.11. – 6.15.). Again, distillations are provided at the end of the chapter to aide the reader and provide a reference point for the summary of key findings (Section 6.16.).

Chapter 7: *Overseers*. The final empirical chapter discusses ‘overseers’ within the UK potato industry. I provide an introduction which explains what is meant by the term ‘overseers’ and their role in the potato industry (Section 7.1.). A history of the development of overseers in the potato industry and food more widely is discussed (Section 7.2.). I follow up this history with a detailed account of fieldwork conducted with key areas of overseers - namely marketing (Section 7.4.), market intelligence (Section 7.5.) and research and development (Section 7.6.). The following section summarises the role of overseers in the potato industry and what impacts this has on the generation and management of waste (Section 7.7.). In keeping with previous chapters, I provide another reflexive review, critical interpretation and understanding which synthesises key findings and relates to the conceptual framework (Sections 7.8. – 7.12.). Finally, distillations which list key understandings and findings are provided (Section 7.13.).

Chapter 8: *Conclusion*. The Conclusion synthesises the interpretations and understandings from the empirical chapters through the idea and construction of ‘The Potato Wasters’. The chapter begins with a critical interpretation of Van Gogh’s *The Potato Eaters* (Figure 2), drawing meanings that in turn influence my construction and analysis of the potato wasters. The Conclusion is a discussion of the aims which are addressed in a procedural manner. In Section 8.1., Aim 1 is discussed where I synthesise the empirical chapters in line with my conceptual framework to present an account of shifts in the UK potato industry with reference to waste and the processes of hyper-globalisation. I identify key processes of concentration, rationalisation, specialisation and professionalisation and how these influence waste and accumulation. Having addressed the first aim, I then turn to the critical interpretation of the UK potato industry through a posthumanist approach by discussing how human/nonhuman relations influence waste and accumulation (Aim 2.1.) and how meanings of waste are defined, negotiated and contested (Aim 2.2.). Discussing Aim 2.3. entails an extended discussion on my contribution to the sociology of waste (Section 8.2.). I develop a potato waste regime as a critical alternative to a potato chain or potato industry. Furthermore, I develop a model of potato waste regime strategies by drawing on previous research and adding my own notions of waste disguise, transfer and deferment to form my contribution to the sociology of waste. To conclude, future prospects on the role of the potato as it moves from collection to cultivation to modification are discussed along with potential future research that can further illuminate the under-researched world of waste (Section 8.3.).

2. LITERATURE REVIEW

Indeed, there have been not wanting those who have regarded these activities with a shake of the head and an indulgent smile, indicating that nothing, short of mental instability, could excuse a lifelong attachment to the study of so banal a subject.

– Redcliffe Salaman (1985:xxix)



Figure 3: *Microphotograph of a Potato Cell*

2.1. Introduction

Is the potato so banal a subject?

The subject matter of the following 9 sections has been organised with directness – but not linearity – in mind. There are general discussions of concepts such as networks, posthumanism, and accumulation. There are also specific discussions on food, waste and the potato as commodity. I have also chosen in places to link the specific with the general in the Literature Review by, for instance, considering supply chains in relation to food. This integration of the concept-base has its analogue in the author citations; some authors, for example Martin O’Brien and Zsuzsa Gille, are referenced more than once and in different sections. In the interest of clarity of understanding, I have recorded in the text where this integrative cross-referencing occurs. The Literature Review casts a broad net; this is narrowed and focussed as it progresses in building a concept-base, leading towards the final section which introduces the conceptual framework that is implemented in the analysis and synthesis of the empirical chapters.

2.2. Food Chains, Networks and Regimes

How as sociologists do we begin to study food and waste in an era of hyper-globalisation?

One way of doing this is through chains of economic activity and the social relations that result. Chains have been discussed heavily across the social sciences, public policy and industry in a variety of different contexts and industries from food to automobiles. Jackson, Ward and Russell (2008) trace the first use of commodity chains from the early 1970's and the work of Immanuel Wallerstein (1974). Wallerstein's world systems theory provoked huge interest in examining the effects of a global capitalist economy on human and natural environments.

Building on earlier development scholars such as Andre Gunder Frank (1966), Wallerstein argued that the key aspect of globalisation was the uneven development of global capitalism between core and periphery. The expansion of capitalist markets which relied upon the exploitation of underdeveloped regions; the flow of commodities such as capital and labour across borders showed the links between production and consumption across the planet and how these led to the reproduction of an unequal global economy. The approach of world systems theory and commodity chains was to historicise global capitalism (Friedland 1984), to place within the modern context an understanding that the way things operate within the global economy are the result of centuries of development and change (Arrighi 1994). In particular, the ways in which wealth and commodities are transferred from underdeveloped regions of the global economy to advanced capitalist nation-states in Europe and North America reproduced inequality and furthered the concentration of power. As Hendrickson and James (2005:270) remark, such events during the twentieth century:

“...led to the development of large, well-financed corporations and a growing concentration of capital and control in the food and agricultural system. Those responsible for the actual production of food products – farmers, farmer workers, and food processing workers – have been increasingly deskilled in the process, removing more and more decisions from the actual point of production.”

Whilst commodity chains remain more of a niche academic interest, the chain approach to the study of food is most popular through the conception of global value chains and in particular supply chains. In academia, the veracity of the chain has been heavily discussed and debated with significant progress in methodology and understandings (Neilson & Pritchard 2009). However, less debate has existed in industry, business and government who have adopted and promoted the idea of supply chains to this day, particularly linked to profitability and efficiency (Jackson, Ward &

Russell 2008). The supply chain is the common parlance of business and popular representations of food systems through the idea of ‘farm-to-fork’ (Figure 4). The generic and popularised use of chain approaches to food use the conceptual idea of chains – from producers, to manufacturers, distributors, retailers, restaurants and finally to consumers in the home or eating out. The linear trajectory of food takes it from farm to fork (WRAP 2012). As such, the final destination of the food, the consumer’s plate, becomes the main goal-orientation of the chain; value is marginally added each time until it ceases. When nothing more can be usefully gained, both the lifecycle of the product ends and so do our imaginations and understandings. It is interesting to trace the evolution of chain approaches in scholarship and their representation in corporate and civil society through to more critical reflections in scholarship. As chains are now well established in food policy and discussion, it is worth understanding how academic or scholarly concepts of chains have changed over time.



Figure 4: ‘The Food Production Chain’

In the mid to late part of the 1990’s, the idea of global value chains began to replace global commodity chains. The work stimulated by Gereffi (Gerrefi et al 2005; Cattaneo et al 2010) built on many aspects of Wallerstein’s theory and developed a framework for understanding how chains operate which included “an input-output structure; territoriality; and a governance structure” (Pritchard 2013:170). Particularly important here is the notion of governance in the global economy, how the processes of standardisation and harmonisation through the liberalisation of natural resources and markets in the so-called developing world entailed a globalised governance structure that business and nation-states had to sign up to in order to trade. Value chains highlighted how certain linkages within the chain were able to gain higher added value, whether during the design stage, or in marketing and advertising. There are certain linkages in the chain where it possible to add more value, and indeed the places across the global economy maintained and enforced these inequalities: For example, farmers would get paid little to grow food in Africa, but food marketers in Europe would significantly profit more by 'adding value' through branding and marketing (Freidberg 2003). How these value chains were organised across the global economy placed interest in the role of intra-industrial firms in value chains, particularly in the field of food with increasing diversity of products made available for trade. This is important for my research in

that value chains often involve the repurposing and rematerialisation of otherwise valueless *stuff* into goods and products sold across the world.

Later on as research developed building on world systems theory and global value chains, many scholars used this approach to the study of agri-food systems (Dolan & Humphry 2000). These perspectives in food scholarship have been a common and popular approach since the 1980's in what became known as the new rural sociology (Newby 1983). Researchers aimed to draw "attention to previously unobserved linkages between food consumption dynamics, retailer strategies, and distribution dynamics, together with the impacts of these on farm and orchard life" (Pritchard 2013:183). Such research traced the ways in which the global economy of food from the farms of the Global South to the dinner plates of the Global North. Further additions to global value chain theory were the challenges posed by global production networks, notably from the Manchester School (Henderson et al 2002).

Researchers started to use 'networks' as a more conceptually powerful tool than 'chains'; for example, chains can be viewed as pathways in a network, it follows that the network concept encompasses the chain concept. Global production network research took issue with the dominance of governance in global value chains, and argued that the spatial production of power was important in networks, rather than chains. The research showing that by centring the analysis on governance structures these institutions become a given, rather than a product of human action and relations, or whether these relations are mediated by something else, like capital (Starosta 2010).

Alongside global production networks, the chain approach to the study of food in particular has received further criticism from some agri-food and waste scholars for its linearity and failure to account for the ways in which commodities are constantly circulated across assemblages (seemingly disparate things that make a unified whole) (Le Heron et al 2016) and networks (Stringer & Le Heron 2008). Such research placed food at the centre of analyses concerning the development of capitalist economies across the globe; academics and activists argued for a critical approach to the study of global food systems as multiple crises affected the planet. Another approach that in many ways built upon world systems theory and global value chains is the concept of food regimes (Friedmann 1993; McMichael 2009). Food regimes take a historical and regulatory approach to global food systems from 1870 to present day, arguing for three distinct epochs of colonial core-periphery (1870's-1930's), United States dominated development models of transnational agri-industrialisation (1930's-1970's) and the establishment of a corporate food regime built on financialisation, multinational retailers, increased meat-energy-feed commodity flows and food social

movements (1980's-present). Food regimes and food networks move beyond the linear conception of markets, and in doing so problematise the resource extraction model. Food regimes have been particularly important in bringing together a critical strand to food studies, particularly the role of indigenous and peasant groups in global food provisioning; popular resistance to agribusiness through agroecology; and, understanding the global historical processes of colonialism and imperialism that have led us up to the current food crisis.

Food waste research has in many ways adopted the chain approach – focussing on what points along the supply chain food is wasted (Stuart 2009; Bloom 2011; Göbel et al 2015). From food loss at the farm gate due to diseases, pests, weather and quality control, to distribution issues over storage and transportation; to processing because of by-products and human error; to retailers because of shelf life, use-by dates; and, finally to consumption, in cooking and buying too much food and poor storage. In particular, the chain approach has been mobilised by corporations and governments seeking to reduce or eliminate food waste. This involves the measurement and quantification of waste along different parts of the supply chain, identifying points of intervention and areas for improvement (WRAP 2012).

The findings of these studies often place the ideas of responsibility and governance at the heart of research by pin-pointing where in the supply chain waste is found, identifying cause-and-effect relationships in the supply chain. Because nearly two-thirds of food waste (that is quantified and classified as *waste*) is found in people's bins at home, most research and policy intervention has taken place there (WRAP 2013). The implementation of the European Union's Landfill Directive in 1999 placed a requirement for local councils and governments to reduce the amount of waste generated by households. As such, a responsible consumer narrative was constructed, aiming to develop an individual who 'Loves Food, Hates Waste'. These narratives of the thrifty consumer, however, contrast with an overarching narrative in the 'retail revolution' (Hallsworth 2013) which encourages overconsumption. One of the main results of political economy approaches to agri-food provisioning and chain approaches has been the focus especially on the role of multinational retailers in mediating and often controlling international supply chains, a consideration that is important for my research (Burt & Sparks 2003).

With the ever increasing need for growth combined with the technological innovations that are developed which valorise waste, the extent to which overproduction and waste becomes normalised and embedded in the system of production, exchange and consumption, waste and excess has been heavily discussed (Evans et al 2013). However, traditionally such approaches to the understanding of

waste streams in production come from industrial ecology and the concept of ‘overflows’ that highlight the complex movements of waste and by-products through industrial systems, particularly around industrial waste and recycling (Oreopoulou & Russ 2007; Corvellec 2012). Not only that: By focussing so much on the economic exchanges within supply chains and the view that people are linked together in chains only through their economic relationship to one another, we also miss the cultural, social, political and ecological *relations* that link up different beings (human and nonhuman) within food systems. Here the research ties in with circular economy, ideas that criticise the linear resource extraction model in favour of the reuse and recycling of resources and materials. Particularly in Europe, the idea of circular economy has gained more and more support from governments and private corporations, focussing on sustainability whilst maintaining competitive advantage in a global economy.

I have highlighted the role and limitations of the supply- or value- chain concept in the lifeworld of food and waste together with the responses of researchers in terms of networks and regimes. I now go on to summarise the above and indicate how these concepts and the matters arising will be developed in the thesis.

The position taken up in this study in relation to chains and networks is this:

Chains:

- A well-established concept, e.g. the Journal of Supply Chain Management was started in 1979;
- The chain concept has correlates in the lifeworld, e.g. cold chains for vaccines;
- The terms ‘supply chain’ and ‘value chain’ are in extensive use in policy, business and industry;
- The chain concept is not appropriate in contexts where there are deviations in the product pathway e.g. when food becomes waste;
- Further to the previous bullet point, the chain concept is problematic in contexts of circularity;
- The notions of value or value-adding chains have met with ethical challenges from critical theorists; and,
- The value chain concepts of repurposing and rematerialising have a role in the extended conceptual framework.

Networks:

- The network concept has widespread use in public discourse, notably due the Internet;
- The network concept has a long pedigree and considerable recent interest in the social science and business communities;

- A chain can be part of a network, so network concepts embody the idea of chains;
- Networks are canonically suited to dealing with path divisions and circularity;
- Networks are considered to be ‘value free’ by critical theorists; and,
- Network structure composed of differentiated hubs and links is ideally suited to the incorporation of multiple perspectives and actors (that is: actor-network theory).

Supply chains and networks are spatial concepts and eminently suited to geographical analysis and representation but regimes are not purely spatial concepts. Further sections deal with these matters.

Crucially from a critical theory perspective:

A chain in a network might add value and lead to capital accumulation for actors in the chain but for other network actors or the network as a whole there might be a net loss of value or resources.

As for regimes, the forthcoming section on ‘Theorising Waste’ (Section 2.5.) develops and consolidates the role of food/waste regimes in this thesis. That development and consolidation depends on the discussion of political economy and posthumanism – to which I now turn.

2.3. Single Commodity Research – Political Economy and Posthumanism Approaches

One way of examining the chains, networks or flows within the globalisation of food is to study a single commodity. In thinking about that commodity and ‘opening its eyes’ or ‘lifting its gaze’ to tell us a story, Ian Cook has been involved in a number of such projects where his curiosity has led him to thinking “what would the fruit say if you could pick it up and speak to it, all the people involved?” (Cook 2004:2). The ‘follow the thing’ approach devised by Cook draws on seminal work from ‘Arjun Appadurai’s (1986) ‘social life of things’, David Harvey’s (1990) ‘getting behind the veil of commodity fetish’, and George Marcus’ (1995) ‘multi-sited ethnography’” (Cook et al 2010:105); as a result has promoted a stream of research that has traced the taken-for-granted items that make up our everyday lives. This highly fruitful area of research has promoted critical engagement with issues around globalisation, production and consumption (Jackson 2009).

From the perspective of waste studies, single commodity research does have drawbacks. Notably, in Cook’s paper *Follow the thing: Papaya* the very first sentence begins: “Once they’re picked, they start to die.” (Cook 2004:5). If there is to be a criticism of such an approach, the idea of a chain of events promotes certain ideas about the ‘life-cycle’ of commodities – ‘the birth’ of the papaya is the

moment its picked and if so why not before? When does it die? Being sliced into pieces for breakfast? Exiting the effluent pipe? Furthermore, it entails a value-producing chain of events situated in time and space, which Zsuzsa Gille (2013:27-28) argues: “implicitly locate[s] food in the register of worth, value and a host of other positive categories”, and in order to get away from such valorising aspects can we view “the world of food from the perspective of waste rather than of goods; from the perspective of disuse rather than use; and from the perspective of loss rather than gain?”

This reversal of the utilitarian and value-producing assumptions of food provisioning provides a useful consideration for my research and something that will be investigated closely. That is, rather than seeing a chain as value-added, what if we looked at it as value-destroying?

With the complexity of globalised networks of production, distribution and consumption, it is increasingly very difficult to actually ‘follow the thing’. This is because commodities and products are often being transformed and used in something else. The original commodity changes what it becomes at various stages during its life-cycle; by studying cotton, for example, you end up studying denim jeans, which ends up becoming a study of cushions, and so on. Rather than exploring the foundations of social order or grand sociological theory, interest is found in the mundane, the unspectacular and microcosmic. Looking ‘into’ rather than ‘up’ (Shepherd 1977), the lofty goals and expectations of macro theoretical explanations lay buried beneath a mass-production industry of academic citations and research (Abbott 2000). Perhaps interest in the single commodity grows out from this retreat from grand social theory.

In this long tradition of single commodity research in sociology and anthropology, another source of inspiration for my research comes from Sidney Mintz’s *Sweetness and Power: The Place of Sugar in Modern History*. Mintz’s vitally important study (1985:214) is captured in the sentence: “in understanding the relationship between commodity and person, we unearth anew the history of ourselves”. Mintz’s book traces the commodification of sugar and how it tied in with the commodification of human beings under slavery, how the properties and qualities of sugar itself led to its central role in the colonisation of the New World. Mintz splits his analysis of sugar into four main chapters: Production, Consumption, Power, and Eating and Being. The skill in this work is in tracing the simultaneous changes in production and consumption, how the expansion of consumer demand in the colonial cores was essential to the increases of production in the colonial peripheries. With a background in anthropology, Mintz was able to merge political economy perspectives on the history and development of global trade (particularly transatlantic trade) with the enlivened

properties of food, describing how they become central to our identity and belonging, embedding themselves within the everyday lives of people, whilst the origins of the commodities we consume remain hidden. This mixture of political economy with socio-cultural aspects of food consumption and production has provided much interest to food researchers, particularly in the field of posthumanism, as will now be discussed.

Posthumanism can crudely be seen as a philosophical position that removes, or decentres, humans as the central focus of reality (Haraway 2008). As such, it places just as much emphasis on nonhuman objects as the makers and shapers of social reality. As Hannah Arendt argued in *The Modern Concept of History* (1958:89), “the modern age, with its growing world-alienation, has led to a situation where man, wherever he goes, encounters only himself. All the processes of the earth and the universe have revealed themselves either as man-made or as potentially man-made.” The devastating events of the twentieth century led to a critique not just of the models and structures of organisation that led normal people to conduct unimaginable crimes, but their philosophical and epistemological motivations.

The posthumanist approach to food waste emphasises the materiality of food. Political economy approaches often fail to separate a utilitarian view of food (that is often taken for granted as a commodity – rather than, say, a public good or commons) from the meanings or non-economic exchanges of food (Giles 2014). Posthumanist research often argues that instead of treating food as an object that has no agency in a world made by and for humans, it follows the work of Latour (2005) and others in actor-network theory (ANT) where food instead becomes something ‘lively’ that is “always in a process of becoming” (Alexander et al 2013:479). Rather than seeing things as static, linear and hierarchical, suddenly the picture becomes much more intricate, hybrid and complex. Whilst sounding unremarkable, it has significantly altered the focus of food waste scholarship. It has given rise to very interesting research connecting the surplus of production and the health crises of obesity across the world; human beings embody the overproduction of subsidised supply and the excesses of production. The conduits for the accumulation of capital becomes organisms and life itself (Braun 2007; Nally 2011; Rioux 2014). A central actant in this dynamic is food – hence its importance.

With the interest of poststructuralist and deconstructionist perspectives in food studies, particularly the ideas of biopolitics and governmentality (Nally 2011), researchers have argued that “the politics of the food system as involving alternative “modes of ordering” in which food is an arena of contestation rather than a veil of reality” (Goodman and DuPuis 2002:15). This means that the

shadowy spaces of food production, distribution, consumption and waste are not, as commodity fetishism inspired research would have us believe, purely a case of hidden reality of capitalist exploitation, but arise out of complex contestations and discourses between groups that all have agency and power, some more than others. In many respects, research in this field moves away from the class-based structural analysis of earlier political economy approaches to food: Indeed the poststructuralist or cultural turn has particular conceptions of power within social relations. Rather than seeing power as centralised in the core capitalist countries, or in the higher value added aspects of the chain, power is diffuse and difficult to trace and detect as a researcher. Indeed these perspectives don't provide answers as such, rather they provide a different way of seeing the world, of changing our sociological and geographical imaginations. Furthermore, Jackson, Ward and Russell (2008) have focussed on the moral economies of the food industry, developing Smith's (2000) ideas of 'caring at a distance' to formulate three morals: remembering and forgetting; connecting and disconnecting; visibility and invisibility.

Popular approaches such as ANT, material-feminist and queer theory focus heavily on the ideas of 'flat ontology', 'asymmetries of power' and the removal of scale. These perspectives critique the hierarchical or vertical categories employed by systems thinking or global power structures which are argued to reproduce and reinforce patriarchal and anthropocentric ideas of the world. In food studies, this has been important for anthropological and ethnographical research that looks at the performance of food (Rowe and Rocha 2015) ('performance' in this case refers to how objects and commodities become part of social identities and practices). While these areas of research are important and interesting, there has been a concern that such research fails to accurately engage with the present realities of exploitation and destruction (Sayer 2010). Furthermore, the cultural and new materialist approaches to food over the last twenty years has arguably, as Gregson (1995:139) forewarned, resulted in a lack of consideration of 'structural social inequalities' such as class, race, gender and disability. I agree that in compensating for a lack of attention to culture and consumption, food scholars have concentrated on consumption at the expense of the links between production, distribution and consumption; microsociological approaches that appear appealing in the complexity of the modern world can lose sight of the bigger picture and historical trends. Posthumanist scholars such as Gay Hawkins (2006; 2013) (whose work is expanded upon later in this Literature Review) who have focussed specifically on waste would dispute this accusation, however. Focussing on the micropolitical, mundane and everyday affects of waste does not dismiss the macrolevel environmental problems of waste or the structural concerns of inequality, poverty, hunger or deprivation. It is not to turn a blind eye, but to reorientate the focus of attention.

To consolidate:

Single commodity research has a rich history in the social sciences and the humanities. Given the extent and complexity of structure and action in capitalism, single commodity research offers the prospect of understanding both the path of goods from initial production to final consumption and any ensuing capital accumulation. However, tracing that path is far from straightforward. Particularly in the case of food due to the complications of, for instance, perishability and waste. This is the issue of the difficulty of ‘following the thing’ – a difficulty which also serves as a reminder of the limitations of the supply chain concept already noted.

Examples of single commodity research, for example the tomato (Harvey et al 2003), provide reference points throughout this study. However, their main use is in the final chapter when I consider the extent to which the potato is similar or different from other commodities in capitalism.

If we are to better understand commodity waste, especially in terms of values, O’Brien has suggested the use of the political economy paradigm in which he emphasises the usefulness of practices, relationships and institutions as ‘parameters’ in framing understanding. I also drew attention to the need to keep in mind the traditional ‘parameters’ of political economy: power and efficiency. These parameters are part of the conceptual framework developed shortly.

Other scholars have turned to posthumanism in order to best understand the complexities of commodities. In respect of investigating the cultural meanings of commodities, posthumanism has conceptual range unavailable to interpretations derived from a political economy paradigm; this is especially the case when considering contested issues. Another difference between the political economy and posthumanist approaches is their respective treatments of power. In the former, power tends to reside in institutions and central authorities. In the latter, power is more diffused and open to more nuanced analysis in regard to structure/agency.

Whereas the political economy paradigm is operationalised formally in the conceptual framework, posthumanism plays a different role in the thesis. First, I use posthumanist perspectives regularly within the body of the thesis in a critical theoretic capacity. Second, I formally incorporate ANT as a posthumanist method in the analytic framework (described in the chapter on Methodology). Further clarification of contrasting – and complementary – roles that the political economy and posthumanist approaches is achieved in the section on ‘Theorising Waste’ (Section 2.5.).

2.4. The Potato – Brief History and Research

I introduced this Literature Review with Salaman's quote about the banality of the potato as a subject for study. As I hope to indicate in this section, the potato may be commonplace but it's hardly banal.

In recent decades a number of books have been written on the potato in this fashion of telling history, society and economy through commodities (Zuckerman 1999; Reader 2009; Smith 2011). The mould of this storytelling was found in other books around the time in commodities such as the tomato (Harvey et al 2003), salt (Kurlasny 2003), cod (Kurlasny 1999), bananas (Wiley 2008; Frundt 2009), tobacco and chocolate (Norton 2008), and sugar and rum (Mintz 1985; Smith 2005). Preceding all these, Friedland, Barton and Thomas (1981) produced a study on lettuce in the United States. Their 'semi-Marxian' approach to studying the lettuce focusses on the social organisation of lettuce production. These studies tell the story of single commodities, the item in question becomes the springboard for discussions around nature, agriculture, industry, capitalism and culture to name just a few.

Reader's (2009) book in particular in many ways was indebted to Redcliffe Salaman's (1985) classic *The History and Social Life of the Potato* in which he traces the history of the potato from the Andean plateau over 8000 years ago, to present day. Salaman's mix of historical archives, farming data, plant pathology, and history, is the encyclopaedia for all people interested in the role of the potato in the development of agricultural and industrial society. Indeed, up until the twentieth century, the origins and development of the potato in global societies was full of myth, misunderstanding and historical inaccuracies over where it came from, how best to grow it, its uses and history – Salaman recommends Roze's (1898) *Histoire de la Pomme de Terre* as one of the few worthy attempts.

Three further academic studies of the potato that are of interest come from Nancy Reis (2009), Gallagher and Greenblatt (2000) and Yakovleva and Flynn (2004). Reis' work is particularly inspirational in her attention to what she calls 'potato ontology', using potato as a way of exploring culture, representation and identity and how it:

“...constitutes a ritualised mode of activity, exchange, and negotiation within families, networks and communities, and across larger politics. It facilitates engagement with, detachment from, or protection against markets and politics. It is indelibly linked to particular epochs (such as WWII) and

in complex ways to recent social change. Potato is viscerally, painfully, poignantly, and triumphantly planted in memory and history.” (Reis 2009:183).

Similar in orientation to Reis' ontological and theoretical perspectives on the importance of objects in understanding ourselves is the short but excellent discussions by Gallagher and Greenblatt (2000) in their chapter *The Potato in the Materialist Imagination*. They trace the historicisation of the potato in becoming a food, how it was central to discussions around civilisation, agriculture and modernisation during the eighteenth and nineteenth centuries. Their ability to allow people to ‘detach from...markets and politics’ was argued to keep them in a state of permanent *homo appetitus*, social action only stemming from our ‘primal’ or ‘savage’ instincts to sleep, eat and have sex. Instead, peasants living outside the market economy needed to become *homo economicus*. Indeed, Gallagher and Greenblatt’s understandings on how imaginations and representations of commodities play into the relations and practices of the UK potato industry is something taken forward and greatly appreciated in this research.

Yakovleva and Flynn’s (2004) *The Food Supply Chain and Innovation: A Case Study of Potatoes* is a rare academic study on the potato industry in the UK. They adopt a systems approach for understanding the potato supply chain. As their focus is on innovation, using such an approach allows them to analyse technological changes in a single commodity. The potato is chosen as it accounts for the most fruit and vegetable sales in the UK; is the second most important crop in Europe after wheat and is mainly bound within the UK, allowing for system boundaries to be drawn more easily. Yakovleva and Flynn’s study provides an excellent grounding for single commodity studies into the potato, however I build on their systems approach by developing a potato regime.

Humans have been cultivating the potato for over 8,000 years with the first societies being based in the Andean ranges of South America (Reader 2009). With over 4,000 different varieties of potato (*Solanum tuberosum*), its adaptability, productivity and palatability have ensured its importance to the sustenance and development of human societies for millennia. Today, the potato is the fourth most planted food staple behind wheat, corn and rice and is a staple food of billions of human beings worldwide, with 80% of production occurring in Asia (mainly China and India) and Europe (mainly Russia, Ukraine, Germany, Poland, and France).

Discovered by European colonialists in the sixteenth century, the potato became an integral instrument for the expansion of European colonialism in the proceeding centuries as part of the ‘Columbian exchange’. In particular, the potato has an important role in the transition from

societies of scarcity to abundance. Until the incorporation of the potato into the diets of European peasantry, people were dependent upon wheat and in the centuries that followed the social status of the potato was tied to necessity and primitivity for their links to times of famine and scarcity. The industrial revolution in Europe coincided with the mass planting of potatoes, providing enough calories to supply a growing urban proletariat. Indeed, there is the famous if not historically dubious story of Antoine-Augustin Parmentier planting potatoes in a walled garden on the outskirts of Paris that was patrolled at night by guards, in an attempt to make people think the things growing there were of value. It has been used as a source for colonial expansion and domination (Salaman 1989 [1948]) and as a vital sustenance for rural peasantry and urban working classes worldwide (Andersson 1986; Woodham-Smith 1991; Hickey 2002).

Today, in terms of waste, potatoes have been identified as the most wasted household vegetable in the UK (WRAP 2012). Whilst the accuracy of these figures and identifications of ‘waste’ will be a constant source of discussion throughout this thesis, an estimated 770,000 tonnes are thrown away in domestic households each year. Of this, 480,000 tonnes are ‘possibly avoidable’ the majority of which is potato peelings. That leaves 290,000 tonnes of ‘avoidable’ potato waste in the household, 98,000 tonnes of cooked leftovers and 180,000 tonnes without any preparation, estimated to cost around £230 million.

At the production side, 20-25% of fresh potato waste occurs at packing – these are often potatoes that fail the standards set by supermarkets (who say their standards are set by consumers – see Chapter Six). There are also a number of other issues around waste in the supply chain, from poor forecasting, in-store handling and of course, weather and damage from wild animals. These add up to potatoes being a very important commodity in food waste production, the nature of potato production however provides a different perspective of commodity chain analyses in that rather than treading the path of ‘south-to-north’ or periphery-core.

In thinking about the circulation of potato waste, it is important to remember that food is highly perishable and difficult to transport. Despite the widespread removal of seasonality in food production and consumption and constant availability of food in supermarket aisles, the logistics behind making sure food remains suitable for eating involves huge amounts of effort, coordination and management. This is noted because in many social scientists interested in food production and consumption often assume the ‘logistics problem’ has been solved with the aid of ‘time-space shrinking technologies of transportation and communication’ (Coe et al 2008:276).

To conclude: Why the potato?

This is the question I have been asked the most during my thesis at conferences and presentations and by friends and family – why study the potato?

This section provides one response to that question: because the potato is interesting in many ways. But in summarising this section with an appropriate academic response, I choose to reiterate something of my motivations and aspirations for my research.

Studying the flow, mobility and use of potato waste will involve looking at the journey the potato waste takes – documenting the livelihoods and practices surrounding potato waste. Building on previous examples of single commodity research, I want to explore the yet unmapped geographies and sociology of potato waste, contributing to recent attempts to further understand and question our notions of accumulation, waste, scarcity and abundance. As it turned out, during the course of my fieldwork and further study, it became clear that the potato makes an excellent subject for single commodity research, especially around the use of surplus and by-products because of how the waste and by-products are used to create new markets. By-products from industrial processes are utilised in non-food economies and production, blurring the distinctions between food and non-food.

2.5. Theorising Waste – Further Developing the Conceptual Base

This section deepens and extends the comments made on waste in previous sections; this is especially so in the case of O'Brien and Gille's approaches to waste.

Of the material and literature covered in my review on rubbish, waste, excess, abundance, and surplus, Martin O'Brien's (1999a; 1999b; 2008; 2013) approaches to waste is unique and ambitious. He brings together theories of capitalist accumulation and surplus (Luxemburg 1913; Baran & Sweezy 1966; O'Connor 1984; Bataille 1988) and applies it to the study of food waste. O'Brien constructs an empirical argument against the ubiquity and taken-for-granted assumptions that firstly, individuals are to blame for their wastefulness and secondly, people today are far more wasteful than previous 'thrifty' generations. He rails against the 'throwaway society' thesis that portrays, in moralistic terms, individuals as voracious, insatiable dupes to a model of consumer capitalism. This is in contrast to our pre-mass consumption ancestors where, the argument runs, individuals stewarded and gained maximum utility from goods and nothing went to waste. Except, as O'Brien shows, it did, and lots of it. Indeed, many of the materials used for contemporary goods such as

liquid petroleum were once regarded as a valueless by-product – a nuisance, in fact. At first what appears a relatively simple question ‘are people more wasteful today?’ turns out to be a difficult question to answer. In absolute terms, most definitely, but considered historically and cumulatively it becomes harder to discern a definite conclusion.

O’Brien adopts a Marxist approach that critiques taken-for-granted perspectives of contemporary consumer society. In particular, he wants to correct some of these “serious misunderstandings of contemporary waste and disposal” that “marginalise the role of production and industry in fuelling the waste stream” (O’Brien 2009:90). Rather than focussing on consumption and household food waste, as many approaches do, O’Brien looks at the role of production and industry. In recent years, nearly all emphasis on the politics of food waste has focussed on households and consumption. This can be achieved, for example, by emphasising that the “world of waste is not simply a world marked by abandoned, under-used and callously ejected leftovers – it is not a world emptied or devoid of meaning and value. It is a highly structured and tightly specified world of actions and relationships to which questions of meanings and value are central.” (O’Brien 2013:195). O’Brien’s argument against the widespread appropriation of the ‘throwaway society’ thesis, the idea of consumerism is the harbinger of a waste crisis, is that contemporary society has much greater mechanisms for the recombination and sterilisation of waste through administrative procedures of highly bureaucratic and industrialised processes. He also questions the effectiveness of such throwaway society theses which supplant sociological analysis for moral philosophy. It is not worth taking the ethical high ground and instead we must question how and why. However, when one reads the extensive and excellent critique of the ‘throwaway society’, one could be led to the impression that *ceteris paribus* things aren’t too bad, pretty good in fact, if history is anything to go by.

On the one hand industrial capitalism has invented new technologies for dealing with waste in production in order for valorisation, profitability and efficiency, and on the other we have the sheer volume of waste across the planet. In recent decades, the uneven development of production across the globe has often involved shifting polluting industries such as petro-chemicals, energy production, waste management and food production to more unregulated spaces of the global economy. Whether or not it would be accurate to describe the surplus management systems of advanced capitalist economies as being highly regulated and subjected to structured administrative procedures, it doesn’t paint the whole picture (as discussed in Chapter Five). The issue that O’Brien returns to is that:

“...capitalist societies are permanently scarred in one of two ways: either by a crisis of excess – where there are simply too many goods on the market and the restricted consumption of the masses prevents their sale – or because the productive forces themselves are left to stagnate in order to offset precisely this crisis of underconsumption...Sweezy follows Marx’s understanding of ‘waste’ as a failure in the efficient use of the productive forces, resulting in a persistent latent or actual surplus of capital.” (O’Brien 2013:202-203).

This could also be located within a small area of sociological and geographical research into the spatio-temporal aspects of capital accumulation (Castree 2009). This area of research provides insights into the role of crises, what David Harvey calls the “irrational rationalisers of an irrational system” (Harvey 2010:71). The ‘crisis of food waste’ has now entrenched itself into discussions around food, and the framing of food waste as one of a uniquely contemporary ‘problem’ of gluttony and excess. Food waste is often framed as a ‘scandal’ or ‘crisis’ with all the moral overtones. This movement towards the ‘crisis of waste’, and food in particular, has seen the existing models of social and economic organisation placed under scrutiny. The historically legitimised institutions of power and control are questioned, their position undermined and alternatives are proposed. Crises, scandals, shocks and fiascos are argued to force and push powerful groups into different actions and practices – this is the time element. The spatial element is that the areas of capital accumulation are constantly expanding, always looking for new spaces to commodify and utilise.

O’Brien’s questions are complex and far-reaching for food waste research and go some way to addressing these questions on crisis management:

“...what are the means of dispersion and reconfiguration, what are the policies, procedures and practices that coordinate (or not) the channels and networks that place and displace different wastes in different regional and sectorial locations – not as a single signifier of moral indignation but as materially realised forms? How is one thing transformed into another through the social process of wasting?” (O’Brien 2013:194).

Here I think O’Brien is trying to place more emphasis on production and regulation rather than consumption which have so far been the main site of interest for studies on food waste. In considering how future research around food waste may be conducted, Alexander, Gregson and Gille (2013:482) argue that “...the political imperative is to minimize food waste. This ignores the work of surplus and excess in cultures of food consumption.” As such, future research needs to “link kitchen bins to waste management systems” through which “lines of connection can be drawn that

enable us to understand how and if new technologies of food waste management means that more food will become food waste. It is through these connections that we can show how the politics of food waste and famine are interwoven.”

O’Brien’s approach to waste is to develop a sociological account of wasting through a refined political economy of waste. Rather than seeing waste as an atomised or individualised act, adopting a sociological imagination of waste exposes “an intricate network of social forces and social actions entangling citizens, governments and industries, policies, interventions and profits” (O’Brien 2013:193). The structuring of this intricate network of social relations is provided by the socio-economic forces of capitalism. Drawing mainly on Sweezy (1962), O’Brien reveals “the status of waste as a source of capital accumulation.” In Sweezy’s (1962) seminal *‘The theory of capitalist development: principles of Marxian political economy’*, he draws on Marx’s theory of accumulation to develop a theory on the continual crises of capitalism. Sweezy argued that the drive for capitalist accumulation in its “rapaciously mercenary exploitation” (O’Brien 2013:196) is counterbalanced by underconsumption. John Bellamy Foster discusses in an interview on the role of surplus and capital accumulation in contemporary capitalism, the importance of surplus production that O’Brien builds on has a long history, indebted to the work of Baran and Sweezy who:

“...provided a nascent political economy of environmentalism via their searching critique of waste in the system. They integrated the most critical element of the Frankfurt School discourse in their analysis of “the irrational system.” Most importantly, they extended Marxian political economy into a consideration of twentieth-century conditions. When a figure like David Harvey speaks today of the economic crisis of our time as a problem of “overaccumulation” based on problems of “surplus absorption” he is speaking in the language of Baran and Sweezy—and for good reason, since their approach captures the main political-economic contradictions of our time.” (Foster 2015:1).

Underconsumption, or a lack of ‘surplus absorption’, is regulated and enforced by the state through disciplinary and restrictive measures. The excesses and overproduction of food, for example, are regulated through measures to restrict consumption through the necessity of either a waged income (to purchase food in a marketplace) or reliance upon charity (see the increased proliferation of food banks). For O’Brien, the management of the surpluses of accumulation are the main interest – it is in the repurposing and reutilisation of wastes (also read: surpluses) that capitalism continues to reproduce itself. Thus we see that accumulation as an ideal of capitalist enterprise (expressed through the profit motive and expansion) regulated by state power.

Despite the importance of surpluses and excess in the development and history of human societies, particularly under capitalism, there has been less attention paid on these issues in the theories discussed previously; as Zsuzsa Gille (2013:30) argues:

“...the vast body of scholarship in rural sociology and anthropology, alongside peasant and agrarian studies, the voluminous literature in political economy, Marxism and world-systems theory, has provided ample documentation and analysis of the historically changing inequalities, subsistence risks (including famine) and social organisations of uncertainty in rural communities. While some of this literature has incorporated the environmental effects and causes of these social developments – most prominently political ecology – what has been missing from this literature is a more systematic focus on farm and food waste.”

Gille’s global food waste regimes is once such attempt to do this. The notion of ‘food waste regimes’ has obvious antecedents in the form of food regimes previously discussed. Gille has already been cited in connection with posthumanism; it follows that the posthumanist perspective is integral to food waste regimes.

For the purposes of this study, I need to clarify my understanding of how food/waste regimes incorporate chains and networks. In comparison to chains and networks, a food/waste regime is not a purely spatial form. Essentially, the regime concept implies diffused power and control – that relevant practices are embodied in behaviours of participant actors. However, given its conceptual roots in world systems theory, a regime must still have a spatial dimension: for instance, the regime has to have a distribution function. In this respect a food/waste regime can contain chains and networks as spatial elements. In this study, the position that food/waste regimes have a network dimension is important both ontologically and methodologically.

Gille combines the template of Oran Young’s (1982) resource regimes and McMichael and Friedmann’s food regime analysis with a posthumanist view on the materiality of waste and our structures that manage and determine it. At the core of Gille’s theory is the idea of reversing the idea that food is valuable and waste is not, that waste is derivative of food and thus surfeit and inconsequential (Gille 2013:28). Rather than seeing food and waste as entirely separate entities, they are completely interrelated, and research should try to bridge these together, or at least raise some issues around their entwinement. In studying the production, representation and politics of food waste, Gille (*ibid*:29) aims to "explore which social relations determine waste production and what the material composition of wastes may be." Furthermore, we should ask “which side of key

dichotomies waste is seen to lie (efficiency/inefficiency; usefulness/uselessness; order/disorder; gain/loss; clean/dirty; alive/dead; fertile/sterile)" and finally, to question who is in control of the discourse around food waste, what is taboo and how is policy constructed. Gille is careful not to suggest that actors involved in food and waste regimes are under a spell of false consciousness, she cautions against the idea that there is a base and superstructure from which behaviours and actions are built up – there is no rational logic by which people waste, and trying to find such a mechanism as researchers will more than likely end in misdiagnoses and inaccuracies.

Central to Gille's ideas is the semiotics of waste, and the definitions and categorisations of what constitutes waste, loss, surplus or by-products. Concerning food waste, this is an important and contemporary debate – ranging from issues of measurement and statistics, property ownership through legal and regulatory definitions to the more abstract, concerning our 'rubbish imagination' (Thomson 1979; Hawkins 2006).

For the purposes of populating and parameterising the conceptual framework, I extract the elements of Gille's in this set of bullet points:

- Challenging the social judgement of food as being valuable and waste being without value;
- Food and waste are interrelated or even entwined – hence my adoption of the textual feature 'food/waste';
- Waste can be dichotomised in terms of: efficient/inefficient; usefulness/uselessness; and gain/loss;
- The process or practice of defining and categorising waste, e.g., as loss or by-product; and,
- The relations or sets of relations which "determine waste production and what the material composition of wastes".

Specifically regarding food, there are a number of different words to describe different types and forms of 'waste'. Concerning fruit and vegetables, it is usually split into two categories: loss and waste. 'Loss' is often used to describe post-harvest and production waste, including for example peelings used for ready-meals and items that do not adhere to quality standards. Surrounding this latter point, there are a number of concerns raised about the amount of food losses that occur from overly-stringent control procedures from retailers in the pursuit of the 'perfect looking' fruit and vegetables, which has led retailers such as ASDA to develop their 'Beautiful On The Inside' range of misshapen fruit and vegetables in 2015 (Chapter Six). Hence this becomes an issue of measurement and perception – these surpluses, excess and leftovers of production are not classified as the moralising and normalising category of 'waste' but as 'loss'.

The term ‘waste’ refers often to the post-purchased goods; the baked beans left over on the side of the plate scooped into the bin, the tangerines sat in the fruit bowl for months on end before shrivelling and following the same fate as the beans, the oversized portion of takeaway that was put back in the fridge on Friday night only to be thrown out again next Friday. You get the idea. But what is important from these examples is the everyday interaction with food and how and when it passes over and becomes ‘discarded’ or ‘wasted’ and the differences between wasting and losing. In fact, the lifecycle of the thrown away items does not end at the bin in the kitchen, the wheelie bin outside or the bin lorry that collects it. The continual birth and death of objects and to quote Martin O’Brien who draws upon an old Lancastrian idiom – ‘where there’s muck there’s brass and equally, where there’s brass there’s muck’. The blurring between prevention and management, use and disuse, and avoidable and unavoidable has been of interest to scholars regarding waste policy and the importance of terminology and measurement (Papargyropoulou et al 2014). There are other words too such as ‘discards’, though this is predominately reserved for discussing fishing for ocean animals, and ‘surplus’ which is used often to describe the geo-political dimensions of agricultural imports and exports. Much of this discussion on nomenclature and classification of what is and isn’t waste and what is and isn’t food is important because often language forms our understandings of society and economy.

Unexplored areas of food research such as the role of byproducts in the supply chain provide interesting examples (Krzywoszynska 2013) of how the typologies of surplus (waste, loss, by-products etc.) can be investigated and uncovered. Rather than seeing the production, exchange and consumption of goods as a linear process, the importance of circularity becomes important, indeed it problematises orthodox economic understandings of how value is assigned and economies are enacted.

These developments in the conceptual base discussed in this section are taken forward and finalised in Section 2.8.

2.6. Geographical Representations of Waste

For the Romans, the transitive verb *vasto* meant “to lay waste, devastate, ravage, destroy” (Harkness 1893:373). When engaging in war and storming a city, for example, it was a well-known custom for legionaries to ‘slaughter every living creature they found’ (Holland 2003:6), purposefully positioning severed dogs heads and the limbs of cattle amongst the rubble of dead bodies and buildings. The

intransitive verb *vāco* was “to be unoccupied or uninhabited” (Harkness 1893:373). Julius Caesar’s famous *veni, vidi, vici* (I came, I saw, I conquered) referred to the Roman conquest of the wasteland of Gaul, a barbarous hinterland cloaked in darkness, “shadow-haunted, sinister, dank with mud and slaughter” (Holland 2003:245).

The representation of waste as an unoccupied and uncultivated space has pervaded to this day, but with some significant changes and qualifications. In Chad Kautzer’s (2007) *Topographia Dominium: Property, Divided Sovereignty, and the Spaces of Rule*, he traces the development of imperium (the power to command, the sovereignty of the state over the individual) and dominium (individual ownership of land) through imperial empires. The relationship between imperium and dominium in the history of expansionary world empires and waste is important. The rights of dominium and natural law stipulated that if people were regarded as human beings, a problem in itself when many groups of people were not thought of as human beings or Godly, then they received the same rights and needed to be asked permission for their land to be cultivated or colonised. Of course, if they refused, then war and their annihilation was an accepted form of retaliation. Kautzer traces a change in this governance structure of land grabbing (*Landnahme*) to the writings of the English philosopher John Locke in the seventeenth century. Interestingly, German critical sociologist Klaus Dörre (2016) has also used *landnahme* to describe the accelerated process of commodification in ‘unactivated’ spaces of the lifeworld.

Locke argued that uncultivated land did not fall into the remits of imperium or dominium. Local people had none of the associated rights of natural law over their land for the definition of dominium, in Locke’s eyes, required agrarian cultivation or the establishment of a labour force. Hence, the uncultivated land which was being wasted required no commitment on the side of the cultivator or colonialist to ask permission. Locke thus destroyed centuries of land governance structures, bringing the idea of *vacuum domicillium* to the fore, where ‘wasted land’ can be appropriated by anybody who wants it. As Kautzer argues, Locke “effectively removed all barriers to the colonial settlements whose newly wrought spaces of dominium are still consequential today” (Kautzer 2007:74).

The idiom ‘a waste of space’ thus takes on important historical and cultural meanings and representations. The geographer and historian of cartography John Harley was concerned with the “discourse of maps in the context of political power” (Harley 2002:278). One of the most important aspects of maps and cartography is what they hide, the spaces they don’t represent, where knowledge is purposefully hidden. Harley termed these ‘the silences of maps’, one example being

the early town plans of eighteenth century England where the map-maker “may have unconsciously ignored the alleys and courtyards of the poor in deference to the principal thoroughfares, public buildings and residences of the merchant class in his conscious promotion of civic pride of vaunting commercial success.” (Harley 2002:292). This ‘ideological filtering’ is what Harley calls a ‘universalising process’ that homogenises and organises space so it can be readily exploited for capital accumulation.

Geographers have long commented on the importance of space in the formation of social relations and vice versa (Massey 2005). Geography began to exert more influence outside the boundaries of its discipline and indeed has influenced much of the literature outlined so far. One of the most heavily cited works and cornerstones of the ‘spatial turn’ in the social sciences is Michel Foucault’s 1967 Berlin lecture. *Of Other Spaces* was released posthumously in 1986 and begins:

“The great obsession of the nineteenth century was, as we know, history: with its themes of development and of suspension, of crisis, and cycle, themes of the ever-accumulating past, with its preponderance of dead men...the present epoch will perhaps be above all the epoch of space. We are in the epoch of simultaneity: we are in the epoch of juxtaposition, the epoch of the near and far, of the side-by-side, of the dispersed. We are at a moment, I believe, when our experience of the world is less that of a long life developing through time than that of a network that connects points and intersects with its own skin.” (Foucault 1986:22).

This quote is particularly well adopted and used by geographers seeking to cement the centrality of space as the starting point to any investigation or research into the world around us. In drawing parallels to the microphotograph at the start of this chapter, the scales of geographical spaces which we conceptualise as areas of interest keep expanding. These ideas have heavily influenced conceptual narratives and understandings of waste in the proceeding decades. In particular, simultaneity and juxtaposition have had significant purchase, in that the objects and things we encounter in our daily lives are both absent and present, their qualities and properties, and the relations between them, are constantly changing across multiple scales to produce hybridisation, heterogeneity and complexity. The challenge this poses for research into single commodities is significant (Hulme 2016).

2.7. Towards a Sociology of Waste – Accumulation, Surplus and Excess

“What would it mean to view the world of food from the perspective of waste rather than goods; from the perspective of disuse rather than use; and from the perspective of loss rather than gain?”

How would we think about nutrition and cuisine if we stopped lying to ourselves about food's ontology: if we stopped both assuming that value outweighs waste, and acting as if waste was derivative and thus inconsequential?" (Gille 2013:28).

In setting up her outline for the theory of waste regimes, Gille suggests that the idea of a 'loss rather than gain' perspective has chronological roots in Georges Bataille, a French literary critic and philosopher. Bataille has influenced a number of contemporary scholars interested in the role and functions of excess, abundance and waste in capitalist societies (Pawlett 1997;2016, Kendall 2007, Corvellec 2012, Gille 2013, O'Brien 2013, McGoey 2018).

Bataille (1985; 1988; 1991) is of interest because, as Gille suggests, there is a general assumption on the productiveness and utilitarian function (i.e. expense in expectation of reward) of practices and goods and to this Bataille dedicated his critique of political economy. Jean-Joseph Goux (1990) regards Bataille's 'Copernican reversal' of political economy as a:

"...remarkable and dazzling operation of ethnological decentering. It is not the store and the workshop, the bank and the factory, that hold the key from which the principles of the economy can be deduced. In the blood that spurts from the open chest of victims sacrificed to the sun in an Aztec ritual, in the sumptuous and ruinous feasts offered to the courtiers of Versailles by the monarch of divine right, in all these dissipations is found a secret that our restricted economies has covered up and caused to be forgotten." (Goux 1990:206/207).

While Goux uses theatrically vivid language and description, he makes an important point in how we think about the 'economy', breaking it apart and analysing what is phenomenologically significant or worthy of understanding and the ascription of value and utility.

Bataille argues that "a society always produces on the whole more than is necessary to its subsistence, it disposes of a surplus. It is precisely the use made of this excess that determines it: the surplus is the cause of disturbances, changes of structure, and of its entire history" (Bataille 1985:143). In archaic societies, the mode of expenditure of the excess was "the consumption of the superfluous" (Goux 1990:207) such as the construction of monuments, sacrifice, feasts and gifts. According to Bataille, the utilitarian idea that everything has a function, a purpose and a use coincides with an economic foundation of the sacred and profane. That is, "whereas the profane is the domain of utilitarian consumption, the sacred is the domain of experience opened by the unproductive consumption of the surplus: what is sacrificed" (Goux 1990 207/208). In order to

develop his alternative perspective, Bataille used the idea of a ‘general economy’ which articulated, somewhat haphazardly, the failures of political economy up to the 1930’s:

"As for the present historical situation, it is characterised by the fact that judgments concerning the general situation proceed from a particular point of view. As a rule, particular existence always risks succumbing for lack of resources. It contrasts with general existence whose resources are in excess and for which death has no meaning. From the particular point of view, the problems are posed in the first instance by a deficiency of resources. They are posed in the first instance by an excess of resources if one starts from the general point of view. Doubtless the problem of extreme poverty remains in any case. Moreover, it should be understood that general economy must also, whenever possible and first of all, envisage the development of growth. But if it considers poverty or growth, it takes into account the limits that the one and the other cannot fail to encounter and the dominant (decisive) character of the problems that follow from the existence of surpluses." (Bataille 1988:39).

The distinction between primitive accumulation and capital accumulation is perhaps not so easy to demarcate, as will later be discussed, and this tension is at the heart of Bataille’s ambitious but ultimately flawed thesis. Moving from the particular point of view to the general point of view, accumulation means to heap up something (from *cumulus* - ‘to heap’) – to gather a large amount of things so that they resemble a pile. This word accurately describes the general accumulation of wastes – from heaps of discards in landfills to heaps of food waste in the back of supermarket bins. Societies that accumulate more than is necessary for survival must decide on what to do with the excess (Bataille 1988). As such, the question of what to do with the (over)accumulated things is an important part of understanding and interpreting contemporary potato wasting.

The concept of accumulation has, since Marx, undergone a number of iterations. Marx distinguished between primitive and capital accumulation, primitive accumulation being a (perceived) necessary precondition in the transition from feudalism to capitalism (Sanbonmatsu 2017). Primitive accumulation entailed the separation and displacement of humans from the means of production; ecocide and genocide established systems of gendered wage labour and commodification (Harvey 2003; Federici 2004). This separation and division of workers from the means and modes of production had profound effects that has shaped agricultural and industrial production to this day (see Appendix 4 for Friedland et al (1981) model of pre-capitalist and advanced capitalist agricultural organisation as a neat illustration of this separation and division). The core commodities at the heart of this development are considered to be human bodies, gold, silver, cotton, sugar and tobacco (Mintz 1984; Patel & Moore 2018). Indeed, this list of new world

commodities have received significant interest in the scholarly study of the political economy of capitalism. Surprisingly, the potato is often overlooked as one of these commodities that has been shaped and continues to shape economy and society. Indeed, the role of the potato in establishing models of capital accumulation and the general expansion of global relations is incredibly interesting, as this thesis contends. The potato also became signifier and vehicle for ideas central to the political economy of capitalism, particularly from the late eighteenth century onwards that came from thinkers such as Adam Smith, David Ricardo and Thomas Malthus. For Smith it was a food that balanced individual self-interest and collective progress and was something to be celebrated, for Malthus it was an excrescent crop in more ways than one; a crop for the poor which overproduced, resulting in overpopulation and misery.

The accumulative biological properties of the potato itself matched the socio-economic need for the expansion and reproduction of capital and labour. In the most well-known potato event of the nineteenth century, the Irish potato famine, we see the impacts of an accumulation strategy centred on economic growth and trade. As the potato crop failed, Ireland's colonial system of production was still geared towards the export of commodities. Food was exported from Ireland during the time of the famine as ports were guarded from groups of starving people. Accumulation strategies of export orientated production and trade surpluses in order to reinvest the profits of the colonies for the benefit of Empire (Mintz 1985; Moore 2015b). Here we begin to see how accumulation is an invaluable concept in the study of potato waste for a number of reasons. The concept of accumulation encapsulates the twin ideas of never ending expansion of production and human progress – ideas that the potato has played a significant role in materially realising. Waste intersects these ideas – expansionary production leads to overproduction and concentration (power), while technological innovations are then required in order to utilise or recapture waste (efficiency).

There is no doubting that excess, waste, overproduction and surplus forms a central part of capitalism, Patel and Moore (2018) conceptualise these developments through 'cheapness' – the abundance of cheap nature, cheap work, cheap food, cheap energy, cheap care and cheap lives. The territorial expansion of capitalism into the twenty-first century has relied upon the increasing abundance and cheapness of things. This argument has a long and well researched area in critical theory and sociology, in particular Bauman (2001; 2003) who argued that the expansive nature of capitalism creates places, people and things that are necessarily discarded and become surplus to requirement. As Morehart and De Lucia (2015:27) argue:

“In a globalised political economy, how and what we produce, overproduce, exchange, convert, consume, and waste have important consequences for people's lives and for the future. Complex societies, states, and empires develop specific policies directed toward surplus production. The production and mobilisation of surplus both finance institutions and elite lives and also often increase the dependency of subject communities on a state political economy.”

When things are conceived of in their economic value, going back to Bataille, only things that have a utility can be seen as having worth, therefore things that do not have a use are categorised as ‘loss’ whereas things that were made for a purpose but that purpose was unfulfilled are regarded as a ‘waste’ – people are born as workers, potatoes are born as food.

One such attempt to incorporate excess into contemporary sociological theory is in Andrew Abbott’s *The Problem of Excess* (2014), in which he sketches an outline for what a social theory of excess would look like, to reimagine Bataille in the twenty-first century and to create a new Copernican revolution in social theory and our understandings of the role of scarcity and abundance. Abbott (2014:1) begins by saying:

“...many great problems of our era are problems of excess: massive pollution, sprawling suburbs, glut of information. Yet our social theories and normative arguments focus mostly on scarcity. Budget constraints, tradeoffs, impoverishment: these are concepts of scarcity. Confronted with excess, we nevertheless make scarcity the centre of our attention.”

Abbott traces a persuasive and scholarly view of the imaginations and theorisations of excess going back to Aristotle and Deuteronomy. He distinguishes between having too much of something and having too many things, subtle differences but important distinctions. Abbott’s exploration of excess conjures up for me the utopian story of the Land of Cockaigne, a folktale going back centuries in Europe that imagines peasant life free of toil and labour in which the fruits are provided, and we have an excess of time for leisure and play. Of course, the excess of time is often equated to idleness and laziness (Rabinbach 1990) and indeed today busyness and lack of time is a signifier of high social status. The promises of post-war capitalism (Galbraith 1958) and the rise of the leisure society claimed to be able to harness the power of technology, the market economy and the state to create affluence and abundance for all. Of course, in the proceeding decades we have seen this model come under increasing strain with the crises Abbott outlines. The excessiveness of life has often been a moral issue, excess equates to hedonism, whilst scarcity equates to demure austerity; how these narratives play out in contemporary food waste and public health discourse is particularly

interesting. Abbott rightly distinguishes between individual excess and collective excess, and the different strategies for dealing with the problem of excess in contemporary society. Abbott constructions a highly useful and precise triplet for investigating excess which is used in the Conclusion (Chapter Eight):

- *Defensive strategies* that ignore excess;
- *Reactive strategies* that use abstraction and hierarchies to focus our attention on what is worthy; and,
- *Adaptive strategies* that attempt to tame excess through markets, states and societies.

Of interest to the discussion so far on accumulation, recent scholarship (Harari 2004, Daoud 2007, Scott 2017) on the developments of agriculture has traced the origins of scarcity and the ideas surrounding them (e.g. finite resources), not in capital accumulation and the development of industrial society, but in the movements from nomadic hunter-gatherer societies to agricultural societies. Indeed, Harari argues that it was agriculture that imposed scarcity upon human societies, the imposition of a handful of core crops that if failed would result in famine, to the demarcation of space and the development of a particular concept of time around planting, harvesting, storing etc. These perspectives are important in contemporary food studies because of the debates around scarcity and abundance. It is argued that we have enough food to feed the world, that we live in abundance, so the problem is really one of redistribution, in which people have a right to food, rather than it being treated as a commodity. Perspectives from Harari and Scott question this view that utilitarianism and scarcity started with industrial society – the accumulation model precedes this. That contemporary capitalism is a particularly wasteful and simultaneously scarce social, political and economic system of organisation does not make it unique. Indeed, these issues have troubled human societies for millennia (Sahlins 1972).

Currently, we still see sustainability and waste framed within a scarcity framework, that is, finite resources and infinite human needs. Food receives significant attention in many respects for the specificities of its wastefulness – that in a world where populations are growing, needs and desires are increasing and the energies that have propelled civilisation along over the last 150 years are running out; to throw away food which is perfectly edible for human consumption is framed as morally appalling. What is interesting here is the positioning of scarcity and abundance alongside each other – mutually reinforcing and compatible. In order to prevent or stop food waste, it is perceived there must be tradeoffs between different agents within a scarce food system, that some people must compromise as multi-stakeholder forum after multi-stakeholder forum is established in which those in power recognise the need to do more whilst pushing forward programmes and

schemes that further entrench their position into the future; controlling production and discourse over what is scarce and what is abundant. It is not in this sense a case of either having pure abundance or pure scarcity. The inequalities of global capitalism are illustrated acutely by the food crises – we see images of mountains of rotting food, hear stories of obesity and diabetes epidemics alongside images of starving children experiencing chronic malnutrition to the ever increasing demand for food banks. Putting the morality aside, the position of scarcity and abundance as if on a sliding scale is a misleading one, as we exist between these polar extremes; research that investigates and understands how and where this is happening, rather than focussing on who and why, may be most fruitful.

One aspect of these insights into the problem of food waste is the question: why the attention on food waste now? This question is not an easy or straightforward one. In order to suggest reasons why food waste has become a significant topic and why this contributes to its reproduction and reification, the ‘new’ politics of food waste needs to be historically contextualised. That is:

“Scholarly interest has been emerging in close connection with a wider surge of interest in waste in the realms of policy and regulation, cultural politics and environmental debate. One frequently repeated theme of recent non-academic commentaries is that the current visibility of waste is something new. Moreover, so the thinking goes, in recognising the ‘problem’ of waste in multiple realms we are coming to a political and cultural moment of transition that reveals one, or some combination, of the consequences of a long trajectory of economic expansion, unsustainable resource use and/or ‘out of control’ consumerism. In the process, it is suggested that this new visibility in formal and cultural politics marks something of an epiphany that holds the promise of a ‘game-changing’ reorientation of our practices.” (Evans et al 2013:11).

2.8. Completing the Review of Sociological Waste Scholarship

In the introduction to *Waste Matters: New Perspectives in Food and Society*, Evans, Campbell and Murcott (2013:11) remark how “many of the contributions emerging from political economy or the cultural turn appear – quite independently of one another – to have departed from their origins to arrive at a post-humanist reading.” Indeed, I would agree with this wholeheartedly. What follows in this section is an overview of selected key food/waste scholars. O’Brien and Gille have already been discussed at length in this Literature Review. However, for clarity and logical consistency, I review their key contributions in reference to the construction of *my own conceptual framework*. As such, there is a discussion of one contribution from political economy (O’Brien), one from posthumanism (Hawkins), one from posthumanism / material culture (Evans) and one from political economy /

posthumanism (Gille). Whilst they are from different origins, much of their work and concepts overlap.

In sociology, waste was never considered that important; it was deemed inconsequential or only of interest as an externality of economic activity (Thompson 1979). It wasn't until the late 1990's that research began to accumulate and sociological interest in waste and rubbish grew. It was during this time that Martin O'Brien published his research on waste. O'Brien's interests in waste are: how is waste practiced? How is waste organised through social and political relations? What role do institutions have in managing waste? These questions provided a focus on waste *itself* in the register of worth not as an inconsequential outcome of production. The 'intricate network' of O'Brien's study of waste focusses on institutions – varying levels of the UK government (Local Authorities, Councils and government departments), the European Union and trade associations. The focus is legalistic and political – looking at state and institutional arrangements under which wastes are commodified. O'Brien's approach is rooted in political economy; in order for the approach to be used effectively and concisely, key parameters of a political economy of waste are presented in order to conceptualise waste. In O'Brien's paper *Rubbish Values: reflections on the political economy of waste*, political economy is reserved “to refer to a regulated social framework for transacting values, comprising an arrangement of practices, relationships and institutions” (O'Brien 1999:270). Transacting values refers to how waste is transformed into new commodities; how the commodity form of waste is constructed and realised and how waste is deemed valueless by some but has existing and potential value for others. Sitting under the broad value creation of waste are the three arrangements of *practices, relationships* and *institutions*. These three 'arrangements' become the sites of analysis and study.

O'Brien takes a social constructionist and structural approach to the study of food waste which focusses primarily on macro level institutions. He focusses on the large scale arrangements by which waste is generated, organised, managed, distributed, exchanged, consumed, destroyed or repurposed. He takes issue with the institutional arrangements of waste that shape and regulate where, how and when waste is commodified. Indeed, this is a highly valuable and perspective that is used throughout this thesis, the macro historical perspectives on a changing potato regime adds layers of understanding and interpretation that microlevel approaches often miss. I accept and use O'Brien's understanding of 'political economy' which is particularly helpful in addressing issues about the means by which capital accumulation is connected to waste. So, to O'Brien's understanding I would add the need to consider political power and economic efficiency. Whilst at all times waste is the *raison d'être* of study and O'Brien has laid fine ground for future waste scholars

in providing a strong critique of conventional political economy approaches to agri-food scholarship, by focussing on the macro level the politico-cultural and social dimensions of waste is sometimes lost.

As mentioned, neo-Marxist political economy approaches can be seen as macro level understandings of the phenomenon of food waste in its historical, economic and legal context, tied to institutions and modes and means of production. These are highly valuable in their critique of orthodox political economy and economics which treat waste as an afterthought, as discussed already. Posthumanism, on the other hand, can be seen as a microlevel approach to understanding the phenomenon of food waste in its material, cultural, ethical and *social* context (the social being the most important that links all the aforementioned). The macro-micro distinction however would be disputed by posthumanist scholars who see the approach as an attempt to transcend the macro-micro problem in sociology completely through the concept of flatness (Latour 2005). The tensions between the political economy and posthumanist perspectives are largely methodological and epistemological. They provide different ways of conceptualising and understanding what waste itself is in relation to ourselves. Posthumanism problematises human-waste relations – it imbricates waste within everyday life, it questions how waste (and the amount of it) affects individual subjectivities and identities through practices, culture and politics. Waste becomes something ‘lively’ (Bennett 2010) which has an agency of its own. Its materiality and imbrication in everyday life is central whereas in political economy perspectives it becomes another phenomenon of study that is separated from human creations such as organisations, institutions and markets. Posthumanism also provides a philosophical underpinning that runs counter to the linear and formulaic orientations of political economy. It also questions the political economy narrative of a historical development from humans-as-animals to civilisation, from agricultural based society to industrial society to the service economy in its end-of-history state (Latour 2001). That is, posthumanism critiques political economy approaches rooted in Enlightenment ideals and liberal humanism. That is, posthumanism rejects the idea of the world beginning and ending with humans in which the study of social phenomena extends from the observable characteristics of reality which are deemed universal.

Posthumanism pays attention primarily to the objects beyond ourselves – the decentering of the human subject as the main ‘actor on the stage’. Sociologically, this is important and interesting when studying the phenomenon of food waste as instead of focussing on people, markets and institutions through social constructionism we focus on the objects themselves that in turn give meaning and understanding to organisations, markets and institutions (Bennett 2010). Things lead to knowledge rather than knowledge leading to things.

One groundbreaking posthumanist scholar of waste is Gay Hawkins. Hawkins' seminal book, *The Ethics of Waste: How We Relate to Rubbish*, was published in 2006. As described in the Literature Review (Section 2.4.), Hawkins adopts a posthumanist approach to studying waste. Hawkins does not focus primarily on food waste but waste in general. Inspired by poststructuralist scholars such as Michel Foucault, Jane Bennett, Moira Gatens and Gilles Deleuze, Hawkins does not dismiss or abandon larger environmental or social concerns surrounding the phenomenon of waste entirely but rather focusses on the "ideas and beliefs that shape social behaviors around waste and how they operate as a kind of second nature, an internalized, embodied set of dispositions that organise practices in certain unconscious ways" (Hawkins 2006:17). Hawkins questions and problematises the idea that waste is bad and worthy of contempt and disgust. She traces the development of cultures of cleanliness and purity which hide and conceal waste as a signifier of moral decay and personal failing.

Hawkins therefore focusses her study of waste around three core conceptual parameters: *practices*, *politics* and *affects*. Studying the practices of waste involves investigating how waste is valued and classified that renders it useless. Hawkins sees the dominant framing of practices through the cultural logic of consumer capitalism and technocracy (Hawkins 2013) – habits are created by social relations that rely upon the *distancing* of waste, the *disposability* of waste and the *denial* of waste. Hawkins' conceptualisation of the politics of waste distances herself from the conventional politics of waste. She sees conventional waste politics as arguing over the environmental costs of waste and a matter of personal guilt that can be rectified by individualised behavioural changes. Rather she coins a 'politics of disturbance' (Hawkins 2006:50) which attempts to transgress conventional waste politics to create new political responses and ethical sensibilities which fundamentally changes human-waste relations. Drawing on the poststructuralist tradition, Hawkins rejects totalising conceptions and prefers to focus her theorisations of the politics of waste on "the qualitative dimensions of deviant minor practices" (Hawkins 2006:7). Hawkins' final conceptual parameter for the study of waste is *affect*. This involves investigating the affective properties that waste has on our own bodies and ethical viewpoints. The corporeal nature of waste on our sensibilities and sense of self is investigated by examining the relational dimensions between things and ourselves. In her examination of the documentary film about potatoes, *The Gleaners and I*, Hawkins specifically talks about potatoes and how "waste makes claims on us. Reducing waste is not simply a matter of the moral reform of the human, it is also about acknowledging that waste has a kind of agency; that it shares in some of the agency we ascribe only to ourselves" (Hawkins 2006:85). Thus the 'material habitus' of our relations with waste affects us in ways that changes us and the world around us.

Hawkins' conceptualisation and approach to waste, whilst unique, is in many ways indebted to Mary Douglas' (1966) work on the morality and ethics of waste.

The third waste scholar to be discussed is David Evans. In earlier work, Evans' approach to food waste focussed on consumption in the household (Evans 2011) and was situated in the geographies of material culture (Miller 2001; Gregson & Crewe 2003) and consumption and sociological theories of practice (Warde 2005). Whilst he discusses posthumanist scholars of waste such as Hawkins, the emphasis on studying food itself is not explicitly recognised as coming from the posthumanist tradition, yet it arguably does. He echoes Hawkins in his attempt not to moralise the 'crisis of waste' but to develop a social scientific account rather than a philosophical one. The focus is on consumption to understand the *processes* by which 'food' becomes 'waste' in the home. Evans does not dismiss production orientated or political economy accounts of food waste but identifies "what goes on behind closed doors" as lacking from academic and non-academic food waste research. Of the waste scholars discussed in this section, Evans is the only to engage in ethnographic fieldwork by "hanging out" with participants in their homes and on shopping trips to the supermarket. This is due to food waste being "and under-researched and under-theorised topic, and in-depth, empirically grounded accounts are thin on the ground" (Evans 2014:7). In order to provide social scientific accounts of food waste, Evans adopts a follow-the-thing approach to study the social life of commodities (Appadurai 1986; Cook 2004), in which he takes food as his empirical focus. In earlier work, Evans' conceptual approach to food waste is to investigate the *practices* and *materiality* of food waste in the household. Drawing on theories of practice, Evans traces the habitual, routine yet improvisational practices in the home that lead to food becoming waste. In the spirit of ANT, Evans particularly focusses on the devices and technologies that 'move-along' waste from the fridge to the bin (or food waste caddy). Situated within collective norms and understandings, individual actions in the process of food becoming waste are open and unfolding which creates the possibility for new practices to form and thus social change to occur.

In later work, Evans builds on his sociology of consumption and ethnographic work in the household (Evans 2018). Attempting to bridge the divide between production approaches and consumption approaches to food scholarship, he introduces *convention* theory (Boltanski & Thévenot 2006) and the economy of *qualities* (Callon et al 2011), using the case study of orange juice to explore practices of 'freshness' (Evans & Mylan 2019). Conventions establish ways of doing things and agreed characteristics that allows for their exchange (economic or otherwise e.g. gifting). Qualities research emphasises the 'unstable' and 'multiple ontologies' (Evans & Mylan 2019:431) of food and how these are created through processes of qualification between network actors (including

devices and technologies). The combination of conventions theory and the economy of qualities research provides a framework for understanding how certain foodstuffs become categorised negatively (e.g. waste) or positively (e.g. fresh). This research builds on Evans' remarks at the end of his book, which focusses on consumption practices and materiality, in which he argues that due to the disproportionate focus of food waste policy and interventions on households and individual consumption, he advocates to "move away from the household" and "engage with other sites of food waste generation and crucially – the *connections* between them" (Evans 2014:101) [italics added].

Last but most certainly not least, another scholar discussed at length in the Literature Review who has put forward a very sophisticated conceptualisation of waste is Zsuzsa Gille. Gille's development of a 'food waste regime' concept is situated within political economy approaches but also builds in posthumanist and ANT perspectives to present a different ontological conceptualisation of waste. There are two main elements to Gille's posthumanist ontology of waste: first, waste has a lively agency and second, reversing the idea that food is valuable and waste is not. The ontological reversal of Gille's approach to waste provides a different perspective to political economy approaches. That is, whilst political economy approaches such as O'Brien's focus on a Marxist perspective of value creation, Gille argues that departing from such a value-based perspective ends up in too great an abstraction. As such, Marxist approaches to "the waste-society relationship in capitalism tended to understand waste as inefficiency, lost opportunity cost, and as the profligate use of resources due to capitalism's inherent tendency towards overproduction – that is, as the opposite of value and thus, just as phantom like as value tends to be" (Gille 2000:1554). Furthermore, and similar to Hawkins, Gille critiques functionalist and utilitarian approaches that come from value or supply chain approaches to the study of food. The placing of food not in the register of worth but in the register of loss builds on Bataille's work on the copernican revolution of political economy. Thus our focus as sociologists of waste is on waste itself rather than as secondary consideration or afterthought to food. It is the *cumulus*, the heaps and excesses of waste that is the phenomenon worth investigating when understanding food.

Gille focusses on three conceptual parameters for analysis and study of waste: *production*, *politics* and *representation*. The production and politics parameters of Gille's study focus on economic institutions and how waste is arranged between and across different regime actors. This enables a macrolevel and political economy approach to waste; whilst posthumanist scholars such as Hawkins may not dismiss these considerations, by focussing only on the microlevel and 'deviant minor practices' there are things we can miss. Like O'Brien, Gille emphasises the 'arrangements' of waste which are unevenly distributed across economy and society resulting in cases of abundance (e.g. disposal) or

scarcity (e.g. famines). The representation parameter of Gille’s conceptual framework focusses on how waste is represented across the regime by different actors. As quoted in Section 2.5., she maintains that when we “inquire into the representation of waste, we are asking which side of key dichotomies waste is seen to lie (efficiency/inefficiency; usefulness/uselessness; order/disorder; gain/loss; clean/dirty; alive/dead; fertile/sterile)” (Gille 2013:29). Binary dichotomisation of waste appears contradictory to the aims of a posthumanist approach which flattens human/nonhuman relations to emphasise a lack of binaries. Posthumanist approaches instead create an idea of a networked rhizome of socio-ecological or socio-technical relations that critiques dualistic thinking (Deleuze & Guattari 1987). Such complexities of arrangements and relations were more apparent in Gille’s earlier publications on actor networks, modes of production and waste regimes in which a ‘reassembly’ of the ‘macro-social’ is attempted. Indeed, in her earlier scholarship, Gille attempted to “return to the macrolevel in theorising the waste-society relationship but at the same time infusing the macrolevel analysis with a more careful examination of the ‘becoming’ of waste and of waste’s socially generative properties” (Gille 2000:1051). The ‘becoming’ of waste and the ‘socially generative properties’ sit firmly in the posthumanist approach. In later works on food waste regimes this macro-social approach was somewhat elided in favour of more social constructivist and political economy approach (Gille 2013).

Table 1: *Selected Scholars and Their Sociology of Food/Waste*

Scholar	Approach	Conceptual Parameters	Methodology
Martin O’Brien	Political Economy	Practices Relationships Institutions	Social construction Sociological
Gay Hawkins	Posthumanism	Practices Politics Affects	Genealogical Philosophical
David Evans	Material Culture Posthumanism	Practices Materiality Conventions Qualities	ANT Sociological Anthropological Ethnographical
Zsuzsa Gille	Political Economy Posthumanism	Politics Representations Production	Social construction Sociological

This section has discussed in further detail the core conceptualisations and approaches developed by modern sociologists of food/waste. Drawing on the scholarship discussed in the Literature Review

and combined with this Section, I now go on to identify the core conceptual parameters that guide and frame my research through the subsequent chapters: power, efficiency and materiality.

2.9. Towards the Conceptual Framework

Building on the literature reviewed so far, I will now develop my conceptual framework that draws on different traditions and strands within food waste scholarship specifically, and sociological theory more broadly. This section narrows down the focus of literature, pulling together the different strands of research reviewed to provide a clear logic and consistency in the subsequent chapters. The concepts discussed in this section provide the framework through which different sites of the UK potato industry can be pieced together to understand the changes to waste in the UK potato regime and how they have occurred. As such, I develop a conceptual framework that organises my analysis and perspective. By using this conceptual framework, I am able to present a clear account of the workings of the UK potato regime. I operationalise this conceptualisation through four different islands of research sites (Marcus 2005): growers, manufacturers, retailers, and overseers. These are brought together in the Conclusion under the banner of ‘The Potato Wasters’.

Throughout this Literature Review, I have been developing the conceptual basis used to progress the research. Power, efficiency and materiality are concepts that have been already highlighted but in this section take their fully realised and expanded form. The conceptual parameters of power, efficiency and materiality were selected for two main reasons:

First, they are drawn from extensive reading and reviewing of the relevant literature. They are conceptual parameters that have been discussed by the scholars reviewed but do not form their central concepts (Table 1). As such, selecting these three conceptual parameters allows me to expand upon the existing sociological scholarship of waste. I regard the three conceptual parameters as concepts which can bridge posthumanist and political economy approaches and as such help develop my hybrid approach. That being said, there are more crossovers between certain conceptual parameters and certain approaches. For example, power may at first appear to be more suited to a political economy approach, whereas materiality is more suited to a posthumanist approach. These tensions and overlaps are explored in the following sections.

Second, they are conceptual parameters that provide a clear parameterisation for the interpretation and understanding of the research aims. They align closely with the phenomena I am investigating and allow me to more precisely frame the interpretations and understandings. That is, these concepts have been made ‘real’ to aid understandings of the contemporary UK potato industry and

realise the aims. In doing so, I am able to nest these concepts within a broader structures and representations of potato waste.

Power

Power is discussed by all the waste scholars discussed in this section. They all emphasise the centrality of waste in regulating society and see waste as a powerful force (if not the most powerful force) in transforming and mediating social relations and our sense of self. However, they have different approaches to the concept of power that frames their analysis of waste. In political economy approaches such as O'Brien's, power is seen to rest in the structures and institutions of the state and capitalist organisations. O'Brien argues that it is the political-regulatory power of the state and governmental organisations which decide how, where, and when food becomes waste or surplus. For example, in Chapter Five and Six, how different potato industry actors negotiate political-regulatory terminologies and definitions of waste is examined and further elaborated in Chapter Seven. Drawing on Claus Offe (1984), the 'anarchic' and destructive contradictions of capitalism create negative system effects such as overproduction and waste. If left alone, the long-term effects of capital valorisation and accumulation would result in an uncontrollable situation and thus requires intervention and regulation from an active state to contain and stabilise the economic and social system (Lessenich 2009:110). Power is clear, for example, in the control retailers and manufacturers exert over the form and size of the potato, as discussed in Chapter Five and Six.

Coming from a posthumanist approach, Hawkins and Evans have a different conceptualisations of power. These are both influenced by the poststructuralist idea that power is more diffuse, critiquing the neo-Marxist ruler and ruled schema which is argued to no longer reflect contemporary relations of power. Instead, there are multiple authorities and agencies which guide and shape individual action. The 'subinstitutionalisation' of power from a myriad of institutional authorities ranging from government to social media influencers avoids the totalising nature of power and sees control as a micropolitical act to subject individuals to certain ways-of-being. The subjectivisation of action, through things like educational programmes for tackling food waste in the home, becomes subjection; the internalisation of affective power on human bodies shapes actions and ethics toward food/waste. Gille presents an account of power that blends the Marxian always-already given nature of power with a microlevel understanding that power is always emergent and apparent in connections rather than spheres or 'nodes'. However, for Gille, poststructuralist accounts fail to accurately describe the concrete relations of power that exist within waste regimes that create conditions of hunger, famine, and environmental contamination. By concrete, we mean the product

of many different determinations (i.e. actions being done over and over again by multiple human/nonhuman relations). Microlevel approaches argue that by focusing on the mundane and everyday, we get a better feel and understanding of the concrete whereas macro approaches are more abstract. However, following Massey (1994), Gille argues this is a false representation of concrete/abstract differences. Therefore, to understand power in contemporary food/waste regimes, power is seen as multi-scalar and through levels of abstraction; the focus should be on how waste shifts from abstract to concrete social relations via the concept of ‘waste regimes’ (Gille 2009:1053). The relationships between power and abstract and concrete social relations are fully analysed in Chapter Eight when discussing the ‘The Potato Wasters’.

Efficiency

The efficiency of production is a key concept in understanding waste. Efficiency can be realised through the formulaic calculation of material inputs and outputs but relies upon a representational value system. That is, in order for something to be made more efficient (using less to produce more) it needs to first be identified and valued as something of worth. Proponents of the dominant corporate regime of agri-food production regard the contemporary regime to be the most efficient at producing and distributing scarce resources (O’Brien 2009b). This argument often hinges upon the soaring productivity of agricultural production in recent decades following the Green Revolution. However this system also creates significant external costs that are often not measured or identified as they fall outside market management and calculation. Indeed, the inefficiencies of capitalist systems of production and consumption have long been a source of debate (Packard 1964). These critiques often emphasise the moral inequity in the unequal distribution of resources and the ecological cost of disposability and waste in consumer capitalism. In recent decades, critiques of the inefficiencies of linear supply chains have also come from within capitalism. These highlight the importance of sustainability, or ‘sustainable development’ – our need to recycle, reduce and reuse. Central to the sustainability argument of a circular economy or bioeconomy approach is efficiency. This has particularly increasing in recent years, with agendas to replace the extractive single-use system of production and consumption with a circular system that reabsorbs waste back into the production-consumption dynamic. In doing so, more efficient and sustainable economies and societies are argued to be produced, tackling the problems of climate change, resource use and just economic development.

For the scholars of waste discussed, with the exception of Evans, efficiency is an important consideration when researching waste. O’Brien’s take is a simultaneous critique of the throwaway

society thesis (see Packard for its most vocal expression) and the widespread belief that the free market by itself brings efficiencies. Rather than the market economy bringing efficiencies by itself, it requires an advanced and highly organised technical, legal and political systems for efficiency savings to be realised. This means there have been efficiencies over time due to technological innovations, for example, but this has required a highly bureaucratised and advanced system interlinking various state and non-state actors. O'Brien sees the integral role of the state in realising the value of worthless waste; complex legal, political and economic arrangements are needed in order for efficiencies to be realised (capital accumulation). Gille discusses efficiency in her analysis of Hungarian waste regimes (Gille 2007). She identifies a period in Hungary's economic history in which there was a reorientation under state socialism towards minimising the costs of production through more efficient means of production. Gille and O'Brien both adopt a political economy approach to the understanding of efficiency; it is regarded as an issue of institutional arrangements and processes that dictate the use or disuse of waste. Efficiency is demonstrated, for example, in the way overseers frame their role and activities in the potato industry as discussed in Chapter Seven.

A posthumanist reading of efficiency takes a critical approach to the concept. As discussed previously in this Literature Review, the development of the posthumanist school of thought rose through the sustained critique on modernity following increasingly destructive human control over nature during the twentieth century. Hawkins understands the "technocratic logic of efficiency and concealment" (2006:16) as particularly powerful in forming not only our relations with waste but our subjectivity towards it. Drawing on Susan Strasser's (1999) historical account of waste, she emphasises the similarities between individual practices of wasting and wider economic and social organisation. Individualised habits of efficiency were framed around concerns over disease and contamination (e.g. the Spanish Flu of 1918) and the conspicuous consumption of labour saving technologies in the home (e.g. cooking, washing and cleaning). The "network of socio-technical relations" (Hawkins 2006:103) require an internalisation of a particular ethics of waste that is framed through classical economic utilitarianism. The moral economy of wasting has strong traditions in capitalism (e.g. Weber's Protestant Ethic) with the self-regulation and internalisation of guilt over the immorality of wasting or excessiveness. Furthermore, tied in with technocratic logic of efficiency, Hawkins identifies the increasing *management* of economy and society as important in waste relations. Under classic utilitarianism, in order for something to be managed, it firstly has to be measured and secondly have a use. If it is not measurable, it is hidden or in Hawkins' word 'concealed'. Over time, there has been the increasing management of waste with increasing attention placed on the environmental crisis, responsible living and valuing rubbish as a resource. Under these three key developments, waste is perceived and acted upon as something disruptive, out

of place and contaminating which needs to be removed in the most efficient and cost-effective manner.

Materiality

As a concept that stems from and fits in with posthumanism, materiality is especially important in the approaches of Gille, Evans and Hawkins. O'Brien also places importance on highlighting the material flows of waste and how such emphasis on materiality is missing from conventional political economy approaches. Indeed, Gille makes the argument that macro approaches, in their lack of attention to materiality, tend to reify waste. Waste is treated as something abstract and 'out there'. Gille does not wish in any way to dismiss these contributions to the scholarly field of waste but argues that in reifying waste, macro approaches belie how waste actually becomes waste. Drawing on Gourlay (1992) and Bulkeley and Gregson (2009), Gille emphasises the materiality of waste in how it "traverses the circuits of production, distribution, consumption, reclamation, and 'annihilation'." Studies in material cultures of consumption frame Gille's understanding of waste, but she is highly original in applying these findings to studies of industrial production.

For Evans, whose research is inspired by such studies in material culture, it is the material properties of stuff that shapes who we are and wider practices of wasting. Materiality is observable, for example, in the technological interventions manufacturers develop to reuse or capture waste, as discussed in Chapter Five. Drawing predominantly on studies of consumption and science and technology studies, how we interact with and imagine the stuff that surrounds our lives is relational. Objects, stuff, things, or what Callon (1998) calls 'devices' shape us as much as we shape them – this is a very important point. Food has a 'vitality' (Evans 2014:85) that is unstable and as such open to different meanings and interpretations. The interactions between material objects (i.e. food), individual action and social organisation are highly complex. These are structured and stratified differently across groups, which is of particular interest to sociological scholarship. As mentioned, whilst Evans' focus is on food itself, he also brings in other devices such as bins (food waste bins or generic waste bins are an important distinction) which are important in the 'moving along' of food to waste. It is anthropological and sociological studies that have brought this to the fore, the so-called cultural turn that emphasises the importance of these objects in our everyday lives. Hawkins also approaches waste in this line of thought, acknowledging the importance of the materiality of waste. As discussed, the material properties of waste itself shapes our practices and relations towards it, whether out of hygienic or risk concerns to human health or the repurposing for economic utility. For example, in Chapter Six, the variety of devices used to control the perishable materiality of

potatoes are investigated. Hawkins goes further than Evans in her examination and concentration on how the materiality of waste shapes our ethics and sensibilities. She sees waste as constitutive of society (in the spirit of Bataille); that our relations with waste say more than anything else about who, and what, we are.

2.10. Towards Synthesis – Conceptual Framework and Research Aims

In bringing together the contents of the Literature Review to form a conclusion, I have three main tasks in mind. The first task is to specify what research is geared to understand about the potato and its related phenomena and issues. The second of the tasks is to complete the formulation of the conceptual framework started in the previous section. The third task is to link the first and second tasks to create the statement of the research aims.

Towards nuanced understandings of potato waste

If we are to better understand potato waste, then there is first a need for further research on the UK potato industry itself, for example in the footsteps of Yakovleva and Flynn (2004). Accounting for any changes in the pattern of workings of that industry will inform insights into recent shifts in waste management.

Once there is an up-to-date account of the working of the UK potato industry, that account can be subjected to analysis and interpretation in order to reveal nuanced understandings of key issues such as the operation of supply chains, the role of human/nonhuman relations, and crucially, different meanings of potato waste itself.

Conceptual framework

Core parameters: Power, Efficiency and Materiality

The conceptual framework that follows pulls into focus the breadth of concepts discussed in this Literature Review. The framework comprises three parts. First, the core parameters of power, efficiency and materiality. As discussed in Section 2.9., these parameters conceptualise the core issues, themes and questions in this research. They expand on existing sociological scholarship of food/waste and enable a bridging of political economy and posthumanist approaches to the study of food waste.

These core concepts play a central role in bridging political economy and posthumanist approaches. They are derived from the food and waste scholarship reviewed and are operationalised when analysing information and formulating conclusions.

Approaches: Political Economy and Posthumanism

Second, the political economy and posthumanist approaches. These approaches are two dominant approaches in critical sociological research on food waste. Precisely, political economy approaches are powerful in understanding economic and institutional arrangements of waste, whereas posthumanist approaches are powerful in understanding the social constitutions of waste. Combining the two to produce a mid-range theory enables a stronger understanding and interpretation of the totality of relations, processes and practices across the UK potato industry.

Discussed throughout the Literature Review, these approaches have a role in framing and contextualising information and arguments. A political economy approach is operationalised to discuss shifts and developments in the UK potato industry, whereas posthumanism is used as a critical lens to interpret how these shifts and developments have occurred and what consequences they have for waste.

Enabling Concepts

Third, 'enabling concepts' that support the core conceptual parameters and approaches. The core parameters of power, efficiency and materiality lack the necessary explanatory power to understand and interpret the totality of potato waste. As such, these enabling concepts are required to provide a richer interpretation and understanding, helping to avoid a reductive imposition of the three parameters. From the literature previously reviewed, I identify eight enabling concepts. I justify the selection of each enabling concept and I explain how each enabling concept connects with the three parameters and two approaches. By doing this, the role of these enabling concepts in the interpretations of the empirical chapters and Conclusion is more clearly defined. The enabling concepts in the conceptual framework are as follows:

Relations

Discussed in Sections 2.2., 2.3., 2.5. and 2.9., sociologists are interested in relational interdependencies. Relations are treated as an enabling concept in the framework. Using relations to support my conceptual framework allows for the understanding of how waste is spatially structured

across and within the potato industry. For example, it permits the exploration of how relations between retailers and growers shape the cultivation of particular potato varieties. Relations enable an analysis of the core parameters via both approaches. More precisely, focussing on relations enables an understanding of power relations in the UK potato industry through a political economy approach whereas the significance of materiality on human/nonhuman relations can be interpreted through a posthumanist approach.

Processes

Discussed in Sections 2.5. and 2.8., using processes as an enabling concept in the framework adds a temporal dimension to understanding and interpreting potato waste. Approaching the phenomenon of food waste processually, we can understand how power relations, efficiency techniques and materiality have shifted over time, a core aim of this research. Processes are applied in the research, for example, in understanding the embedding of technological innovations such as starch capture. Enabling the concept of processes in the conceptual framework also bridges the two approaches; it presents a mid-range theory between an overly deterministic structuralism of political economy and an overly microsociological deconstructionism of posthumanism.

Practices

Discussed in Sections 2.3., 2.5., 2.8. and 2.9., I use the concept of practices in my conceptual framework to refer to the embodied and concrete forms of social action. Practices are the result of relations and processes. That is, practices are embedded in the lifeworld relationally and processually such as the practice of potato growing. Practices are connected to the core conceptual parameters as the concrete and embodied enactment of power, efficiency and materiality in the lifeworld. Terminologically, practices connect both approaches as the concept is used as a descriptor of processual and relational social action.

Accumulation and Overproduction

In Section 2.7. I explain the importance of accumulation for researching waste. That is, critically understanding the historical process, structuring force and development of accumulation in capitalism is necessary for scholars of waste. Accumulation bridges both approaches. Through a political economy approach, accumulation is connected to the core parameters of power and efficiency. From a posthumanist approach, accumulation is connected to materiality; how quantitative and qualitative changes in accumulation shapes material relations between humans and nonhumans. Drawing on the concept of accumulation, and particularly capital accumulation, to understand how and why overproduction and waste occurs in the UK potato industry provides a

richer conceptual framework for understanding the shifts in potato waste. In the heading above and last sentence, I referred to ‘overproduction’. Closely connected to accumulation, overproduction is a concept that provides further interpretative understandings for why and how the potato industry is geared towards waste. This enables a further understanding of power within the industry, how efficiency operates within systems of overproduction and the shifting materiality in the flows of potato waste as a result of overproduction. Overproduction bridges both approaches; through political economy we can understand why overproduction occurs whereas posthumanism provides a critical understanding of how overproduction impacts on potato waste and accumulation.

Commodity

The importance of capturing the complexities of ‘following the commodity’ in regards to the potato was considered at length in Section 2.3. Following the commodity enables both approaches to be operationalised, an understanding of the macro arrangements of the UK potato industry through political economy, whilst interpreting the cultural, social and moral dimensions of commodities through posthumanism. The notion of commodity and related phenomena, for example the process of commodification, have on-going roles connected to the core parameters. For example, commodification is a necessary precursor to techniques of efficiency and shapes the materialities of commodities which in turn shapes us. Without the concept of commodity, and by extension the process of commodification, a less critical interpretation would be possible than if just operationalising the core parameters.

Supply Chains and Networks

Chains and networks were discussed in Section 2.2. and their key features itemised. Supply chains and networks are a central feature of the UK potato industry and their conceptual analogues play an essential role in supporting and informing both descriptions in the narrative accounts and their analyses. They enable the core conceptual parameters to be analysed in the interpretations and understandings of the potato industry. Without them, the core parameters could not be fully explained and analysed as they require a structuring concept for them to be fully understood. Supply chains and networks are both connected to the political economy approach but networks can be more fully understood through a posthumanist approach. Using the concepts enables the necessary construction of an up-to-date account of the potato industry on its own terms, which can subsequently be critiqued and interpreted.

Waste Representations

I recorded the insightful contributions of the discipline of geography to the representation of waste in Section 2.6. The empirical chapters feature geographical images. In addition to this role of visually illustrating waste-related issues, I have also used geographical imagery and concepts, especially maps and mapping, to guide my thinking – not least, figuratively. Waste representations are also important in understanding the semiotic and performative dimensions of potato waste. Connected to the core parameters, enabling the concept of waste representations can aid understandings of power and its unequal distribution and the dominance of efficiency in representation. Emphasising the semiotic and representational aspects of food waste, this supports the posthumanist approach.

Critical Thinking and Philosophising

The writings of Georges Bataille, David Harvey, Donna Haraway, Isabelle Stengers, Zygmunt Bauman, Jacques Ellul and Mary Midgley have had a profound affect on my thinking. Whilst these scholars and their ideas are not always brought through in the subsequent chapters, they played an ever-present part in influencing the conduct of the research and my writing. This can be understood as a meta-enabling concept which has informed the construction of this conceptual framework and the sociological epistemology and ontology running through the research.

I wish to stress that even though the elements of the conceptual framework have been listed one-by-one when put to use in the four empirical chapters and the Conclusion, the elements are applied relationally and synergistically. Furthermore, the core conceptual parameters, approaches and enabling concepts are applied reflexively to each empirical chapter to provide coherence and integrating logic through the thesis. There are occasions in the analysis and interpretations where only part of the conceptual framework is operationalised, this is justified because when studying a wide-ranging and complex phenomenon such as potato waste, being equipped with a wider array of conceptual tools can illuminate the under-researched world of potato waste.

Research Aims

As already indicated, key aspects of the above subsections are combined and consolidated in the research aims.

1. To present an account of shifts in the UK potato industry with reference to waste and the processes of hyper-globalisation.

2. To subject that account to critical interpretation using a posthumanist perspective with a view to:
- (2.1.) Understanding how human/nonhuman relations influence overproduction with consequences for waste and accumulation;
 - (2.2.) Describing how network actors define, negotiate and contest different meanings of food waste; and,
 - (2.3.) Contributing to the sociological discourse on waste, notably in respect of single commodity studies and a critique of the food/waste chain concept.

3. METHODOLOGY

The Literature Review concluded with the formal statement of research aims; that is, what I intended to achieve. The role of this chapter, Methodology, is to describe and explain ‘how’ those aims were to be achieved. The chapter is organised into three sections. First, I take forward the business of the Literature Review in respect of the general methodological implications of the aims. Second, I cover all aspects of data collection, with particular emphasis on fieldwork. Third, I deal with analysis, synthesis and representation.

3.1. Linking Methodology and Research Aims

This section comprises three subsections: locating the research; the research strategy; and, the ANT methodological framework.

3.1.1. Locating the Research

Alfred Schutz (1954: 265-266) helps set the scene:

“...philosophers as different as James, Bergson, Dewey, Husserl, and Whitehead agree that the common-sense knowledge of everyday life is the unquestioned but always questionable background within which inquiry starts and within which alone it can be carried out. It is this *Lebenswelt*, as Husserl calls it...”

“This insight sheds a light on certain methodological problems peculiar to the social sciences.”

The research aims provide a useful way of locating the research in respect to the Methodology. For ease of reference, I re-state the aims:

1. To present an account of shifts in the UK potato industry with reference to waste and the processes of hyper-globalisation.
2. To subject that account to critical interpretation using a posthumanist perspective with a view to:
 - (2.1.) Understanding how human/nonhuman relations influence overproduction with consequences for waste and accumulation;
 - (2.2.) Describing how network actors define, negotiate and contest different meanings of food waste; and,

- (2.3.) Contributing to the sociological discourse on waste, notably in respect of single commodity studies and a critique of the food/waste chain concept.

The aims have methodological implications for locating the research: within the lifeworld; in reference to the traditions of food waste research; and, paradigmatically.

Regarding the lifeworld (*die Lebenswelt* - the 'lived world'), the Introduction and the Literature Review have already recorded my reasons for centring food waste research on the potato. The decision to investigate the potato was followed by the decision to research supply-side issues which came about as a direct consequence of other researchers, for example O'Brien (2008; 2013), pointing out the unbalanced attention given to consumer waste. For 'supply-side' I have substituted 'the UK potato industry' and the relevant methodological details follow in the next section on fieldwork. The materiality, relations and practices of the UK potato industry are manifestly located in the lifeworld; the extent to which the UK potato industry can also be considered a food waste regime is integral to the aims and is a frequent theme in this thesis.

The Literature Review also recorded key conceptual and other knowledge inputs to the thesis. Alongside the content of this research stream, researchers have established a research tradition in methods. The attention on food in the social sciences has grown significantly over the last two decades; as such, the variety of methods used has been equally as wide-ranging (Miller & Deutsch 2009; Warde 2014). The three main approaches remain grounded in quantitative, qualitative or mixed methods. In truth, the conflict and animosity between different ontological and epistemological positions of research methodology are not so prevalent in food scholarship. Indeed, there exists a recognition of the value of many different types of data in constructing perspectives, arguments and analyses of social processes and action, not limited just to numbers or text but visual methods too (Guthman 2002; Mintz & Du Bois 2002; Toussaint-Samat 2009; Evans 2014).

Like the research position of others (Back 2009), I gathered my questions and ideas first and then searched and found appropriate methods that could guide and give some interesting answers. Food waste research generates many difficulties in operationalising the questions asked. Even the most basic question 'how much food is wasted?' is very difficult to measure.

As recounted more than once in the thesis, quantitative approaches to the study of food waste are problematic even when given the advantage of studying a single commodity; any such advantage due to a commodity being a tangible object is lost owing to the potato's perishability.

The aims contain words and phrases that require methodological clarification. What do I mean by an account? And, what about “critical interpretation”? (see final section of chapter for responses.) As far as “using a posthumanist perspective” goes, that’s the paradigmatic issue of present concern. How do I propose to locate the thesis within a posthumanist perspective? In part, the question was anticipated in the Literature Review and addressed in relation to the political economy perspective. I indicated that my intention was to use the political economy and posthumanism perspectives in a loose combination. By this I mean that while both paradigms deal with phenomena such as power and efficiency (shared content), the approaches to understanding or interpreting such phenomena are markedly different (contrasting perspectives).

In this context, the methodological requirement is to clarify the two perspectives *in use* – how are they going to be applied? In responding to this prompt, Schutz’s comments on common-sense, the unquestioned and the questionable are apposite. I have already stated that the political economy paradigm is a ‘good fit’ for the supply chain concept/reality in terms of descriptive power. That is, following Schutz, the common-sense workings of a supply chain are open to political economy descriptions in an unquestioning fashion. Put another way, the political economy paradigm is useful for accounting for the workings of supply chains because they both arise from the common logic that underpins capitalist enterprise. However, can supply chains be questioned thoroughly or critically by an endogenous method? I have taken up the position where, in choosing to use a posthumanist perspective exogenously, I can question the “common-sense knowledge of everyday life” that is embedded not just in potato supply chains but also the UK potato industry as a whole (as indicated above, these are in effect opening remarks on the challenge of employing two contrasting perspectives – remarks that serve to locate the research).

Bringing together these three ‘locating the research’ strands – lifeworld / tradition / approach / paradigm – I return to the words of Alfred Schutz used at the beginning of this sub-section. This matter of “...the common-sense knowledge of everyday life is the unquestioned but always questionable background within which inquiry [is performed]...” goes a long way in locating this research in common-sense, the unquestioned and the questionable. Take for instance, the largely unquestioned common-sense concept of the supply chain which does become questionable in this thesis. The power to question is a function of methodology and that involves, invoking Schutz again, recognising and confronting “methodological problems peculiar to the social sciences”. Even so, I am of the opinion that the technical methodological power of mapping and tracing across and between social relations, giving us insights into social phenomena, is only fully realised when fused with the sociological imagination (Wright-Mills 1959).

3.1.2. The Research Strategy

In broad terms, what methodological steps needed to be followed to achieve the aims?

When I started my doctoral studies, as already described, I had an interest in the potato and naïve questions about waste that were subsequently developed and substantiated during the desk-based research. Once I had established my research aims, logically the next step was to formulate a set of methodological objectives geared to meet the aims, for example, specifying details of the fieldwork. I set about the task of setting methodological objectives with a greater emphasis on the implicit rather than the explicit. Of necessity, the level of organisation required for fieldwork required explicit objectives, for example, interview schedules. And, I was clear in my mind about how I was going to use the fieldwork data to generate the ‘empirical chapters’ related to the first research aim. However, charting a passage using a set of explicit objectives that would lead to answers to the other aims proved elusive and, in any case, did not fit with my overall approach. Once I had completed the four empirical accounts, I felt like a detective in a ‘incident room’; photos stuck to a wall, a desk overflowing with notes and reports, a list of leads to chase up and so on. Just like any dedicated detective, I kept looking for the ‘new angle’: Shuffling papers, joining dots and seeking hidden connections. I felt all along that there was something interesting and useful in what I had done so far – but hadn’t expressed it. Then two seasoned detectives dropped by my incident room, made suggestions, and it all clicked. ‘*Verstehen*’ – no less! The emergent, organic research strategy that I had been implicitly using was realised. The understandings that took shape and are ultimately articulated in the final chapter came as a surprise to me, perhaps the biggest difference between positivism and its alternatives. In positivism, the result is either ‘yes’ or ‘no’, a knowledge claim is either confirmed or rejected. Using my ‘hybrid methodology’, it wasn’t until the very end that I was in a position to make a knowledge claim – a moment of sociological imagination in action I like to think.

So, somewhat retrospectively, and in lieu of objectives, I present these five steps as representing my broad research strategy:

1. Perform fieldwork and associated data processing.
2. Write a dedicated account for each of the four morphological units: growers, manufacturers, retailers and overseers.
3. Subject each account to a reflexive review within a political economy frame.
4. Further, subject each account to a critical interpretation within a posthumanist frame.

5. Integrate the understandings derived from the above reviews and interpretations to generate a definitive response to the aims.

3.1.3. The ANT Methodological Framework

“Although we speak of an actor-network theory, ANT is also defined as a method to follow and describe the movement of actants and the effects that result from the bonds between them. The researcher who chooses to conduct an ANT research needs to understand the social as the result of constant and unpredictable associations between the actors. Thus, the researcher “should not define in advance what the actors are, nor sort the controversies among them a priori, decide how to solve them or seek explanations.” The researcher should compare to a “*detective* who traces the enigmatic alleys of his investigative case, we must follow the clues that appear at all times.”” (Cavalcante et al 2017:4) [italics added].

A detective!

Actor-network Theory (ANT) has developed alongside posthumanism in part to give substance and form to a distinctive philosophical orientation. As a theory, ANT has its own conceptual basis in which the elements have defined meanings that don't altogether accord with 'everyday understandings'. ANT is self-described as a theory but from its conception it has always had the role of a method as “how-to” (Latour 2005). ANT has increasingly been used as multi-purpose methodology in a variety of contexts removed from its origins in Science and Technology Studies (STS). Certainly, this research into potato waste that takes in the biological characteristics of the potato, logistics technologies and a variety of human participants and institutions might be included under the STS banner.

In the Literature Review I set out the conceptual framework to show the concepts and associated ideas used to underpin this thesis. Because I am employing two perspectives in researching waste in the UK Potato Industry, there's a particular need to sort out how the elements of the conceptual framework are going to be considered methodologically. In sorting out this issue, the contrast between the political economy and posthumanist perspectives is sharpened. For instance, the application of the concept of efficiency within the political economy paradigm in describing supply chain actions is relatively straightforward. However, from a posthumanist perspective, efficiency is in itself a nonhuman actor – a monster, even – that has a life of its own within the supply chain. There is recognition within posthumanism that the classical dichotomies between, for example, organic/

inorganic or human/animal or structure/agency, are inadequate in trying to reveal the nature of the lifeworld with all its complexities. Or, more precisely, whilst dichotomies are a highly convenient basis for the binary quantification of data as 0 (zero) or 1 (one), within an ANT perspective any dichotomy recognisable in the lifeworld, as polarisation for instance, becomes in itself a network actor/actant influencing in particular the narratives that human actors use to define and negotiate both their own network position and role and that of others. In this way, ANT is a powerful tool for conceptualising and understanding cultural contestation – the sort of cultural contestation highlighted in vignettes in the Introduction. Indeed, researchers of health and nursing research in Brazil, have detailed “operating actor-network theory through the mapping of controversies” (Cavalcante et al 2017:8). I again quote at length from their paper:

“Thus, the mapping of controversies is considered the operation of ANT. It is described as a set of techniques to explore and visualize controversies, observing and describing social debate, especially – but not exclusively – regarding technical and scientific problems. In the mapping of controversies, instead of a static representation like a map, the objective is to portray a map / landscape that reproduces itself through the intermediary and dynamic movements of the actors (including the cartographer himself). The researcher is granted more freedom to access the network registration devices and maintain it as open as possible in the face of the controversy, especially at the beginning of its surveys. An inscription is understood as a form of translation where the association is defined by means of scripts (manuals, protocols, graphs, rules, standards, laws, others), which materialize in an entity of any support, causing the action to be the fruit of hybridism and the production of results.”

The ANT methodological framework used in the thesis has been derived from a number of sources (Jackson 2015; Bilodeau and Potvin 2016; Cavalcante et al 2017). Table 2 below, and continuing on the following page, is taken from Jackson (2015:30) which is based on Walsham (1997).

Table 2: *Summary of Key Concepts of Actor-network Theory*

Actor/Actant	Any material, i.e. human beings or nonhuman actors/actants.
Actor-network	Related actors in a heterogenous network of aligned interests.
General symmetry	The symmetrical treatment of humans and nonhumans as <i>a priori</i> equal.
Translation	How actors generate ordering effects by negotiating or manoeuvring others' interests to one's own with the aim of mobilising support.
Enrolment	Embodied translations into a medium or material.

Black box and punctualisation	A temporary simplification in a network that acts as a single unit so that the network effaces into one actor.
Quasi-object	A nonhuman that is necessary for the collective to exist; an object that passes through a social group which in doing so forms relations between members of that group.
Hybridity	The idea that neither a human nor a nonhuman is pure, that is, either human or nonhuman is an absolute sense but rather entities produced in associations between the former and the latter. Thus, humans are considered as quasi-subjects and nonhumans as quasi-objects.

Jackson (2015:30) comments on this table:

“These elements represent the foundation concepts of an analytical and methodological approach for ANT. Individually or together they provide a mechanism through which researchers can extend their study of the social to include nonhumans and open up their gaze to examine the interrelations between humans and nonhumans.”

Applying the contents of the table above to the task in hand generates the ANT methodological framework.

Table 3: *ANT Methodological Framework*

ANT CONCEPT	ANT Concept Applied to This Context
Actors/Actants	Growers/manufacturers/retailers/overseers/consumers Food/waste The natural environment and its properties Chains/networks Technologies/policies/market forces Relations Power/efficiency/materiality Semiotic duals of listed actors/actants
Translations	Commercial/technological/social/cultural processes
Inscription	Physical infrastructure and practices
Quasi (or token) object	The potato

Given the explanatory nature of the table of key ANT concepts, there is an easy read through to the methodological framework but even so, some further notes are useful:

- The methodological framework does not contain the following elements of ANT conceptual table: actor-network, general symmetry, and hybridity. These elements are used to define or describe key philosophical position taken up within ANT, for example, actor / actant as ‘any material’. These elements are not ‘parameterisable’ in applications.
- Nor does the methodological framework use the concepts of enrolment and black box. These are ‘parameterisable’ but were not needed in this application. There is a good argument for the UK Potato Industry or the UK Potato Regime being classified as a ‘blackbox’ – but would the criterion ‘temporary simplification’ apply?
- The importance of the semiotic dimension. Whilst not going as far as Baudrillard, who thought the role signification in postmodern capitalism resulted in “the end of political economy”, I recognise the considerable importance of semiotics. Semiotically, the potato is not just a dirty tuber dug from the ground; for instance, it is also an object that dinner ladies and school children might view and understand rather differently, as in one of the vignettes in the Introduction.
- Some commentators have seen similarities between ANT and symbolic interactionism, including the notion of ‘interaction order’, for example Fernback (2007). I raise the point because I have used Abbott’s ‘processual theory’ (Abbott 2016) and, in my view, ANT, the interaction order and processual theory have conceptual and methodological similarities that are worth using. This is especially true for the ANT concept of ‘translations’.

Having located the research, set out the research strategy and the ANT methodological framework, I now move on to give a description of the range of data I gathered and the practical processes of data collection that took place during the course of this research journey.

3.2. Data Collection

The following section falls into two parts: the first is concerned with the collection of primary data by which I mean data that is new information; this was created through fieldwork that involved face to face and telephone interviews with individuals from across the potato industry. The second part

describes the secondary data, that is data already in existence, which was gathered from both scholarly and grey literature.

3.2.1. Primary Data – The Fieldwork

In relation to the primary data, the following is covered: an outline of the preparations that were necessary once I had identified the research areas and the relevant locations I intended to visit; the gaining of access to research participants; the ethical considerations; and the designing of the interview schedule and aide memoirs. I continue by describing the actual conduct of the interviews: the use of walking interviews, static office-based interviews, and telephone interviews. The sequence of interviews is explained, and what primary data was obtained.

Preparing for the Fieldwork

Drawing upon previous research into the potato supply chain in the UK (Yakovleva & Flynn 2004; WRAP 2012; Neaverson & Burgess 2013), and reading both the grey literature and waste scholarship, I was able to identify particular areas that had been recognised as being under-researched and unexplored (Gille 2013). Accordingly I chose to conduct the research within four morphological units: growers, manufacturers, retailers and overseers. These units represent different aspects of the UK potato regime which work together but also with autonomy – an interesting division of labour and expertise but overseen by certain logics and understandings. By interviewing different actors within each of these four units, I hoped to explore some of the relationships that exist not only between people but how people’s behaviours and beliefs are shaped by nonhuman things, in this case, the potato.

Having chosen these four units – growers, manufacturers, retailers and overseers – it was then necessary to identify specific actors and geographical locations within each; this meant visiting different types of farms, processing plants, the offices of large retailers, the offices and laboratories of the UK quasi-governmental bodies that oversee the regulation of the potato industry. I now describe how I gained access to these actors and their locations.

Gaining Access to Study Participants

Trying to enter a field and industry as a novice researcher with no network of contacts, proved a significant challenge when I began my fieldwork. This was not surprising and the difficulties of recruiting participants to academic studies are well documented (Archibald & Munce 2015).

Gille (2010:1049) describes these challenges as being especially difficult for researchers of waste “since industrial and, in general, production wastes are rarely accessible to fieldwork methods.”.

I soon found that the reality of setting up a programme of fieldwork interviews did indeed require patience, pragmatism, and flexibility. Getting access and building up a list of contacts and participants was time consuming and at times disheartening. Emails would be ignored, and voicemails were left unanswered. A research summary was created (see Appendix 1) that was distributed by email to industry organisations including the Fresh Potato Suppliers Association, Potato Processors’ Association and British Potato Trade Association, but I received no replies. That was understandable – people are busy. I found large multinationals in industry were particularly concerned over commercial sensitivity – this was certainly the case with McCain and PepsiCo, two of the largest potato manufacturers and purchasers in the UK. I wasn’t able to conduct fieldwork at McCain despite writing to them (Appendix 2), however I conducted a telephone interview with a sustainability officer from PepsiCo.

Despite these difficulties, I was able to slowly build up my number of participants through a snowballing technique, that is finding one person willing to become involved who then provides the contact details of others who might be interested – and went from there. Snowballing technique is a method of convenience sampling that is often used with populations that are difficult to identify and locate (Biernacki & Waldorf 1981). The advantage of using a snowball technique is that it enabled me to access participants I was struggling to find. Once I was in communication with a respected member of the potato industry, I was introduced to a number of other participants. A disadvantage of using a snowball technique was that I was reliant upon a key participant to gain access to and interest from other participants. This could have led to a restricted group of participants who shared the same opinions and values, however I was fortunate that my interviewees offered a range of perspectives. The snowballing technique was initiated when I attended the British Potato 2015 Conference (BP2015) organised by the Agricultural and Horticultural Development Board (AHDB) and spoke to relevant industry professionals and experts who then introduced me to potential research participants. The promotional material for this event describes it in the following way:

“Once every two years the whole of the British potato industry comes together for this unique ‘seed to shopping trolley’ event. It’s an exceptional networking and business opportunity for all those involved in growing, handling, processing and retailing the crop in this £multi billion industry.”

I will expand on how the sequence of interviews unfolded later in this section.

Ethical Considerations

Prior to entering the field, I was required to make a submission to the University Research Ethics Committee detailing the arrangements for my fieldwork and data collection. The General Risk Assessment Form was approved by the Committee.

The University Research Ethics Committee also approved the information sheet and consent form to be provided to all those participating in the study (see Appendix 3). These participant information sheets were sent prior to interviews, and once I arrived at the interview locations, I outlined my research aims, and asked participants to sign the consent form.

In my submission I identified risks to myself that could arise from conducting the fieldwork. These were twofold: firstly, that I would need to travel alone and stay in various unknown and often rural locations around the UK. I mitigated this risk by notifying people of my travel plans, implementing a buddy scheme with a fellow PhD student and maintaining contact with home whilst I was away, checking in that I was safe after a day in the field.

The second, and greater, risk to me was posed by being on-site in a factory and on farms which all present potentially dangerous environments. In terms of these risks to me, I had to undergo health and safety checks at the various research locations, organised by the relevant companies. This involved watching videos on the health and safety procedures in place such as what to do in the event of a fire. During my factory visit I was also required to wear suitable clothing and equipment (such as goggles and a safety helmet). I had to sign consent forms myself at the factory and farms which stated that in the event of an accident the companies would not be liable.

The often remote and isolated locations of farms are noted as creating both logistical and health and safety issues for researchers, both in travelling to them and in conducting interviews (Chiswell & Wheeler 2016). The Social Research Association (2001) code of practice on research safety highlights the ways in which researchers can protect themselves in the field and covers a range of topics including assessing risk at the interview sites.

Designing the Interview Schedule

Part of the preparation for carrying out the interviews was the design of an interview schedule that would be used to direct the course of the conversations with the participants (see Appendix 4). The interview schedule was put together in order for the interviews to discuss the research questions and aims I had developed.

The interview schedule began with an open question on why the research participant thought there was waste in the potato industry. Having a broad and open question to start the interview gave the participant the ability to speak for themselves. Cues were developed in the research schedule to try to manoeuvre the interview to discussing key themes.

As Fielding and Fielding (1986:49) point out, in the actual conduct of an interview, interviewees develop their own responses outside any pre-structuring format. Indeed, the most illuminating and productive interviews were those in which interviewees engaged with the topics and expanded upon them.

In the Field: The Interviews Themselves

My fieldwork consisted of nineteen interviews with eighteen practitioners; I interviewed AHDB participants on two separate occasions. My interviewees were professionals and experts within the UK potato industry, in private business and in non-governmental organisations: These included potato farmers, farm managers, potato traders, employees in quality control, waste officers, sustainability managers and head of supply chain operations. The Interview Sequence on pages 86-87 provides full details of the interviewees, the interview settings and the methods of data elicitation. Three of the participants requested their names remained anonymous. The different contexts of the interviews required different approaches: for example, on a wintery day at a potato farm in Yorkshire, relationships were built, and conversations were had over cups of tea, whereas in glass cubed office spaces, interviews took a more formal approach. As Longhurst (2010:103) simply says: 'talking with people is an excellent way of gathering information.'

I now outline the use of the walking interviews, the semi structured static interviews, and the telephone interviews as the methods I used to collect my primary data.

Walking Interviews

There is a long history in ethnography of researchers ‘walking alongside’ participants in order to observe, experience and make sense of everyday practices. More recently, there has been an increasing interest in the use of ‘walking and talking’ methods across the social sciences (King & Woodroffe 2017).

Six of the walking interviews I conducted were on farms and a further one was in a factory, although in a sense one of the farms was more akin to a factory such was the industrialisation of the processes taking place there. I made the decision to conduct these seven interviews as ‘walking interviews’ rather than static room-based interviews because of the nature of those workplaces. I wanted the interviewees to show rather than just describe their working environment; it is recognised that when participant’s narratives are told in their lived environments this can help participants articulate their thoughts which in turn can add detail to the researcher’s understanding and insight. These advantages are confirmed by Clark and Emmel (2010) in their toolkit for using the walking interview as a research method. There is a small literature on the walking interview being used in the farming context in preference to the static interview (Riley 2010).

Walking with the participants proved to be an effective way of discussing the issues around waste and the history of waste in their company. I was able to point and ask questions about certain processes which would act as segues into discussions on waste and wider environmental, political, economic and social issues. Therefore, a walking interview approach allowed for the development of a participatory model of qualitative data collection.

Because of health and safety issues, and in accordance with their specific job roles, the research participants decided on the routes of the walking interviews, rather than ‘natural go-alongs’ (Kusenbach 2003) or ‘guided walks’ determined by the interviewer. Interviewees took me to the particular areas of their worksite which they considered would be of interest to me. However, there were also opportunities for deviations from their chosen routes; when I saw and asked about certain processes or devices, my interviewees took the time to explain them, which in turn stimulated interesting conversations. For example, I asked if I could quality check potatoes on the sorting line; this was permitted and provided an opportunity for me to actually handle the potatoes and note the skills involved in the process.

Tape recording of the walking interviews was simply not possible because of the physical environments in which these interviews took place. Windswept fields with tractor engines; a busy factory floor with whirring machinery; these noises, whilst forming part of the richer affective

picture, made it impossible to capture conversations clearly with my hand-held voice recorder. These difficulties of recording walking interviews have been noted elsewhere (Clark & Emmel 2010). These challenges required me to make as many contemporaneous notes as I could of the conversations and environment, and to recall and write them down in detail immediately after the interviews were concluded. In two of the fieldwork visits I took photographs to complement the discussions.

The fieldwork notes, written up in the hotel rooms and campsites immediately after the interviews took place, detailed not just the verbal exchanges that took place between me and the participants, but also the sights, sounds of the interview environments. Even allowing for the practical difficulties of recording and directing the encounters, I believe that the walking interviews were an effective method for capturing the data I wanted to collect. Indeed, the walking and ethnographic approach to this aspect of my data collection allowed for the methodological aspects of posthumanism to be realised it is in the field, with the sights and sounds (the affective materiality) of the world around us that shaped and informed the discussion and forms of data collection.

Semi-Structured Office-based Interviews

Of the remaining twelve interviews, seven were conducted in the offices of the interviewees, and five took place over the telephone. The walking interviews at the fieldwork sites allowed for open and observational forms of data collection that linked to the posthumanist approach of the research. The semi-structured office-based interviews however, without the distractions inherent in walking interviews, allowed for more in-depth discussion on the questions I wanted to focus on using the prompts and cues I developed in my interview schedule. This enabled a sharp focus on my research questions and aims, with the intention of avoiding the use of leading questions and forcing conversations into my preconceived ideas of waste.

Interviews that successfully draw out the views of the interviewees are heavily dependent on the researcher themselves: this includes their ability to develop rapport, trust and to build relationships with the research participants. I was more comfortable with the face to face interviews than those conducted over the telephone; I was able to develop stronger relationships with these participants not just in the interview but over time. In the case of the AHDB I made two separate visits in a six month period.

The office-based interviews required careful arrangements with the organisations involved, given the work commitments of the interviewees. Meetings were organised with a number of different professionals where the research was discussed in broad terms. From these meetings, further interviews were organised with the most relevant participants in the organisations who showed particular interest and knowledge of my research area. It was important that I maintained positive and respectful relationships with the individuals, particularly as I continued to have contact over time with the organisations involved. The office-based interviews were recorded and subsequently transcribed.

Semi-Structured Telephone Interviews

I conducted five telephone interviews all of which were with manufacturers as none of the participants were able to commit time to the face to face interviews I had asked for. I appreciated of course that telephone interviews can offer resource savings in time – and travel – costs.

Using the telephone as an interview mode has traditionally been considered an inferior alternative to face to face interviews with the absence of visual clues and the restricting of rapport (Oltmann 2016). Novick (2008) noted that telephone interviews are largely neglected in qualitative research literature and that scholars who have examined telephone interviewing have seen it as an alternative to face to face interviewing rather than having its own unique merits.

More recently, efforts to understand the impact of telephone interviewing on the collection of qualitative data have had mixed findings: Vogl (2013:148) suggested “very little difference between the two modes of interview”, whilst Irvine et al (2013) suggest there do appear to be interactional differences between semi-structured telephone and face to face interviews.

It was certainly my experience that the interviews that were conducted over the phone were less discursive and did not lead to any opening out into fruitful discussion. I took notes during all these phone interviews and wrote them up fully immediately after the phone calls took place.

The Sequence of Interviews

Because of the nature of the snowballing technique to gather participants, I was reliant upon the sequence of events and the personal contacts I made; this meant taking opportunities that presented themselves, often spontaneously. For example, when interviewing a senior employee at a national

retailer, their colleague entered the room whilst the interview was taking place to pass on an urgent piece of information. I was later introduced to this colleague who was the Environment Manager for Waste Management at the organisation. This led to an interview on the waste management strategies of the retailer.

As referred to earlier, my first fieldwork contact was my attendance at the BP2015 Conference where I introduced myself and my research to key stakeholders; this gave direction and opened up avenues for research. I chose the BP2015 conference to initiate my fieldwork and to gather participants as it was an industry-focussed event. Due to my research interests in the production and manufacturing aspects of the potato industry, I decided this would be a good place to start.

From attending this conference, I met AHDB potato representatives. Follow up conversations were had which led to me visiting their headquarters in Stoneleigh, Warwickshire for an extended introductory interview with key professionals which proved to be invaluable. From that I interviewed four AHDB staff individually.

The contacts and interviews I made at AHDB led to my being introduced to growers, manufacturers and merchants. The growers I met through the AHDB then led me to other participants in the retailing sector, and other manufacturers. I was able to build up my research participants over time, using the contacts and rapport I had built with previous interviewees so that new and potential participants were trusting of me and willing to engage with my research.

Table 4: *Interview Sequence*

Mike	AHDB	Head of Research and Development	Face-to-face Office based	54 118 32
Nick	AHDB	Head of Marketing	Face-to-face Office based	118 26
Phil	AHDB	Head of Supply Chain Management	Face-to-face Office based	118 43
Giles	AHDB	Head of Market Intelligence	Face-to-face Office based	118 82
Mike N	Farmcare	Farm Manager	Face-to-face Walking interview	180

Bill	Farmcare	Trade Manager	Face-to-face Walking interview	58
Fraser	Farmcare	Operations Manager	Face-to-face Walking interview	123
Laura	Farmcare	Quality Control Manager	Face-to-face Walking interview	68
Iain	Co-Operative	Environment Manager - Food Policy	Face-to-face Office based	74
George	Co-Operative	Environment Manager - Waste Management	Face-to-face Office based	49
Farmer C (JB)	Self-employed		Face-to-face Walking interview	67 126
Farmer C2	Self-employed		Face-to-face Walking interview	39
Andra	McCain	Corporate Affairs Manager	Phone	28
Lucy	PepsiCo	Sustainability Officer	Phone	34
Andrew	Anyonymous (Manufacturer)	Sustainability Manager	Phone	58
Sarah	Anonymous (Manufacturer)	External Affairs Manager	Phone	32
Merchant A (JS)	Anonymous (Merchant)	Head of Operations	Phone	45
Harriet	H.J Heinz (ISS)	Waste Management Officer	Face-to-face Walking interview	210

Use of my Research Diary

After each interview I made notes and recorded observations in a research diary that I added to and built up throughout my time in the field. The use of a research diary is well recognised as a tool for reflexive practice: recording emotions; reflecting on the research challenges; considering what has been learnt at a very personal level and using it to question biases or assumptions (Nadin & Cassell 2006).

The following extract after visiting a storage facility gives an indication of the sort of material I included in the diary, and other extracts are also included in the proceeding chapters:

Supplying potatoes all the year round requires new ways of distributing and storing – it requires infrastructures that can accurately measure and predict future yields, prices and consumer habits – something that the potato industry has shown is difficult to get right with overproduction, underproduction and price volatility occurring throughout history. The seemingly simplified (subsistence) has become the complex (market). The rhythms of production that supported rural communities and ways of life have been eroded in the last 30 years, though the processes underlying that had taken place a century and a half before and if not even further back. The people I speak to and the places I visit bare this change, the quantitative statistics of agricultural change are brought to life in the field as this is where they are lived and experienced.

What Primary Data Was Collected from the Fieldwork?

My fieldwork took place over a 18 month period from my attendance at the BP2015 Potato Conference in November 2015 to my last interview conducted with retailer practitioners in April 2017. By the end of the fieldwork I had assembled the following primary data:

- Detailed notes recorded immediately after the seven walking interviews;
- Transcribed tape recordings of the seven office-based interviews;
- Contemporaneous notes taken during the five telephone interviews;
- Photographs taken during two of the farm visits; and,
- Observations and reflections recorded in my research diary.

3.2.2 Secondary Data

Further to the primary data gathered from my fieldwork, I used a wide array of documentary evidence (Mogalakwe 2006) to supplement and give weight to my research. These secondary data included the formal scholarly literature which I identified from database searches and which is described in detail in the Literature Review.

I also used grey literature, referring to research that is either unpublished or has been published in non-commercial form.

I made extensive use of WRAP's (Waste and Resources Action Programme) technical and policy documents. These provided empirical data on potato production and waste that were used throughout the empirical chapters. WRAP documents paid particular attention and emphasis to

policy developments, these were read and analysed in terms of how waste is to be managed and what key stakeholders were considered important.

I consulted industry documents from associations and farming unions such as the Potato Processors' Association (PPA), North-Western European Potato Growers (NWEPG) and the National Farming Union (Horticulture and Potatoes) (NFU). These industry documents outlined key trends, future prospects and industry-related news and were used to find articles that discussed waste. How industry documents talked about and framed waste was of significant interest, whether from guidance on water usage to new machinery; reading them I began to understand and trace how waste from potato production and manufacturing changed over time – particularly references to new technologies which would improve efficiency and productivity.

Alongside industry documents, I also used advertising and marketing literature to understand how the uses of potato waste and by-products had changed over time in the UK potato industry. This was particularly useful when examining new product development and how changes in production and technological innovation led to new products being formed and how new markets for consumption needed to be created.

Further to the industry documents and advertising literature I accessed, I searched for articles in periodicals such as the *Potato Review*, which is an UK-based publication with monthly editions going back to 1991. Articles that referenced or discussed issues related to waste, resource use and sustainability were examined; these documents also included advertisements selling machinery and equipment aimed at reducing waste. These periodicals are not yet digitised, so I ordered a total of thirtysix back editions from the publishers. This was to broaden the range of my data and provide a background on the developments of waste in the UK potato industry. Other farming periodicals such as the *Farmers Guardian* were used to find potato-related news and developments.

Furthermore, evidence was used from the UK government and Parliamentary debates around potatoes from the 1930s onwards. I searched for these on the online Hansard database using keyword searches such as 'potato', 'waste' and 'efficiency'. These searches brought up a number of debates and discussions in Parliament regarding potatoes that were used in the empirical chapters. I also used the Eurostat data on potatoes to analyse key trends in the changes of potato production over time.

During my research I was fortunate enough to be sent various artefacts, stories, passages from popular culture both by participants I had interviewed, and by colleagues, family and friends. These ranged from Douglas Adams' novels, potato poetry, Eastern European folklore to a Mr Potato Head toy from the 1960's which adorned my desk throughout my research; these were all part of the lived research experience I refer to in the following section.

3.3. Analysis, Synthesis and Representation

The third and final section of this chapter serves these functions: explaining my use of key methodological terms; describing the analytic techniques employed; describing my approach to synthesising data and information to produce a narrative; and, discussing representation.

3.3.1. Overview

To start with, I make a simple observation: most social science research outputs are formed using text. To use an industrial metaphor: all research inputs usually and ultimately get homogenised as output in the form of text. And, by "all research inputs", I refer not just to primary and secondary data, concepts, frameworks and so on, but also the lived research experience that includes tramping a potato field or being sent "Mr Potato Head" through the post. It all ends up as text. I'm still a little uneasy with this. The Literature Review contains a section, '*Geographical Representations of Waste*', and given the power of the academic discipline of geography to generate visual representations – notably maps – there are good reasons for escaping the 'iron-cage' of text. Methodologically, I have chosen to *represent* the output of my research on potato waste – this thesis – through the medium of text, although wherever possible I have 'broken up the text' with visual imagery. But, in the final analysis, this thesis is mostly composed of text and I need to record and explain the methods I used in producing that text.

The Research Strategy serves as a useful guide to *how* I produced the text of the four empirical chapters and the Conclusion:

1. Perform fieldwork and associated data processing.
2. Write a dedicated account for each of the four morphological units: growers, manufacturers, retailers and overseers.
3. Subject each account to a reflexive review within a political economy frame.
4. Further, subject each account to a critical interpretation within a posthumanist frame.

5. Integrate the understandings derived from the above reviews and interpretations to generate a definitive response to the aims.

To use another industrial metaphor akin to homogenisation: blending. I'm thinking of the kind of blending that leaves discernible something of the original inputs, unlike homogenisation. I'm also thinking of blending as synthesis: the bringing together of a variety of ingredients. The second and fifth steps of the Research Strategy are exercises in blending – blending the inputs of the other three steps. These inputs were produced by analytic methods. So, the main task in this section is to describe both the processes of blending (synthesising) and the analytic processes by which the input contents were made available.

3.3.2. Glossary of Methodological Terms

I flagged the need for a glossary in the first section of this chapter. I gloss four terms. Two terms, 'account' and 'critical interpretation', feature in the Research Aims. The remaining two terms, 'reflexive review' and 'understanding', are key processes in linking the four empirical chapters to the Conclusion.

Account

Four chapters are to be produced using a discursive technique in which the text of the narrative is constructed from information gleaned from all the available data sources and linked by a style of writing that is variably observational, descriptive, factual and reflective. I have called the main contents of each chapter an 'account'. I have used the term 'account' rather than 'narrative' because the former includes latter and additionally connotes a greater degree of reporting, detailing, chronicling and explaining. By and large, these accounts were informed and guided by political economy ideas and constructs. The accounts 'go with the grain' of political economy.

Critical Interpretation

In keeping with the posthumanist perspective, the research has been influenced by critical theory as articulated by the Frankfurt School, notably Erich Fromm, and more recent links to the Marxist tradition, for example, Jurgen Habermas and Mark Fisher. Weber's 'Interpretive Sociology' can be thought of as finding a way of understanding both the stated and unstated rationality of social

actors. So, by ‘critical interpretation’ I mean the application of an analytic approach to the understanding of text that derives from Marx and Weber.

Reflexive Review

I use ‘reflexive’ in the familiar way of ‘bending back’. This method arose in the context of dealing with the conclusions of the four empirical chapters. There was a need to summarise the contents of the empirical chapters from a political economy perspective and I wanted to use a more active form of reviewing the narrative than just ‘cherry picking’. Pierre Bourdieu recognised the intrinsic biases of the social scientist and argued that reflexivity was a means of at least recognising those biases. So, for me, reflexive review is the approach I used to summarising the empirical chapters with a view to actively engaging with the accounts and reducing the degree of subjectivity.

Understanding

This is *verstehen* in the classic Weberian sense. I also refer to the final ‘take-aways’ of the empirical chapters as ‘understandings’. At this point, for further clarification, it’s worth linking back to Alfred Schutz (1964:264):

“*Verstehen* is, thus, primarily not a method used by the social scientist, but the particular experiential form in which common-sense thinking takes cognizance of the social cultural world. It has nothing to do with introspection, it is the result of processes of learning or acculturation in the same way as the common-sense experience of the so-called natural world. *Verstehen* is, moreover, by no means a private affair of the observer which cannot be controlled by the experiences of other observers. It is controllable at least to the same extent to which the private sensory perceptions of an individual are controllable by any other individual under certain conditions.”

Schutz’s remarks on *verstehen* provide not only direct insight into its core nature but also indirectly how it connects with the putative problem of subjectivity.

3.3.3. Analytic Techniques

I have presented two frameworks; one being conceptual (in the Literature Review), and the other methodological (current). These frameworks provide compact and structured presentations of key notions that underpin the thinking (what?) and doing (how?) of the research. In effect, the two

frameworks ‘double up’ as an analytic framework used to assist ‘*verstehen*’ in the most general way. The task in this subsection is to describe the analytic methods used in conjunction with the frameworks at the first, third and fourth stages of the research strategy. (The second and fifth stages are considered in the subsection, ‘*On Synthesis*’.)

The first strategy stage lists “associated data processing”, this naturally included data analysis now described.

Once the fieldwork had been completed, the first tasks in relation to the analysis of primary data were to transcribe the recorded interviews and digitise my fieldwork notes. This was time consuming but essential: these very practical tasks required me to immerse myself in what the interviewees had actually told me. I familiarised myself with the data by reading and re-reading the interview material: familiarisation, as Ritchie and Spencer (2002) have pointed out, allows the researcher to gain an appreciation of the richness, depth and diversity of the data.

I then began breaking down the texts and making notes, identifying where interviewees discussed the particular topic areas outlined in the interview schedule; there were naturally variations in the depth and detail of the responses. The output from this exercise was a set of annotated interviews that provided a range of comments and opinions on the topic areas.

My research diary contained the observations I had made and this too was digitised and used to add an additional perspective to on the views and opinions of the fieldwork participants.

In terms of the secondary data, the inputs from academic literature were accessed, read and re-read; references were followed up, and papers annotated. The material from this scholarly literature and from the grey literature including industry documents and government policy documents was then selected to provide both context and insight into the topic areas of the research.

As far as strategy stages three and four are concerned, my core analytic tools were reflexive review and critical interpretation described previously. Seeing as the purpose of applying these analytic tools to extract meaning from the narratives that I have termed ‘accounts’, essentially, I was performing ‘narrative analysis’ (Riessman 1993). The themes that required distillation in order to produce a contribution to the sociology of waste were already present to a degree in the conceptual framework. The idea behind my use of narrative analysis was to understand afresh the conceptual and factual substance of the accounts using the ANT methodological framework. Out of these fresh

understandings, I hoped that new sociological knowledge might be gleaned. In one way, the narrative analysis of the accounts was like a researcher coming to an established dataset and subjecting it to new analysis derived from a novel conceptual framework. So, to summarise, the analytic methods of reflective revision and critical interpretation were used as tools to unpick meanings and distil understandings.

3.3.4. On Synthesis

Most experienced researchers I have met recall the challenge which I'm about to describe. After some years of blood, sweat and tears, the researcher ends up with mounds of papers, books and data. How is it all converted into a form that responds to the original questions and aims? Previous experiences as a student, even at Masters level, don't really prepare me as a doctoral student for the enormity of the task of producing a purposeful narrative out of those mounds.

Step 2 of the Research Strategy is: "Write a dedicated account for each of the four morphological units: growers, manufacturers, retailers and overseers."

I have described what I mean by an 'account' and the means by which I analysed the data from the fieldwork and other sources. From the outset, the research has included and been influenced by my own 'potato experiences'. The 'personal ontology' I brought to my research was transformed methodologically into a form of autoethnography (Adams et al 2015). When it came to writing the four accounts, I found the only way I could produce an accurate and coherent narrative that captured the reality of both what I had witnessed directly and had uncovered at my desk was to use the flow of those personal experiences as a medium in which I could embed the facts. So, the synthesis in respect of the accounts took the form of using the research data and information inputs with reference to my conceptual framework distributed in an autoethnographic narrative medium.

Step 5 of the Research Strategy states: "Integrate the understandings derived from the above reviews and interpretations to generate a definitive response to the aims."

Compared to the task of synthesising the four empirical chapters, integrating the understandings, or distillations, produced at the end of those chapters was relatively straightforward. The distillations provided a palette from which I could select, prioritise and organise my thoughts in relation to the aims and research questions. All there remained to do was write my conclusions.

3.3.5. A Note on Representation

In the overview to this section, I outlined my views about representation and the roles of text and visual imagery. Given that the research findings, as recorded in the final chapter, are communicated through the medium of text then on the face of it there seems to be nothing further to say on the matter of representation. Except...there is text as pure text (if that's possible!) and there's text that's infused with other qualities. For instance, the words of Kavanagh's poem, which follows in the next chapter, are unambiguously text but, somehow, the poet transcends semantics to open up all the sensory and emotional experiences of the potato field for the reader/listener.

A further quote from Cavalcante et al (2007:4) helps:

“The genesis of mapping has always been linked to human concerns with knowing the world it inhabits. Etymologically, cartography means description of letters, but this initial conception entailed the idea of mapping. Studies with cartographic inspiration argue that the researchers should not adopt a position of methodological rigor, but rather maintain a margin of flexibility and provisionality in relation to the objectives and goals of their research. Since this will not compromise their methodological rigor, the cartographic researchers need to incorporate a disinterested look, without focusing on one point, but attentive to everything that is becoming present in the problem context. Mapping does not mean that there are no guidelines, but rather that the way of the research process takes precedence over the goals and objectives of the study.”

There are two important points that stem from the quote. First, there is the link between mapping/cartography and letters/text. For me, this observation underscores my comments above about the possibility of text being infused by visual imagery, in this case, the visual imagery of the geographical imagination. That is, whilst I did not use the “geographical representations of waste” overtly in representing, for example, my conclusions, I often had geographical imagery in mind in forming my words. Second, I see my own research experiences represented in the final sentence of the quote, “the way of the research process takes precedence over the goals and objectives of the study.” I end this chapter on Methodology with this thought that if the processes/methods of mapping potato waste are sound then the goals and objectives will take care of themselves.

4. GROWERS

4.1. Introduction

The barrels of blue potato-spray
Stood on a headland in July
Beside an orchard wall where roses
Were young girls hanging from the sky.

The flocks of green potato stalks
Were blossom spread for sudden flight,
The Kerr's Pinks in frilled blue
The Arran Banners wearing white.

And over that potato-field
A lazy veil of woven sun,
Dandelions growing on headlands, showing
Their unloved hearts to everyone.

And I was there with the knapsack sprayer
On the Barrel's edge poised. A wasp was floating
Dead on a sunken briar leaf
Over a copper-poisoned ocean.

The axle-roll of a rut-locked cart
Broke the burnt stick of noon in two
An old man came through a cornfield
Remembering his youth and some Ruth he knew.

He turned my way. 'God further the work.'
He echoed an ancient farming prayer.
I thanked him. He eyed the potato drills.
He said: 'You are bound to have good ones there.'

We talked and our talk was a theme of kings,
A theme for strings. He hunkered down
In the shade of the orchard wall. O roses
The old man dies in the young girl's frown.

And poet lost to potato-fields,
Remembering the lime and copper smell
Of the spraying barrels he is not lost
Or till blossomed stalks cannot weave a spell.

– Patrick Kavanagh, *Spraying the Potatoes* (1972)

The first of my empirical chapters draws on my fieldwork and interviews with potato growers in the UK. I visited three farms across the north of England and southern Scotland with different operations and characteristics ranging from size, ownership structure and the importance of potatoes *vis-à-vis* other commodities and crops on the farm. What we might refer to as farms, are now also called 'sites'. Their purpose extends from the original aims of growing food into more complex and diversified operations of energy production, spaces of 'natural' environmental protection and subsidised holdings of financial investments. Farms become sites of multiple productions and linkages to all sectors of global capitalist economy.

I outline the general trends that have influenced and shaped how the role of potato growers has changed over the last thirty years before going into more detail on each site, exploring how the role of the grower has changed over time, and the consequences and effects these changes have had on potato waste and surplus.

4.2. Major Changes in UK Potato Growers

I will begin this chapter on potato growers by first outlining some of the broad general trends and changes that have affected growers over the last three decades.

Like many, if not all, agricultural industries in the UK, producers and growers of food have changed considerably in recent decades. The potato industry reflects wider political economic changes in increased financialisation, concentration and professionalisation (Harvey et al 2003). In 1960 there were 70,000 potato growers in the UK. In 1980 there were 35,000 potato growers and 3,000 in 2015. The numbers are expected to continue to decline in the future. Despite such decreases in grower numbers, yields have nearly doubled to over 50 tonnes a hectare (roughly 2.5 acres, slightly bigger than a football pitch) on average. The UK still produces the same number of potatoes as in 1980: six million tonnes, despite 2015 having the lowest ever planted area of 120,000 hectares (AHDB 2016).

These changes over concentration raise pertinent questions about sustainable food systems: if you can grow the same amount (or potentially more) on less land, using more intensive forms of production, what are the consequences of these changes on issues of biodiversity, resource conservation and food quality? On one hand we have the critics of an ever increasing industrialised food system and on the other those who argue that without these developments, we would not produce enough quality food. The issue of food waste interweaves itself amongst these debates,

asking the question: why do we need to produce more food if we are aren't eating nearly half of it? The question of when waste becomes waste – and not loss – is something that is discussed later in the Conclusion as a result of my research findings in these empirical chapters and forms a central question for my thesis.

In the UK these debates are very different compared with those in many other countries, particularly in relation to potatoes. After the Corn Laws, the UK's national food production strategy changed, signalling a shift from agricultural production to industrial production: from sourcing food locally and nationally to sourcing food from across the British Empire – the import of tropical goods and the export of manufactured goods. Indeed, this cycle of production and consumption, rooted in slavery, trade and industrialisation was central to the rise and supremacy of the British Empire in the nineteenth and early twentieth centuries (Mintz 1985). To what extent the contemporary situation in the UK surrounding food sovereignty, security, production and consumption stems from these historical events and decisions is one that is still of academic and scholarly debate – transitioning from agricultural to industrial to post-industrial and digital societies, where does food fit in? Despite the growing diversity of food diets, changing consumer tastes, cooking techniques, shopping practices and technological innovation, potatoes have remained a staple and are still the most consumed staple food in British diets, meaning growers still have a market and demand to supply, though they themselves have changed, multiplied and differentiated.

As the map on the next page shows (Figure 5), the majority of commercial potato growing takes place in the east of the British Isles: from Suffolk to the East Riding of Yorkshire and up to Perthshire and Angus in Scotland. Unfortunately, there is no similar map available for Northern Ireland as it is run by a different agency, so this map is only of potato growers in the British Isles. Potatoes are grown all over the country, in people's backyards, in allotments and in fields of one to a hundred hectares.

Beyond quantitative changes in the number, location and size of potato growers and their farms in the UK, there are some significant changes as briefly mentioned earlier, the first being financialisation. Farms over the decades are increasingly more and more expensive to own, run and maintain. They require large amounts of capital investment, from purchasing land which has significantly risen in price (rural land in the UK is often seen as a secure investment), to paying for expensive farm machinery and inputs such as fertilisers, molluscides and pesticides. This in itself has reduced the number of growers – families who have farmed land over generations have sold up. This has meant that those who are still farming and own their own properties and land often have to

leverage their assets in order to maintain cash flow and keep their business going and food on the table.

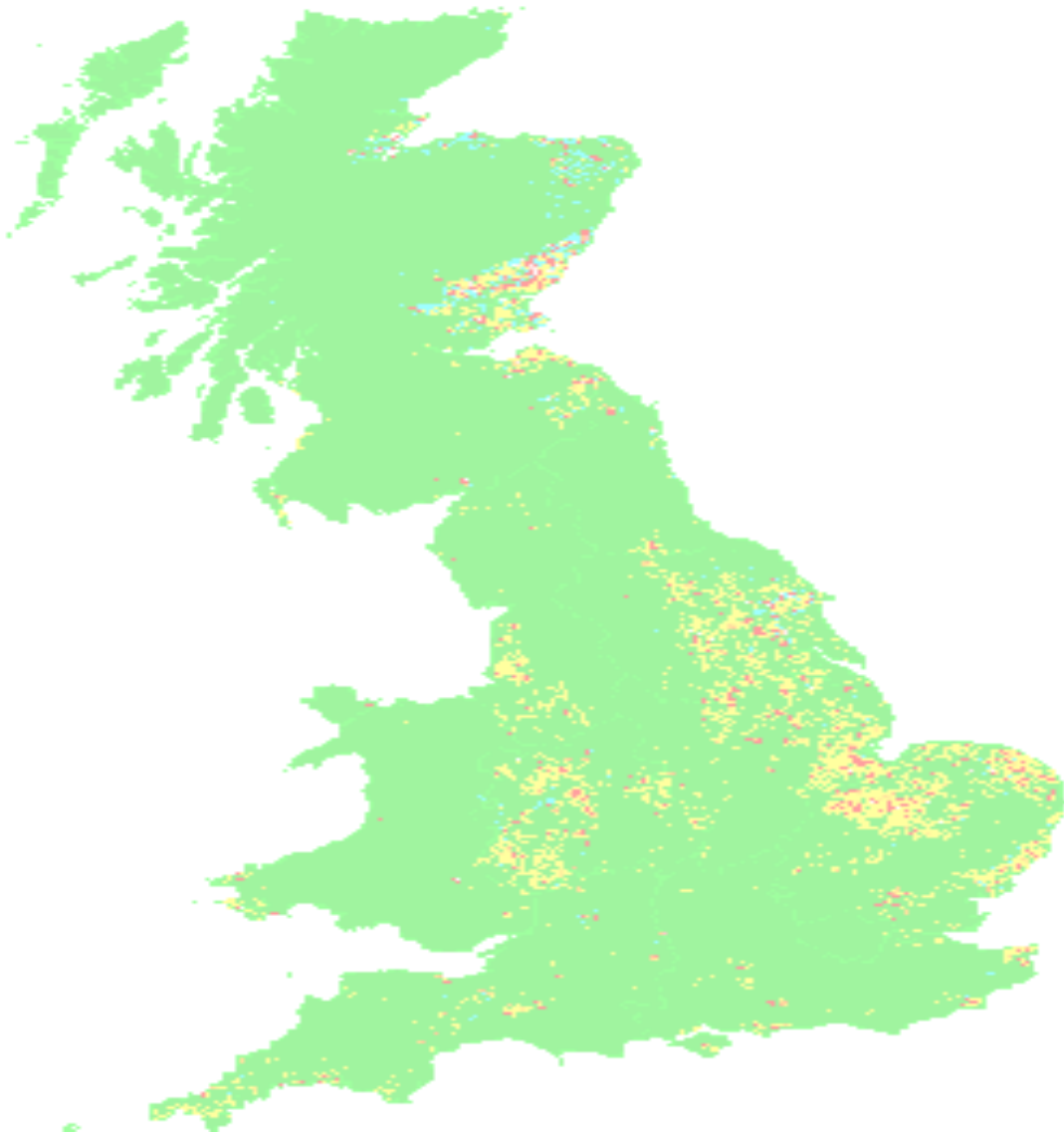


Figure 5: *Locations of Commercial Potato Growers in Great Britain*
(AHDB 2016)

Many growers of potatoes will no longer own the land they farm as freehold, but as leased land which is owned by landed aristocracy, international investors or multinational corporations (Christophers 2016).

Alongside the national changes in financialisation of UK agriculture, this period in time saw the growing involvement with the Common Agricultural Policy (CAP) that has subsidised European farmers to continue growing food or leave land to lie fallow. The vast majority of CAP funding has gone to large landowners (European Commission 2013), who need to meet certain requirements in order to gain grants. These Environmental Stewardship Schemes range in their complexity depending on the size and purpose of the farm. The schemes often, however, require a level of

expertise in order to successfully apply for and receive grants that gives rise to another phenomenon briefly mentioned – professionalisation.

Potatoes may be regarded as the common spud, the inglorious vegetable, something that anyone and everyone can grow, but in recent decades, growers have professionalised: by this I mean, as other researchers who examine the stories and careers of food in the supply chain have found (Harvey et al 2003), that rather than simply growing food as you want in order to supply local wholesalers or potato merchants, you are linked into a global network of production and consumption that revolves around finance, complex contracts, business plans, regulations and financial governance. Growing food to supply large markets has always required a level of expertise – this expertise could be described as tacit knowledge, knowledge learnt over time, passed down through generations; knowledge of the land, of plants, animals and seasons. Now it's much more 'expert' knowledge, where managers manage.

Within this story the role of contractual obligations is incredibly important. Much has been written and discussed on the increasing role of retailers in mediating the production and consumption of food (Winter 2005; Horlings and Marsden 2011). Indeed, in an example examined in this thesis, one retailer went all the way back along the supply chain to grow their own potatoes to supply their own stores. This, however, is generally the exception. For many retailers, this is a risky strategy and it is easier to let growers do the growing and retailers do the retailing. This has given rise to two distinct markets 'free-buy' and 'contracts'. With increasing retailer power across agri-food supply chains, particularly at the point-of-sale, this has enabled them to often set the price and in volatile markets such as food production, this can be tempting for growers, but it comes at a cost. There is an uneven power relationship which has affected the financial viability of many potato growers.

Within the last thirty years of potato growing, the scale of the technological, economic, social and political transformations in these times is worthy of significant research and attention. Examined and explored within the context of a sociology of excess or a society of abundance, these examples aim to investigate and understand some of these issues.

4.3. Fieldwork at Potato Farms

The three fieldwork sites for my empirical chapter on growers are from different parts of the UK. These three farms were visited as a result of the contacts I made at the ADHB and as described in my chapter on Methodology. These three farms were visited as a result of the contacts I made at the

ADHB and as described in my chapter on Methodology. The first location I visited was a mixed-use farm in the East Riding of Yorkshire. The second was a potato farm and packing house in the southern lowlands of Scotland. The third was in the hills of North Yorkshire, on a mixed-use farm that was owned freehold by a single farmer. These three sites were different in their ownership structure, size and purpose. Visiting and interviewing growers from different farms enabled me to gain different understandings of how the market and organisational structure for potatoes has changed over time, focussing in particular on waste, loss and surplus.

4.4. Goole

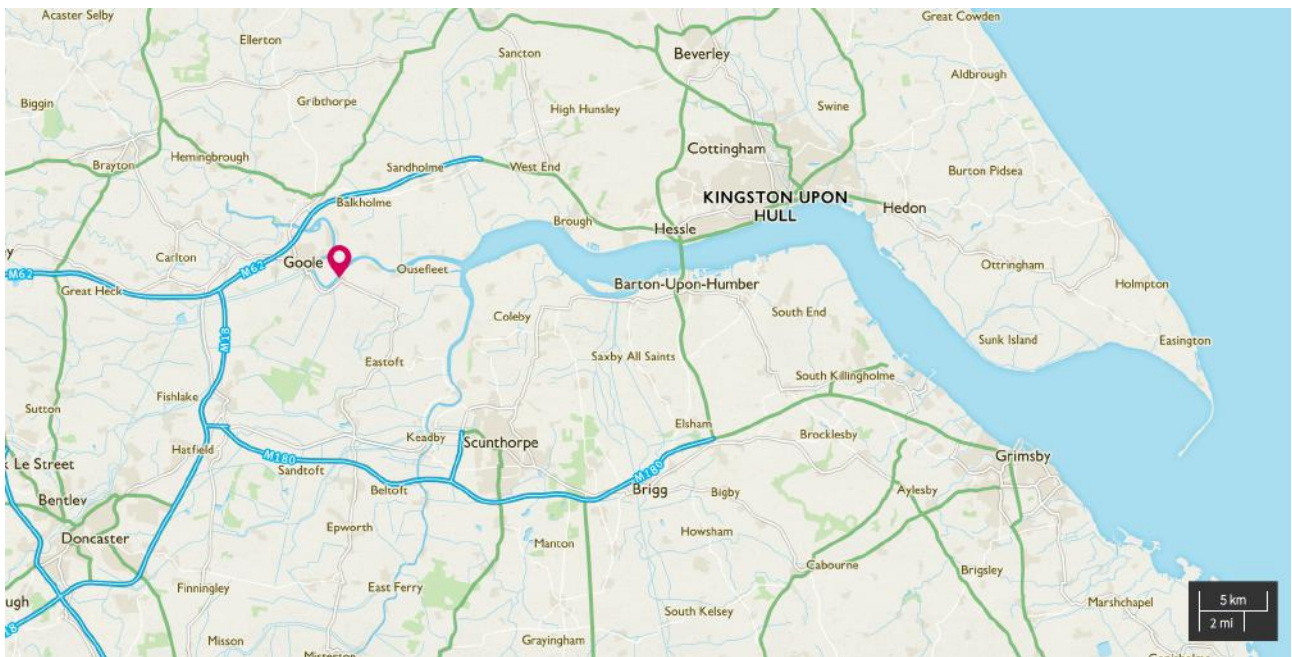


Figure 6: *Map of Goole*

The first of my fieldwork visits took me to the East Riding of Yorkshire, close to the border with Lincolnshire. A small village called Swinefleet was the nearest site of human habitation amongst the endless fields and tributaries leading off the River Ouse, most of which are man-made irrigation channels for farming. Coming from the west, my geographical and topographical experience is rooted in hills and undulations. I had never crossed to the east, a totally alien landscape. Big skies, flat ground. Perfect for farming. These areas of the country have always been desirable for large scale farming because of the soil, the water table, the drier weather and the accessibility to Europe and Scandinavia.

One of the main reasons why large scale farming has become so successful in this part of the country over the centuries is the soil. Geological changes over time have resulted in this area having

sandy soil that is quite loose, meaning that crops can be harvested and cultivated with less effort, which meant less work for humans and animals in the past and less chance today of your machinery breaking down. Even so, there is always variation within a small area. Whilst some parts of the farm soil may be light, dry and sandy, others will be cloggy and wet. Which crops to plant in which sections of the farm is a decision made carefully, based on previous experience, future predictions and seasonal variations. The role of the grower in this decision making process has, over time, narrowed.



Figure 7: *Ridging the Soil*

As I talk about the general changes over time of what it's like to farm potatoes, Farmer A (I am using pseudonyms in this chapter for confidentiality) tells me:

“I've only been in this position for a few years. I graduated from agricultural college down the road and just started on the farm. Now I'm the farm manager but it's not as exciting as it sounds. I get to make quite a few decisions alongside the agronomist but I don't get the independence I want. It's not my farm, I manage it.”

The area I visited is known as 'Goole fields' and as can be seen from the map on the next page (Figure 8), the topography and geography have been shaped and formed to provide food. The small

lines of blue you see are irrigation channels for the crops, draining and moving water in a place which is below sea level. These areas have been managed to produce large quantities of food over hundreds of years. The yields today would be unimaginable even half a century ago, having doubled with up to 70 tonnes an acre for potatoes.

The ownership structures of farms have changed significantly over the last thirty years. It is rare these days to find a farmer who owns the land, owns the machinery, owns the outbuildings, owns the farmhouse (the example of Harrogate is a case of this however that will be discussed later). This ownership is known as freehold. As the core commodities – land, labour, capital – have increased significantly over the last thirty years, cash flow and liquidity is a problem, independent farms struggle to survive as is well documented and investigated. Owning land is still the biggest barrier to market entry, or put in another way, land has yet to be democratised. The autonomy and independence on this farm then, was slight. Working within a complex organisation, with international operations:

“Can feel a bit powerless. I work with the agronomist who is great, really knows his stuff, advises me and we work together. But there’s still this feeling, that I’m not shaping or farming the way I want, there are procedures, protocols, research and development strategies that are in the pipeline for ages.”



Figure 8: *Goole Fields*

The farm that Farmer A manages is 1000 hectares. That’s just under 2500 acres. Of that, around 200 hectares are reserved for potato growing, whilst the other fields are used for a variety of grains, brassicas or what are known as ‘speculative crops’ – areas of land that are sometimes reserved for farmers to grow certain crops which are either in high demand or low supply. In recent years the most popular and common crop for such speculation has been rapeseed. Some crops are rotated in line with the Three Crop Rule but fields, used for growing potatoes since the Second World War when demand for homegrown produce increased, are still used to this day, increasing the likelihood of pests and disease such as nematodes and scab.

I found it hard to comprehend such a scale and how you begin to manage it. In the room of the main site building where we sat was a plan of the farm, field systems bounded and mapped, different colours representing different crops. Each field labelled with extensive information – acidity

levels, pesticide use, herbicide use, time charts for the coming season. The sophistication and planning of these production systems are examined and practised to the finest detail so when we come to discuss waste, it matters.

In starting this research much of my interest was on explaining parts of the supply chain that hadn't received so much focus in the food waste literature. With half of food waste being generated in homes, studies argue that if we can find social phenomena that have the largest causal effect then that is where intervention and practical steps can be taken to remedy or 'tackle' the problem of food waste and sustainability. Therefore if we can identify where X = food waste then we can stop it. This positivist approach to food and the environment has come under much criticism in the food waste literature (O'Brien 2013; Gille 2013). This line of thinking is also apparent in the interviews with the grower at Goole.

"If you look at the reports that have been done, 3% of food waste occurs at the farm level."

"But what about losses?"

"But that's a different thing?"

"Is it?"

"Yes, loss is loss and waste is waste."

Loss is loss and waste is waste. When asked about what farmers can do to prevent food waste: "Nothing more than we trying to change already: water use, pesticide use, better crop development through genomics, better storage techniques, resistant and hardy strains, less varieties." Food waste was considered primarily a consumption problem – those lazy and ignorant townies (people from urban areas) who don't know or appreciate the first thing about food so have no problem with wasting it. On the production side, efficiency can always be improved, profitability should always be maximised and the mantra of 'less waste equals more money' rang true.

The cold-chain is a term used to describe the process by which food supply chains have used techniques of refrigeration to preserve food either across distances to maintain it's 'freshness' (Freidberg 2009), or in temperature and atmospherically controlled storage warehouses.

As this farm was a large operation, supplying retailers across the country, there were three storage facilities on site.

Potatoes have different growing seasons depending on the variety. There are 'earlies' which are planted early in the year around January and February and are usually planted in western areas such as Pembrokeshire in Wales and southern areas like Cornwall and Jersey. These are harvested in the spring or early summer and growers can command higher prices for these 'new potatoes'. New potatoes are much more perishable than main crop varieties: their skins are flimsy, and with a higher water content they're more prone to disease and rot. You can't sell new potatoes as new potatoes if they have been kept in storage. In the early 1990s, the Potato Council and the government introduced stricter regulations after people were found to be selling new potatoes that weren't new but 'old'. Today it is nearly impossible to mis-sell; from seed to shelf, potatoes have barcodes which track their life history, their origins, their growers. In advanced economies of agri-food production, potatoes have an identity and informational history, a bio-history (Nally 2011). Their lives are documented more than those of most human beings around the world. The other varieties known as 'maincrop' are the dominant variety and are harvested in between late summer and early winter after planting in the spring. These ones are kept in storage and subject to a variety of controls which themselves are tightly regulated in order for potatoes to remain as fresh as possible, cool and humid air is distributed across the warehouse.

The modern forms of storage are still undergoing technological transformation and advancement. When I went to visit the Agriculture and Horticulture Development Board's potato conference in 2015, whole areas of the conference were dedicated to tweaking and improving the techniques for storage, with manufacturers from across Europe representing their new technologies. Men in suits stood beside potato crates which improved air flow as televisions flickered with flashing images promising better quality and better profits. The effects of refrigeration and 'freshness' on the political economy of food have been discussed not only in food waste literature but across production and consumption scholarship. It's not enough to just analyse and discuss the changes in the production side alone but to go through how the production of potatoes has been influenced (and in turn influences) the consumption of potatoes.

The predominant way of consuming potatoes before refrigeration in the UK was to buy sacks of potatoes that weighed 25 kilograms and keep them in a cool and dry place in the home such as the larder or underneath the stairs. Going further back in history, the most common way of storing potatoes, particularly in Ireland, was to dig a big hole in the ground, pile the season's crop in and

cover it back over with soil (Salaman 1985). We've come a long way. The most common way of buying potatoes today is in 2.5 kilo plastic bags which are meant to be stored in the fridge or in as cool, dark and dry a place as possible.

In their study on potato waste in the UK, WRAP (2012) found that potatoes were the most wasted fruit and vegetable in part due to their greening or sprouting. The plastic bags in which potatoes are sold in do not help; as potatoes 'breathe', they release oxygen into the bags which in turn accelerates the process of greening and sprouting. Part of the 'Love Food, Hate Waste' campaign has been to encourage the use of potato bags which completely block out light from touching the potatoes. Food safety is primarily the concern here. The links between food waste and food safety run deep and far. Food safety and food waste are interlinked. In an economy and society of excess there is also greater food safety. As the farmer at Goole said: "we have short memories." We don't have to look far back in the history of the UK to find this and can look to other parts of the world to see this happening still. One such case from the UK was in 1978 when a group of schoolchildren were hospitalised with solanine poisoning (McMillan & Thompson 1979) after a bag of potatoes left over from the previous school term was used in the cooking: Food safety, abundance and waste.

Trying to integrate farms as much as possible across the whole supply chain has been part of the consolidation and concentration of the industry over the last thirty years. The greater the horizontal integration, from seed to shelf, the greater control can be exercised over the production and distribution processes – cutting waste, reducing inefficiencies, controlling supply and keeping things 'in-house' as much as possible. This is a double-edged sword however, as retailers are keen to reduce their own risk by passing it onto the grower. Who can you trust? This is part of the concentration of production story. Farms that depend solely on supplying the market find themselves at risk of varying prices and supply; those farms that have survived through the wave of concentration over the last thirty years have found it essential to develop their own storage facilities. At the site in Goole, three large storage warehouses were set off the main site area. The farm is so big you have to drive everywhere; we jumped in the brand new 4x4 pick-up truck, scooted down the B road and turned off to the area in which the storage facilities were built.



Figure 9: *Storing the Potatoes*

During the height of summer, each warehouse costs £1000 a day to keep running. Most of these costs are for the air conditioning. The costs of production have been one of the ways in which the industry has concentrated and provided barriers to production for those who do not have the capital to invest in such projects, “there’s no way you could afford these things on your own...impossible... you need big money” the farmer said as we walked across the yard. As we enter the storage warehouse, the cold draught blasts through the door, the pitch black darkness is punctuated by lights flickering as they turn on. Rising high above us, stacked some 25 metres high, were tonnes and tonnes of potatoes, as perfect as when they were dug up six months ago. To the side of the wooden boxes, scaffolding rises up to the top of the warehouse where a sea of potatoes stretches as far as the eye can see. In typically British fashion, the ladders leading up to the top were attached with cable ties, “we put these in because of health and safety” they said with a wink.

It took a few years for the effects of the global financial crisis in 2007/08 to reach the potato farmers of northern England, but it did eventually come. The agricultural and food retail industries had managed to avoid significant losses whilst other industries and small businesses failed. However, combined in 2012 with the worst harvest in living memory and wider effects on retailing market, the consequences on potato production and the management and operations of the farm were significant. The retailer involved with the farm at Goole had played an important role in establishing the farm as a central cog in the production and consumption of potatoes. Farmers and management had worked together over decades to bring together a comprehensive and ‘farm-to-fork’ approach to potatoes. All of the assets, knowledge and expertise were contained within the retailer’s supply chain. With retailers diversifying their businesses over the last two decades, expanding into areas like banking, insurance and telecommunications, the focus of the retailer on key, but less profitable areas like food, waned. When the retailer in question was discovered to have significant cashflow problems from their banking arms, the first things to go were the assets.

On my visit to the farm in 2016, things were in a state of flux. “We had the most ambitious business plan in the country, going all the way from seed to the supermarket.” This involved a highly coordinated system that tried to tie together the different production, distribution and consumption sides of growing and selling potatoes. Working with a national retailer, the idea was to develop a system that built on ‘just-in-time’ business and organisational ideas and structures (Christopher 2000). Just-in-time organisations have grown as supply chains become more flexible through increased ways of controlling supply (such as storage) and increased variations of demand from retailers and consumers. As a report by the AHDB (2016:6) discusses: “Just in time’ strategies are

now widely used by the major supermarkets to connect different parts of the supply chain and conditions for food processors are shaped by the competitive pressures generated.”

From 2012 onwards, the selling of assets and land to the highest bidder continued alongside widespread redundancies. The economy of food production for many was replaced by the economy of finance. From material production to immaterial reproduction. As Farmer A said: “Some of the people I’ve worked with have dedicated their lives to this and it all went like that [clicks fingers], gone, all that work and people just have to suck it up and move on.” Despite the changes to the structure and ownership of the farm, the day-to-day operations of running the farm continued as normal, although the entire structure of distribution and supply changed. After decades of concentration and the expansion of the retailer into every sphere of production and consumption, the last few years have shown signs that this is beginning to change, with retailers wanting to become more flexible and less tied down by long term relationships and contracts in a political economy of food that is increasingly volatile and unpredictable.

As such there appears to be a simultaneous fragmentation and concentration of the political economy of food. The society of networks and rhizomes alongside solidified structures and rigidity. By this I mean that over time the supply chains for food have become increasingly regulated and controlled through international agencies and global governance structures (see Chapter Six) which have established conventions and codes which regulate the supply of food through national deregulation. At the same time, increased complexity and divisions of responsibility and labour have made the supply of food increasingly differentiated. These parallel and interlinked phenomena in the political economy of food were more than apparent at the farm in Goole – precarity/security and re-regulation. Talk about a paradox. What I find particularly interesting about this stage of modernity in the global economy are these seemingly contradictory processes and phenomena fitting alongside each other.

Capitalism continues to be reborn. Out with the old, in with the new. Facing liquidation, the retailer sold the assets which were picked up by others who had survived the Great Potato Crash of 2012. A change of logo here, a change of uniforms there. The work done on reducing waste, improving efficiencies across the whole supply chain was scrapped. Back to the basics – plant, harvest, store, sell and make money. The last twenty years of food production have seen the issues of sustainability become more and more prominent, with waste and resource scarcity and efficiency particularly salient. To some extent I think this research is being done at a time when these issues are more important than ever, yet they are running out of steam – the ideas and practices are fading even as

we move to ‘after sustainability’ (Foster 2015). Rather than these issues of sustainable production and waste reduction being slowly implemented through incremental change which has been the general trajectory of potato production over the last thirty years, a society of risk is becoming a society of uncertainty.

As I left the farm, winding my way along the north eastern roads that reached out onto the horizon, I passed the port of Goole where a multi-million pound expansion was taking place to turn the port into something that could compete with Dutch ports. I stopped outside a shop to get a coffee and the builders who were working on the site walked across the road with their Meal Deal, throwing their empty crisp bags onto the ground where they tumbled in the wind only to hit the metal railings around the site and there they stayed, creased and skewered. I thought of the farm and the farmer, the lives and stories embedded in the quotidian potatoes, the townies and their ignorance, the waste and the consequences.

4.5. Carnoustie

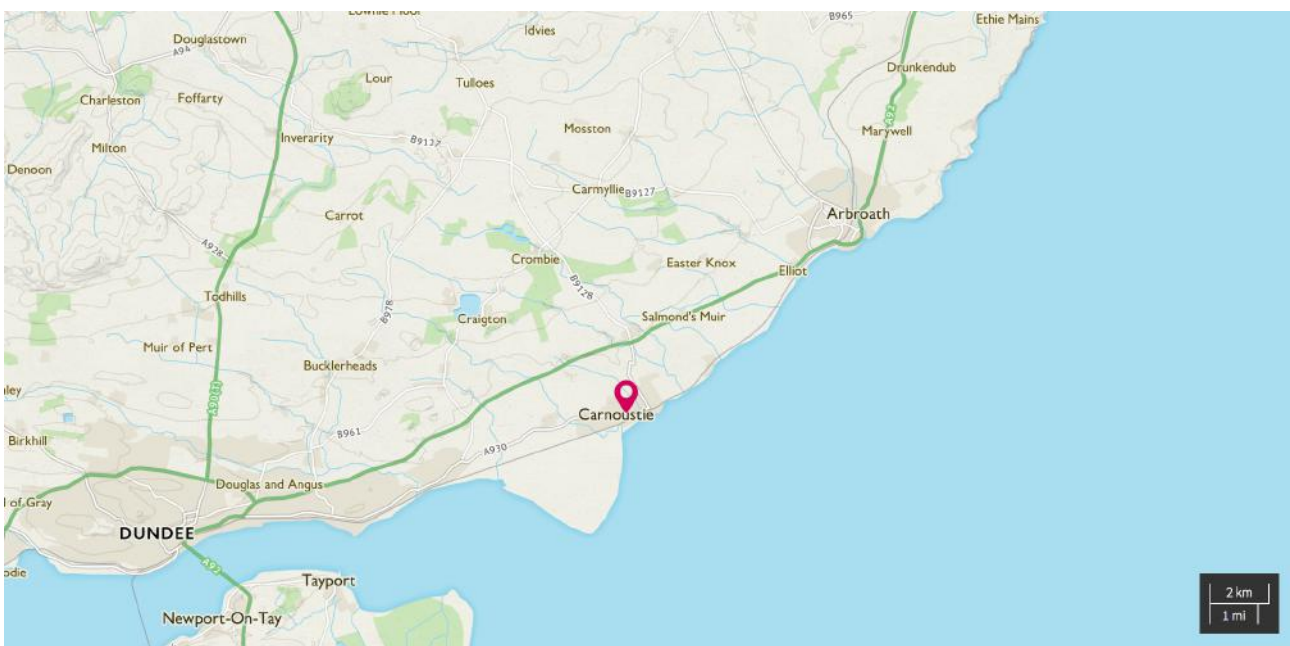


Figure 10: *Map of Carnoustie*

Other than Northern Ireland, Scotland has arguably a more important historical and contemporary connection to the potato than any other nation in the UK. Everyone is familiar with the Great Hunger and the potato famines of the Irish, but not so much those in Scotland around the same time. Over 80% of Highlanders survived on potatoes alone during the middle of the nineteenth century (Devine 1988). It wasn't just the Irish who emigrated and fled across the world because of

potato blight. A long time has passed since then and today Scotland is one of the world's leading countries in seed potatoes.

Travelling to Scotland to talk about tatties (potatoes) I found myself heading east again having always gone west. If you want to talk about self-reflexivity of the researcher, I found myself thinking about this east/west geographical divide more and more – how would my research have been different if I visited a potato farmer in West Wales or Cornwall? Would I have been different or been treated differently – would I have gleaned different information? I'm cautious about the generalisability of my visits here, knowing they are specific to time and place. Passing the decaying industrialism of Dundee, the landscape quickly turned to fertile fields as the River Tay coursed from its origins in the west of Scotland and merged into the North Sea as cold winds blew from the north.



Figure 11: *The Dividing Line (Potatoes on the Left)*

The farm site at Carnoustie was different in a number of ways to the farm at Goole. Primarily the site packed potatoes rather than growing them or processing them. That means that the primary role of the site is to buy in potatoes from growers in the regions of Angus and Perthshire and pack them themselves, selling them on to retailers, wholesalers and manufactures at a profit. As such, the attempts in this empirical section to draw clear distinctions between each stage of the supply chain become difficult. This is something I have gone back and forth over and thought about but struggled to overcome without losing the structure that is needed to set out the different stages of production and distribution and form a coherent thesis. The strength of studying the sociology of surplus and waste means that any attempts to assume a fixity of the social world is soon unravelled. In this case, the life cycle of commodities no longer follows a ‘farm-to-fork’ and if they do, they form a tiny

minority of food production and distribution. This research on potato waste focusses on areas of agri-business food production that have as yet been neglected.

Since I conducted my fieldwork at the site it has undergone significant changes such is the narrowed specialism of their business; this will be discussed at the end of this subsection, but for now I will describe and analyse how the farm stood at the point when I visited it and how the systems of organisation and production at the farm impacted upon potato waste.

As I go on my fieldwork I try to remember and keep in mind what my research is about, the main questions I have and what I'm looking and trying to get from my visits. I can find these things difficult to keep at the forefront of my mind once I get there. Indeed, upon entering the site office I was greeted by the person I had been in touch with leading up to my visit and was led to the staff kitchen and upon the table were five plates of steaming freshly boiled potatoes with taste sheets alongside them.

I was asked if I wanted to try the potatoes and fill out a questionnaire on them. "Of course!" I replied, "I love potatoes!" I might have regretted it however as I bit into the first plate of potatoes. They don't sell these ones in the shop – it was bitter, floury to the extent that each grain seemed to stick and grate between my teeth and left a long sour note on my tongue for the rest of the morning. I filled out the form which asked for my description alongside metrics ranging from 1-5 on the extent to which the potato was floury or waxy, bitter or sweet and the colour ranging from grey, white to yellow. Thankfully the other few plates I tried tasted more like the potatoes we buy from the shop – those received higher ratings all round. These completed forms then went off to the office to be collated and the results fed back to the manager.

The sheets which are filled out by dozens of people working at the site are used as part of the quality control and grading procedures for potatoes. Grading is one of the most important parts of the potato supply chain when it comes to waste, as has been discussed in relation to other foods such as parsnips and bananas (Stuart 2009). Campaigns which have attempted to reduce food waste in supply chains have often focussed on reducing the stringent controls on quality and grading; in recent years this has led retailers and campaign groups around the world to produce marketing campaigns which promote things like 'Ugly Fruit and Veg' which attempt to change consumer perceptions on quality. The Soil Association (2012) estimates that between 20-40% of produce is rejected by quality standards despite being edible for human consumption. Food waste scholar Zsuzsa Gille argues that in societies of abundance and excess in which we have *choice* then there is a

causal relation to waste – in societies of scarcity the quality of food we buy on the market will necessarily be from a wider selection of gradings, leading to less waste. The consequences of a global recession, stagnating wages and the rising cost of food are already thought to have had consequences on retailers and consumers, relaxing their quality standards on fruit and vegetables (WRAP 2014).

What may be suitable for human consumption, however, does not mean that people will find such food enjoyable. Are we still hedonists in our consumer culture, especially when it comes to food? Good food, good drink, good times. Even the market stall owners of eighteenth century Paris used to shine their apples whilst Marie Antoinette told the poor to eat cake. The potatoes are fit for human consumption, but no one would buy them and if they did, upon returning back home from the shop to cook up their dinner, they wouldn't buy them again. The abundance of choice, the market in action. The lines of potatoes we see under the lights of supermarket aisles are the select, the few chosen ones. What happens to the rejects, the 'outcasts of modernity' (Bauman 2003)? "We have various stages in the production process where potatoes that do not make the grade are sorted into these buckets" an employee at the farm tells me as they guide me round the packing centre. "And what happens to these?" I ask, "Oh they get sold on" they reply. I have found this response often to my questions on what happens to the rejected surpluses that do not meet the requirements. There are two common responses: pet food and, increasingly, bio-fuel. There is a third one – ploughing back into fields, which used to be more common than it is now. Indeed, as O'Brien (2008) argues in his book *A Crisis of Waste?*, despite the quantitative volume of waste increasing with the growth in population, capitalism in the industrial and post-industrial age creates ever expanding markets and new technologies in which the extraction of utility never ceases. More on this later. Later on as my research and fieldwork progressed into different areas of the potato supply chain I would come to discover more about the different markets and routes of potatoes beyond pet food and bio-fuel, as will be discussed later in Chapter Five on manufacturers, specifically how the rise of different markets and globalisation of economies has affected potato supply chains and waste.

Like other fruits, vegetables and food, grading takes the form of class, ranging from 1-3. At the packing house in Carnoustie there were labels from every retailer and wholesaler, from high-end to low-end. All potatoes come from the same places, the differentiation of marketing and branding to meet our consumer tastes and desires. They all come to the same place to be sorted, the labelling and marketing of produce to add value, to create loyalty and perceptions of taste and class. Potato grading procedures also range in their technological and scientific sophistication. From lay people like me sitting down at a table, eating boiled potatoes and filling out a 'scientific' form, to lasers

which scan for blemishes and rot, these procedures and devices (Cochoy 2011) (forms, machines etc.) are the fundamentals of the political economy of waste. The infra-ordinary artefacts of everyday life that make up the world we experience. It is here that the world of waste and abundance takes place, not filtered down through reports, goals or ideology. Practice and action, little-by-little, leads to knowledge and the social world. As Andrew Abbott argues in his book *Processual Sociology*:

“By a processual approach, I mean an approach that presumes that everything in the social world is continuously in the process of making, remaking, and unmaking itself (and other things), instant by instant. The social world does not consist of atomic units whose interactions obey various rules, as in the thought of the economists. Nor does it consist of grand social entities that shape and determine the little lives of individuals, as in the sociology of Durkheim and his followers.” (Abbott 2016:23).

The grading systems for potatoes at the site in Carnoustie use conveyor belts which separate the soil and rocks from the potatoes. Further down the production line, rows of workers pick rocks and potatoes that are too small and discard them into bins beside them, the more advanced sorting machines as already mentioned use laser scanning systems which can sort potatoes based on size and detect blemishes and diseases such as silver scurf. If farm sites do not innovate or automate, as Carnoustie has experienced, they struggle in an agri-food industry of continued innovation and competition. As an employee for the Agriculture and Horticulture Development Board said in another interview which relates to this:

“Everything is going to be demand driven in future, and the problem is that agriculture is based on supply driven model, if you know what I mean, in other words the proactive step that we need to understand is that we need to change our thinking so that there is some business model that can accommodate a demand-driven model and the real disconnect in that is that because of the time scales involved in the whole thing...you’re talking about a lead time of a year...so being able to contract a year ahead in terms of what you think demand will be...is quite an unreliable business and that’s the issue that really applies to problem with agricultural production unless you’re going to be processing...in other words it’s suffocating the innovative business model because there is this huge time lag...unless you become much closer to production.”

The farm was over half an hour from the nearest city, down an A road that stretched across the eastern Scottish coast. After turning off it was another ten minutes in the car to reach the farm. There are no buses here. The workers bent over the conveyor belt were predominantly from Eastern Europe and slept in static caravans on the farm as they didn’t have private transport, no public transport was nearby, and their rent was kept low. Workers are brought to the UK through agencies

who work in tandem with gangmasters, who work with farms who in turn supply retailers. They worked, went to the caravan, slept, woke up, and went back to work. Repeat. Surplus potatoes and surplus labour. Human waste and potato waste. Utility and value. The workers on the farm I interviewed and spoke to who had permanent, all year round, office-related jobs or positions in management were British; they drove to work and lived in nearby neighbourhoods. There has been much discussion in agri-food industry over the effects of migrant labour on food supply chains. With the result of the European Union referendum and the exit of the UK, farmers, agri-food companies and retailers have all raised concerns about the declining supply of labour that would occur if immigration from around the world, and in particular the EU, was curtailed or slowed (NFU 2016; AHDB 2016).

The work at the packing house and farm is dirty, dangerous, insecure and low paid. I stood on the conveyor belt for five minutes as a barrage of potatoes relentlessly came down at me, my hands and arms moving fast in repetitive motions, back and forth, back and forth. Without concentration, it would be easy to lose a finger or two. There are shortages of labour in agricultural production that are filled by seasonal migrant labour. They are paid the basic minimum wage of around £7.20 an hour (at the time of writing). Work, immigration and farms are increasingly discussed in public discourse. With the rise of discount retailers like Aldi and Lidl and the public preference for low cost produce, this system of production is not only built on the exploitation of the land through unsustainable forms of production but also the exploitation of people.

Rather than addressing the issues surrounding labour conditions and rights in agricultural industries and bringing to account the role of corporations, gangmasters, agencies and retailers in the supply of cheap labour and cheap food, political parties and governments strive to meet abstract figures whilst ignoring, and in some cases promoting, the use of cheap labour to supply ever greater profits. Rather than wanting to solve the problems of wage undercutting and declining working conditions, labour standards and conditions which are rooted in precarious and dangerous labour are increasingly seen as the norm – the standard which workers, whether ‘native’ or ‘foreign’, should accept. Rather than wanting to raise standards up, they are being dragged down – a race to the bottom. The extent to which this can continue in the future is subject to much debate in the agri-food industry. Some fear the worst – widespread insolvency, food shortages, further reductions in labour conditions; others see these changes as opportunities, where decreasing labour will bring about a new wave of automation and creative destruction in agri-food, where labour can be replaced entirely by machines, boosting productivity and reducing costs (AHDB 2016).

Farmer B describes the purpose and goals of this farm site:

“We’re not a big one, the place you went to in Goole is on a different scale...we’re not supplying or growing potatoes for national retailers - our primary role is to buy potatoes from growers in the area and sell them on through our pack house, but we also grow potatoes which can give us an idea of what varieties are popular or how demand is changing.”

Farm sites like Goole which have hundreds of hectares are increasingly being relied upon to supply the market. Places like Carnoustie play a different role and their role has changed over time as retailers have become the dominant intermediary between producers and consumers.

Nevertheless, despite the decreasing numbers of farmers and the obsolescence of potato merchants in the supply chain, relationships and those who remain change the nature of the market and how those within it operate. There used to be dozens of growers in Angus, and the market competition was fierce. What seems peculiar about the consolidation and concentration of potato production in the south-east of Scotland, and which is mirrored elsewhere in the UK, is that rather than increasing competition these period of production has decreased competitive production internally within the UK to competition on an European and global scale. “I used to deal with hundreds of people buying and selling here and there”, Farmer B tells me, “now I deal with a handful, and when you deal with a handful, you can’t be messing people around, as they’re all you’ve got.” The concentration of production has meant the relationships between the producers and growers who are left are closer than before. Information and knowledge are regularly exchanged, people are open and honest rather than operating in a dispersed market of suspicion and distrust.

The issue of varieties in the potato industry is particularly important. The most common form of potato grown in the UK is the Maris Piper which accounts for 75% of crop coverage - this variety is chosen and has been selectively bred over time to have characteristics which make it the perfect ‘all-rounder’. That means that you can roast it, boil it, fry it, bake it and it will still taste good.

Consumer research conducted by the Potato Council (2014) has shown that when shopping for potatoes, the majority of consumers do not know the differences between varieties of potatoes beyond the common ones sold in shops - Maris Piper, King Edward, Rooster and Charlotte. These potatoes have more specialised roles depending on their waxiness or flouriness, the thickness of the skin and the sugar and starch ratio which gives off different tastes when cooked in different ways. The abundance and excess of choice leads to selective and habitual consumption - the majority of

consumers buy the same bags of potatoes each time they enter the shop. Despite Maris Piper being the most common variety of potato, most potatoes in the UK are branded and sold as ‘white potatoes’. This can be any potato ranging from a ‘Kestrel’, ‘Cara’, ‘Innovator’ to ‘Accent’ varieties. There are over 300 varieties of potatoes listed on the AHDB’s website, and over 4000 varieties of potatoes stored in the CIP headquarters in Peru. In this world of excess, surplus and abundance, a sociological world of excess as Andrew Abbott (2014) calls it, we have coping mechanisms, shortcuts and rationalisations.

The questions and ideas that spring to mind then revolve around the effects of excess, choice, abundance and variety on waste and surplus. With forms and modes of production narrowing, variety or the absence of variety establishes systematic and standardised systems of production - regulated quantities of water use, pesticides, herbicides, fungicides and molluscicides which can be achieved across geographical areas – difference becomes obsolete and homogenisation of supply chains and production dominates. More on this will be discussed in the next section which goes through the case study of the farm in Harrogate, and in particular the role of agri-chemical industries in establishing this standardisation of production. This fits into the broader themes around specialisation leading to concentration - horizontal and vertical integration of supply chains dominating the trajectory of agri-food organisations and industry in the UK for the last thirty years. Businesses like the farm site near Carnoustie have found themselves increasingly swallowed from all sides: what is you actually do? It’s not enough to just grow a few potatoes and pack potatoes grown by others. Competitors grow, pack, process, research and sell. As such in recent months the site at Carnoustie has faced a highly uncertain future and has only recently been bought by a national retailer. Specialisation and distinction between different aspects of production are merged and formed into large conglomerates with capital and power, those small organisations and businesses who show promise and innovation and bought up and merged.

4.6. Harrogate

For whosoever hath, to him shall be given, and he shall have more abundance: but whosoever hath not, from him shall be taken away even that he hath.

– Matthew 25:29

The final farm visit of my fieldwork took me to the hills of west Yorkshire on the outskirts of Harrogate to a farm owned freehold by the farmer, 250 acres of multi-purpose farmland but with much of it dedicated to growing potatoes.

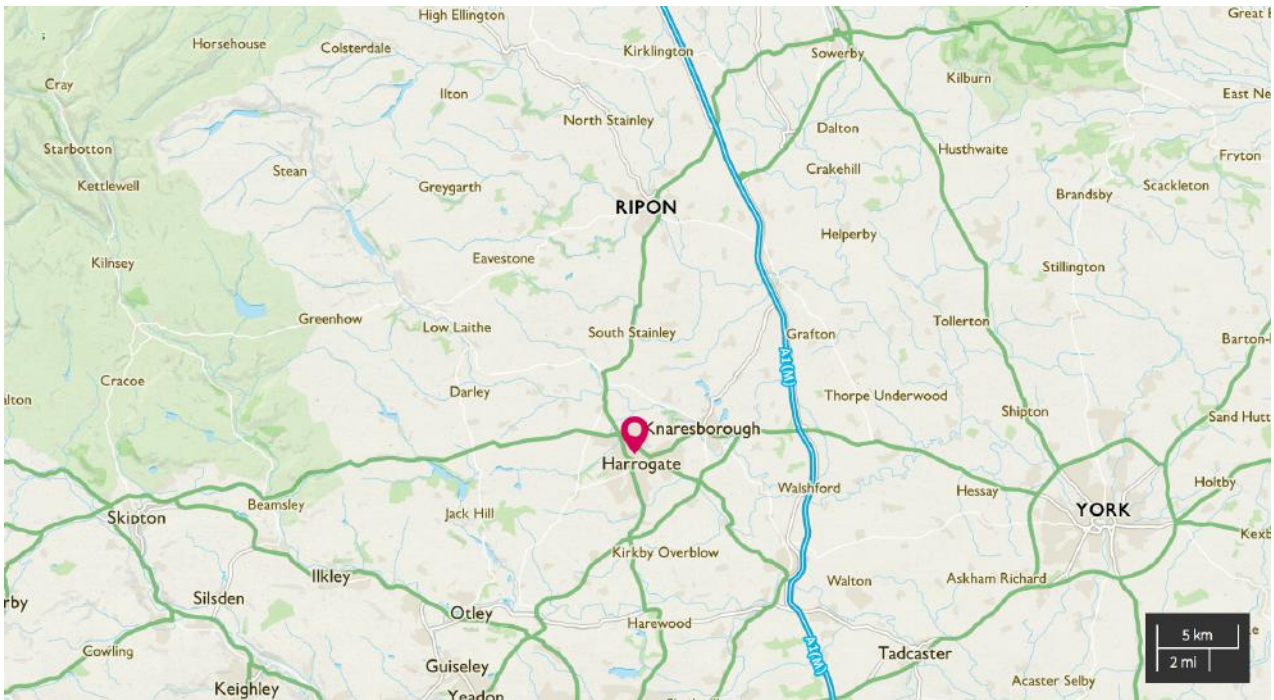


Figure 12: *Map of Harrogate*

From my fieldwork notes:

Beautiful country. Rolling hills. Hedgerows. Pasture. Eyes seeing shades of green. Very English. Blackbirds singing, honeybees buzzing. 09:48. Slight low mist. Northerly breeze. From the flat fields of the Scottish lowlands and the east of England, here I feel at home. Does this matter? Reflexive research. Objectivity, scientific reason and detachment trying to form the sociological mind and inquiry by my own life and experience. Part travel. The word travel comes from the French travail - to toil or to labour.

On a dry, crisp summer morning in 2012, Farmer C (*RB*) dug his fork into the soil of a perfectly ridged potato field. Planting was delayed that year, a cold frost had clung to the soil since winter. A clattering of jackdaws launched from the adjacent field to speckle the skyline as the soil was turned to inspect the progress of the crop. Like many growers in 2012, the results were not good. Cases of silver scurf and common scab had been fed through into reports and growers remained uneasy.

The summer of 2012 is still regarded by many involved in the potato industry as a crossing the Rubicon moment. When prices soared from their averages of £150-£200 a tonne to over £700 a tonne, imports from Cyprus, Israel, France and Holland reached unprecedented levels, there was concern that this was perhaps it for many. Up until that point, the effects of the financial crisis had been staved off for many growers as mentioned before. Declining consumer spending doesn't tend

to affect potatoes, indeed they are the ultimate ‘austerity food’ (Salaman 1985:536). However, the summer of 2012 was when things ‘came home to roost’.

Locked in competition with rival staples to compete on the British plate, namely pasta and rice, production cannot drop and instead consumption must rise. A recent Scottish government policy announced in 2013 set a target of increasing potato consumption by 20% by 2016, it has since declined (AHDB 2016). The solutions to the problems experienced in 2012 were at first to either grow more or innovate. There are tensions between those who think yields are paramount and those who believe flexibilisation and specialisation (including non-food markets e.g. starch and protein) would improve the industry. “Managers with their big ideas” I heard. The problems in 2012 brought about a discussion on the future of potato production in the UK – questions like “Is there any need to produce when we can import?” were being asked again, raising the question of the potato’s role in food sovereignty and food security yet again.

What is it that drives us to produce? The potato industry must grow and outcompete the rivals. The solution to the problem is more sales, higher growth, better productivity and greater innovation. Without these, we are uncompetitive and redundant. We will lose our jobs and livelihood, we must remain economically profitable. The problem of trying to solve the perfect balance of inputs and outputs, to maximise efficiency, to reduce waste and match given resources is tried and tried. Yet we still overproduce, we make more than we need, we hoard a surplus, overproduce an excess and waste in abundance. Just in case. Unless society produces the means by which it can reproduce itself then society ceases to function. I tried finding answers to my questions about the balance between scarcity and abundance, the line between efficient and inefficient, how these are played out in markets and society. Potatoes are the food commodity that are tied in with the transition from systems of scarcity to systems of abundance. As Salaman (1985:125) describes:

“...[the potato] shared, to a greater degree than any other of the botanical novelties which poured into the Old World at that time, the advantage of coming on to the European stage at a time when actor and recorder in the great dramas of the New Capitalism and the birth of Empire were, if not combined in one person, never far removed spiritually from one another.”

“People just don’t do things the same anymore, you have to change”, Farmer C told me, “That sack of spuds under the stairs, that’s gone. What’s the point when you can buy some for a quid?” The markets that growers supply to have changed considerably. Farmer C is a perfect example of this. From supplying fresh potatoes to local markets to currently supplying potatoes to a large

manufacturer of potato based snacks. Over the course of decades spent in the potato industry, experiencing a changing world, witnessing the rise of a whole new political economy of food yet still retaining the essence of the work – farming – weaved through the discussion. The need to farm, the need to grow something, the need to live and provide – a productive character. Willing to sell potatoes to whoever will buy them at a good price. However this also meant taking on different responsibilities, in their words they had to become more like professionals. “I started noticing it when I was wearing a shirt more often than not”, they remarked.

“How do they feel about the changes you have lived through?” I ask, “It is what it is” comes the reply. It can be challenging sometimes to get things from farmers. Yet as we meandered through the deep mechanised ridged rows of potatoes they remarked “That things actually grow never ceases to amaze me” Farmer C said, “it’s nothing short of a miracle, what a world, what a world.”

Farmer C is a perplexed winner of environmental awards and sustainability certifications, “Others do a much better job at that than I do, I farm”. Sustainability and the environment are seen as important yet secondary. Of course we need to ensure the environment continues to be safe in order to grow food. These are not natural spaces - they are sites of production, the areas have been managed over centuries, they are almost entirely human environments.

Conversations were often drawn back to the European Union, farmer C being a fierce opponent of the ‘Brussels bureaucrats’. Recent discussions on neonicotinoids and glyphosate in the European Parliament were a regular source of anger and consternation. Too much stuff going on elsewhere, the creep of cosmopolitan and urbanite philosophies and practices against regionalist and agrarian pride and self-reliance. Balancing self-reliance and dependency on contracts, mitigating against risk and the potential scarcity of an uncertain future. Perspectives in sociology, geography, anthropology and the history of food around socio-materiality (Greenblatt & Gallagher 2000; Gille 2013) suggest that our lives become like the things we live through, and with the potato that can mean perishable, uncertain, abundant yet scarce. A patchwork of seemingly inconsistent states but which function simultaneously.

4.7. Reflexive Review, Critical Interpretations and Understandings

Compared to the account of current UK potato growers, Patrick Kavanagh’s *‘Spraying the Potatoes’* seems to belong to a lost world, yet it’s only 50 years ago. It could be said that Kavanagh’s images, “barrels of potato spray” / “knapsack sprayer” / “rut-locked cart”, speak of technologies that have

their counterparts in today's farming life – but that would be to strain the meanings of those words. And I wonder if today's potato growers offer “an ancient farming prayer” or whether ‘blossomed stalks still weave a spell’.

After recovering from a bout of agricultural nostalgia, it's pertinent to ask reflexively not just about the possible waste levels of Kerr's Pinks and Arran Banners but also about their probable distribution in hemp sacks and brown paper bags. In all likelihood, farmgate waste was relatively higher than today and household waste much lower. This introduces an important question for this concluding section and the thesis as a whole: to what extent has the UK potato regime simply replaced farm waste by household waste? Or, put another way, is waste control at best a zero-sum game?

In the Literature Review and the Methodology, I raised the issue of secondary data and information related to potato waste. This issue is particularly problematic in relation to potato growers. Formerly, potato waste data was captured at the farmgate; for example, Yakovleva and Flynn (2004:23) record the ‘Organic potato supplies and disposals in GB’ which includes ‘Field leaving and waste’ data. As already recorded, current – and equivalent – data has proved difficult to track down. Yet this apparent absence of hard data on farmgate potato waste may well have a simple explanation – the lack of data is simply an artifact of the ‘great transformation’ which has reduced waste and loss to such an extent that it's not worthwhile recording the relevant data.

As described in the Methodology, this section accomplishes three tasks that are in line with the stated aims and the conceptual framework. First, I reflexively review the account of ‘Growers’. Second, I offer a critical interpretation of that review. Finally, I record a distilling of my understandings (findings) through bullet point lists.

4.8. Workings & Shifts – Reflexive Review

The task is both to review the Growers narrative so as to ‘glean’ its contents and to subject those contents to some form of critical analysis. To extend the metaphor of gleaning: the narrative is like a field that has been planted and now it's not just harvest time but also ploughing time when the furrows are turned one upon another and the nature of the ground is revealed. This turning back the narrative on itself is, of course, reflexivity.

What are the workings of the growers' section of the UK potato industry? And what about the shifts in waste generation and identification?

The account featured three potato grower sites that differed profoundly to the potato-field in Kavanagh's poem – which could be classified as 'traditional' potato growing. The three researched farms all performed some form 'traditional' potato growing – but they are not purely traditional. The Harrogate farmer was closest to this traditional model – with the resulting environmental awards – but he did supply a potato-based manufacturer. In this respect, all three had – to a greater or lesser degree – an industrial orientation. This industrial orientation includes: the direct supply to manufacturers (Harrogate); purchase/re-sale (Carnoustie); and, technologically sophisticated warehousing (Goole). The other category is a specialism: potato seed production (Carnoustie).

This three-fold classification of traditional / industrial / seed reflects the core orientations available to growers and represents an important characteristic of the current differentiated structure of the UK potato industry. Other recorded structural characteristics of the industry include: soil type and related geography (e.g. proximity to transport and population hubs); economies of scale, notably field size; economies of scope related to the industrial potential of potatoes as food, raw material and waste; the use of high-tech biological controls and logistical arrangements; and the continued role of capital. To these elements of the structuring and social organisation of the potato (Friedland et al 1984), there is a very long list of everyday actions and practices that I observed in the fieldwork, ranging from ridging with tractors to climbing very long ladders.

Capturing the full extent and scope of these everyday actions and practices is clearly well beyond the scope of the thesis. The task is to account for the workings – and not the work. What forces and processes have been at work to generate the UK potato industry?

The question is part answered by recourse to political economy. The drive for improved efficiency and productivity is behind many of the strands of the 'radical transformation' ranging from reducing waste/loss using the high-tech innovations to the differentiated strategy decisions of each grower to configure business according to the traditional / industrial / seed format. There is also the role that food security has played, partly in consideration of the imported potatoes; clearly, post-Brexit, this issue will gain greater prominence.

But, as I 'turn back the furrows' of my account to consider what has influenced, and continues to influence, the workings of growers in the UK potato industry, I return to the quote from Abbott in

the Literature Review which stresses the importance core processes. In that respect, the references to grower-concentration, financialisation and professionalisation need restating as representing the processes and forces really at work in the structuration of the industry.

The radical transformation has involved growers addressing the problem of waste - and that has led to shifts in waste generation and identification. In reflexively reviewing the growers' account, I unearthed two thought-provoking issues. First, that there had indeed been physical shift of waste from growers to households. Second, that accompanying this physical shift was a shift in the responsibility for waste – consumers have become identified as potato wasters. It is to those thought-provoking issues that I now turn.

4.9. Overproduction, (Surplus) and Accumulation – Critical Interpretation

Were overproduction and surplus an issue for Patrick Kavanagh's potato grower? Kerr's Pink is main crop and, in the happy event of surplus, would have required storage using the low-tech methods described (Arran Banner is second early). In short, the potato harvest was uncertain. Spraying with copper-based compounds may limit the effects of blight in a good year – but the named varieties are both nematode cyst susceptible.

Unlike Kerr's Pink, Arran Banner is no longer grown on a commercial scale. In effect, the UK potato industry acts like an evolutionary system in which complexity as characterised by variation, interaction and selection has obvious correspondence to ANT. Arran Banner has been 'deselected' not just because of its botanic susceptibilities but also because it just doesn't taste good. The interaction between biological characteristics and consumer taste has led to the extinction of the variety.

The growers' account highlighted the following system's knowledge characteristics:

- Potatoes are grown in those places in the UK with suitable soil conditions.
- In addition to applying knowledge about geological variation across the UK, potato varieties will be selected by growers according to the match between the variety's biological characteristics and soil specifics.
- In addition to its biological characteristics, a grower will select a potato variety in respect of: taste, harvesting/storage issues, and non-food use requirements.

There are also the material technological aspects to consider, notably: the use of farm machinery, inputs (ranging from water to pesticides) and warehousing. This advanced technological system will safeguard against many environmental risks. But, not, as has been recorded, risks due to market and financial instability – another system dynamic that can generate ‘deselection’ amongst human actors, particularly during a crisis. Both sets of risks can be mitigated by government action – but as the Corn Laws’ Crisis showed, protectionist measures designed to continue production on unsuitable soils leads to inefficiency and loss in the wider economic system.

The interaction order that is evident in the UK potato industry is the evolutionary outcome of the managed interaction between variation and selection. The interaction order also represents and embodies the extent and level of accumulated capital, capital assets, knowledge, technologies and practices that are due, in part, from previous surpluses. One form of surplus is profits and, metaphorically, profits ‘ploughed back’ into the industry contribute towards accumulation (there’s also the issue about the role that literal ‘plough back’ plays in the system). But the question arises: given the degree of system sophistication that could readily tailor supply to demand, why the need to generate surplus in excess? Given the degree of sophistication, overproduction has to be seen as deliberate, or, at the very least, the managed default position. Deliberate overproduction is part of the control efforts designed to generate further accumulations. In this respect, the role of warehousing and the cold chain are especially important - as considered shortly. It could be said that Patrick Kavanagh’s farmer is also working in a context defined by previous cycles of accumulation in the line that “God further the work.” Accumulations, to be sure, but of a very different nature.

4.10. Food Waste Meanings – Critical Interpretation

“... loss is loss and waste is waste.”

How can this tautology be interpreted? At face value, like any tautology, there is no substantive content – New York is New York or $X=X$. But the use of ‘and’ in this tautology does give it more than mere rhetorical affect. There was an air of authority, of definitiveness, of ‘you can’t argue with that’ in the way the farmer expressed himself. I interpret this expression as meaning that loss and waste are to be strongly differentiated. Two inter-related lines of interpretation stem from this observation.

First, there is the apportioning of responsibility. The farmer had already stated that “...only 3% of food waste occurs at the farm level.” By implication, 97% of food waste occurs elsewhere – particularly in households. In effect, the farmer is saying that farming has ‘got its act together’ in

respect of waste - due to all the aforementioned technologies. There is a tacit admission to the role of unquantifiable losses but with a sense that those losses are not preventable.

Second – and coupled to the notion of responsibility – is the sense of morality contextualised by reference to townies. Farmers don't waste but urban dwellers do. Farmers have done all they can to limit waste, they still suffer losses that they can't do anything about. Does the Goole farmer's view of waste and loss indicate a frame for a growing cultural boundary between the rural and the urban?

At this juncture, it is worth recalling the moral discourse associated with waste in the capitalist system: for example, capitalism as a product of Protestantism (Weber 1968). Classically, wastefulness and wasting are understood as undermining efficiency and ultimately limiting accumulation – though, of course, this thesis is a challenge to the classical position.

If we take the poststructuralist view of language as representing as both the sediment of social interactions and the source of new cycles of interaction, then this distinction between waste and loss has implications. Network actors make attributions differentiated other on the basis of perceived attitudes and motives. Attributions made about other network actors can reinforce or diminish self-perceptions about identity. In this case, the linguistic attribution that townies are wasteful consolidates the existing cultural identity of farmers as protectors of 'The Land'. Crucially, as I am about to consider, the corollary of the farmer's identity is the self-perception of innocence in respect to waste.

4.11. Food Chain Concept – Critical Interpretation

In addition to drawing down on the above sub-sections, this critical analysis of the food chain concept introduces the following notions: waste transfer, waste disguise and waste deferment.

In the most rudimentary fashion, the supply chain connecting growers to consumers can be thought of as a channel for 'prepared' potatoes – by prepared, I mean having gone through the processes already described, e.g. washing, sorting, bagging, and so on. With reference to Gille's food waste regime concept, my contention is what seems a simple arrangement in which potatoes flow one way and money flows the other is not simple at all because, in reality, far more than potatoes and money flow in the channel. Structurally, my position is the familiar network insight: once a link has been established between two actors, the link is available for the flow of both material goods and intangible sentiments. Indeed, I have already indicated a flow of 'moral sentiment'.

Grower technologies have reduced ‘nominal waste’ in the farm but led to an increase in recorded domestic waste, e.g. via plastic bagging of potatoes. So, the downstream flow of potatoes is accompanied by a downstream flow of waste; this inseparability of food and waste is one characteristic of Gille’s food waste regime. Further, Gille suggests the application of the efficiency/inefficiency dichotomy. On following that suggestion, I note that increased grower efficiency due to the reduction of ‘nominal waste’ is paralleled by increased consumer inefficiency due to the increase in waste; this practice of transferring the burden of and responsibility for waste can simply be termed ‘waste transfer’.

In the above paragraph, I used punctuation for ‘nominal waste’. In the Literature Review, I summarised the elements of Gille’s food waste regime which included these bullet points:

- The process or practice of defining and categorising waste, e.g., as loss or by-product; and,
- The relations or sets of relations which “determine waste production and what the material composition of wastes are”.

I consider the inter-related roles of warehousing and the cold-chain in relation to the above bullet points. In applying these elements in tandem, by linking the process of defining waste to network interactions, I am seeking a wider and deeper understanding of potato waste than is achieved by chain analysis. Both warehousing and the cold-chain are considered fundamental to food waste reduction. To apply Gille: there is a specific accounting practice of defining potato waste in relation to warehousing/cold-chain; that is, accompanying the introduction of these technologies is a set of performance measures. How then is it possible to treat an accounting categorisation/definition of potato waste as merely ‘nominal’?

One of Gille’s key insights is that under capitalism, definitions of waste will always ultimately be directed to forms of accumulation – it’s arranged like that because “waste is waste”. But what about the warehousing/cold-chain technologies which are powered by large quantities of electrical power – including the carbon indebted materials from which they are constructed? The question arises: How much do the technologies supporting potato growing contribute to energy waste and carbon debt in general? That is, what is the extent of the waste externalities in the food waste regime? No doubt, those externalities can be quantified, with consequent adjustment to the ‘nominal waste’. Working within the limitations of this thesis, I am restricted to giving the label ‘waste disguise’ to the practice of failing to adequately represent the true extent of waste.

In the Literature Review, I emphasised the importance of spatial concepts. However, the warehousing/cold-chain technologies need also to be considered in relation to time – they are technologies for the suppression of time (Rabinbach 1990; Abbott 2001); that is, technologies which, in the case of the potato, slow and limit its biological characteristic of decay. In the Literature Review, I cited commodity research that emphasised that ‘perishability’ made food a distinct commodity class. In this respect, warehousing/cold-chain technologies reduce that level of distinction: potatoes become more like, say, a mineral commodity, and in consequence integrated into the more generalised pattern of commodity exploitation and accumulation.

I term the time element of this analysis waste deferment as it conveys the need for potato growers to slow the decay of potatoes as food and that decay occurs at a different time and different place, e.g. in the domestic kitchen; the use of the chemical agent, Chlorpropham, in the suppression of potato-eye formation during long-term storage is also to be noted. The notion of waste deferment complements naturally the notions of waste transfer and waste disguise because it introduces the time dimension necessary for the other two notions. In short, the supply chain concept fails to represent the true nature of waste because it neglects the systemic extent of waste transfer, waste disguise and waste deferment.

4.12. Distillations – Understandings

I list the key understandings (findings) from this chapter. The understandings exist in their own right. However, in this bullet point format, the findings also provide convenient reference points for use in the final chapter. It also aims to help the reader by explicitly putting forward key findings.

- Growers can be classified in terms of a variable mix: traditional / seed / industrial.
- Grower concentration, financialisation, specialisation and professionalisation represent notable processes in the UK potato industry.
- Changes in grower practices have been designed to increase the quantity and quality of farmgate yields and overall efficiency.
- Changes in grower practices processes have also reduced (anecdotal) levels of waste at the farmgate.
- These changes and innovations in grower practices include:
 - scientific tailoring potato varieties to soil conditions;

- scientific use of biocides;
 - chemical suppression of potato-eyes sprouting by using Chlorpropham;
 - harvesting methods that minimise tuber damage;
 - harvesting methods that reduce field leavings;
 - post-harvest washing/cleaning;
 - post-harvest crop grading and selecting;
 - adopting technologically advanced warehousing;
 - using polythene bagging for the household end-user; and,
 - accessing alternative users for non-food potatoes.
- These changes have led to the re-definition and re-designation of potato waste.
 - Whilst levels of grower waste have been reduced, the recorded level of household potato waste has increased. That is, there appears to be a shift in the responsibility for waste from the grower to the householder – this is ‘waste transfer’.
 - Advanced supply chain logistics, warehousing/packaging/distribution, have contributed to ‘waste deferment’.
 - Advanced supply chain logistics, warehousing/packaging/distribution, have not only permitted overproduction and surplus but, crucially, have also mitigated the risks normally associated with capital accumulation (e.g. spoilage and low demand).
 - Logistics assist the ‘disguising of waste’ by re-calibrating the perishability of the potato.
 - Waste transfer / deferment / disguise can be understood as ‘rent-seeking’ activity in the pursuit of accumulation since losses are borne by end-users rather than the owners of productive capital.
 - Using a posthumanist perspective has revealed a hidden counter-narrative to that offered by conventional political economy treatments of supply chains.

5. MANUFACTURERS

[I pour potatoes into the rumbler]

Me: “Where do the peelings go?”

Rumble

Rumble

Boss: “How the hell would I know?”

– Me, Working at a Chip Shop

5.1. Introduction

Through my Literature Review, I came to the conclusion, along with many others, that following waste is a way of critiquing the existing ‘farm-to-fork’ view of food supply chains and ‘realist’ approaches to commodity chain analysis. How can this be done? Things are not linear, the spatialities of production are here, there and everywhere. One way to do this is rather than focussing on the human relations is to focus on devices which link together human relations, not viewing human relations and action as the main point of sociological investigation but to decentre the human being and thus our anthropocentrism. Objects occupy spaces that we do not sense.

Such perspectives have the benefit of understanding how and why food is produced, distributed and consumed in the ways it is. It questions when food becomes food and when it becomes something else, like waste, loss or a by-product. For example, how can food that can feed one person be used as an adhesive for sticky tape for another? Is it sustainable to produce food that we don’t even eat? Alongside an estimated 50% of food grown for human consumption being wasted, there is also another story of the valorisation of food by-products, that is turning food into something more valuable, turning a good into a product (Callon et al 2011). Food is often considered to have a teleology, a purpose that is primarily for human consumption. This chapter, however, develops a non-teleological appreciation that what is considered food is not always food (i.e. non-food), how and why it becomes something else, the devices and ideologies that are constructed to act as justifications and norms for seemingly untenable moral and ethical contradictions that become acceptable and reproduced daily.

The structure of this chapter firstly outlines what by-products are why they are important in the development of new economies of food waste. Whilst the interest of my thesis is primarily on waste, this chapter will focus heavily on the role of by-products, as I will discuss. When discussing these

parts of the industry, it becomes more common to talk about value chains rather than supply chains, as the main interest is in the valorisation of goods into products and thus profit and growth. Secondly the historical role of manufacturers in the potato industry will be analysed using documentary evidence. I analyse the role of two manufacturers of potato products where I conducted fieldwork. As these were not as in-depth as other areas of the potato industry investigated, greater emphasis is given to surrounding literatures and other forms of storytelling and evidence.

5.2. What Are By-Products?

I wish to first outline some perspectives on how and when something becomes a by-product. So, what exactly is a by-product? The Oxford Dictionary defines by-products either as "an incidental or secondary product made in the manufacture or synthesis or something else" or "an unintended but inevitable secondary result".

The etymology of the word by-product enters the English language in 1857 around the time of the Industrial Revolution. Twenty years later, in 1876, James Torbitt, a wine merchant and potato breeder who moved his potato business from France to Ireland because of the Franco-Prussian War five years earlier, corresponded with Charles Darwin over the potato blight that was making its way across the world. Torbitt is regarded as the first inventor of the method which turns the residue from potato starch into human food (DeAcre 2008, Ristaino and Pfizer 2016).

The industrialisation of agricultural production was accelerating at this point. The movement from rural areas to urban areas and the development of mechanised techniques of production that transformed the landscape and food cultures of the UK. The potato's role in this transformation is well documented (Salaman 1985): the diets of working classes across Europe become centred around the new world products of tea, sugar and potatoes as they moved to cities (Mintz 1985). This model of food production based on the mass supply of calories to industrial labour still exists today; despite our more sedentary lifestyles, the level of production has soared, human bodies become the vessels for the overproduction and over accumulation of stuff, obesity rates soar as we put more into our bodies than energy we can expend (Nally 2011). Systems of production get locked in, spatio-temporal ideas of history lead us on paths or roads from which changes of direction seem impossible as we bear the weight of historical development.

It is at this point during the tumultuous decades of Atlanticism and European history that surpluses and by-products of production become much more integrated into a capitalist political economy. Primitive accumulation superseded by capital accumulation, drove forward the territorialisation and expansion of markets and capitalist economy across the globe. The first global system with standardisation and expansion at its core (Arrighi 2014). Over the course of the next century the industrial and scientific advances in food manufacturing and resource capture continued to expand (Stearns et al 1994). As products require processes, modern day commodities and products are increasingly globalised and standardised through procedures and techniques. In Callon, Meadel and Rabeharisoa's (2011:197) *The Economy of Qualities* there are a few paragraphs that outline the importance of these distinctions for the study of markets:

“What is a product?...To better understand the emergence of new forms of organisation of markets and new modes of competition, it nevertheless seems useful to make a distinction – necessarily arbitrary but nevertheless rooted in etymology – between a good and a product (two concepts which are often used interchangeably in the vocabulary of economic theory).

Talking of a good means emphasising the fact that the aim of any economic activity is to satisfy needs (what is good, sought after, wanted). Qualifying these goods as economic means adding that their production and circulation involved the mobilisation of necessarily rare resources, or that these goods can be attached to property rights which are transferable from one agent to another. The concept of an economic good implies a degree of stabilisation of the characteristics that are associated with it, which explains why it is in demand why W, being wanted as such, it is traded.

A product, on the other hand, is an economic good seen from the point of view of its production, circulation and consumption. The concept (*producere*: to bring forward) shows that it consists of a sequence of actions, a series of operations that transforms it, moves it and causes it to change hands, to cross a series of metamorphoses that end up putting it into a form judged useful by an economic agent who pays for it. During these transformations its characteristics change.

The product is thus a process, whereas the good corresponds to a state, to a result or, more precisely to a moment in that never-ending process. As an economic good a car is an object, a thing with a well-defined shape, which is used to meet specific needs and which has an established value in a market context. But it is more than that. It is also an object that has a life, a career.”

This is a long quote, but I feel it is essential to this discussion and I could not put it any better. Is the potato a good, a commodity or a product? The answer? It depends! At different points of its career, or life, the potato takes on the role of multiple products and goods. The potato is a fungible good, it is totally interchangeable. From one week to the next, from day to day, location to location, never having the same properties from one point in time and space to another. Even on the most basic

level like prices. A quantity of potatoes from one season is not interchangeable with those from the next season.

By-products and waste are transmutable (Krzywoszynska 2013), that is, they do not hold an essence or fixed state. What is more, potatoes have no teleology. The potato has no point. No divine purpose. This then raises the issue of fungibility within economics and economic theory. Fungible commodities are commodities that are interchangeable, they can be replaced by something with exactly the same qualities at another point in the future. It is as much a food as it is an object for washing your body or worshipping the Gods. The purpose of potato production is not solely food for human consumption though we may consider it 'common-sense' to be so. For example, the UK is unusual in global food production for the amount of food that is sent for human consumption. 90% of the total potato crop in the UK is grown for human consumption, whereas in China it is less than 50% and in France it is 75% (FAOSTAT 2017). This raises the question: When and how a commodity is transformed into being food and under what conditions this arises?

In order to examine some of these questions, I think it is worthwhile trying to understand the philosophical and epistemological perspectives on value and categories. Theories of value are well established in studies of production and consumption, particularly around waste (O'Brien 2008; Giles 2014). Theories of categories is a field that does not receive so much attention however. But if things are categorised according to the value, what is it we are classifying? In order to construct hierarchical systems of value firstly the categories upon which values are placed need to be established. Think about the supermarket. The produce section of the supermarket is split into different categories. Exotic fruit (papaya, mango, passion fruit etc.), fresh fruit (raspberries, strawberries, blueberries etc.), tubers and similar foods (potatoes, squashes, aubergines etc.), other root vegetables (carrots, swede, turnip etc.), brassicas (cauliflower, broccoli, cabbages etc.) and so on.

These goods are categorised based on their qualities – but how are they grouped? What is the taxonomy of food and how has it come about? Are these decided upon nutritional content, upon their appearance, their qualities or quantities? There are culinary uses – some are useful for salads, for snacking, for putting in stews. Consumers roam the aisles knowing what should go where, what matches with what. Commodities on their own have no value or use, only when matched and in relation to others does the value become realised.

This, then, is the relational aspect of things that is essential to understanding not only how goods are valued but also how they are categorised. For waste and surplus this is important, as waste is often

perceived and imagined as something ‘out of place’, something that does not belong in the tidiness and cleanliness of modern society that needs to be cleared of detritus and decay. Are there systematic procedures through which we identify something as waste, by-product or loss? How have these categories been established over time or have they just so happened to exist in reality because one or more people looked for them and said that is what they are? These discussions on categories have existed since Aristotle's *Categories* which has set the tone for philosophical discussions on categories for the last 2,000 years, still informing how and why somethings are *this* and other things are *that*. Moving beyond the categories of the supermarket to the categories manufacturers use to distinguish between different types of potatoes and their qualities, we see the demarcation of things which are considered Grade I, II, III and then the grey areas of waste and loss. The mechanisms and techniques for deciding what commodity is attributable to what category are discussed later in the chapter.

5.3. Terminology and Etymology Continued

How are by-products different from waste, surplus or loss? Waste is defined as “(of a material, substance, or by-product) eliminated or discarded as no longer useful or required after the completion of a process.”

The Environment Agency (2014) proposes four questions to ask in order to aid the individual to decide whether their object in question is a by-product or waste:

- Is further use of the substance or object not just a possibility but a certainty?
- Can it be used directly, without any further processing prior to its use?
- Has it been produced as an integral part of a production process?
- Is its further use lawful in the sense that:-
 - it fulfils all relevant product, environmental and health requirements for the specific use to be made of it; and it will not have an adverse impact on the environment or human health?

“No longer useful or required after the completion of a process.”

At what point is this decided? What are the processes and techniques for delineating what is useful or required and when does a process end? Here the regulatory authority provides only guidance. In

the world of modern food regimes one commodity becomes another, which then becomes another, which then becomes something else, which problematises the resource extraction model that only focusses on the end point of something – and misses everything else. As Mary Midgley describes in her analysis of the fox in human imagination, the fox has been characterised as a menace to society; we see the actions of the fox when it has killed, when it has left scenes of gruesome death. The image we then have is of the fox as a killer but not when it nurses its cub or mourns. We construct an image of something other than ourselves at a singular point in time, not considered something within its context (Midgley 2005:124).

Georges Bataille argued that an ontological obsessiveness of industrial capitalism with utility is flawed, as utility taken to its logical conclusion ends in uselessness. The origins of accumulation destroyed the 'age-old equilibrium' of primitive societies (Bataille 1997:465). The rationalising aspects of industrial capitalism are seen as objectively rational, rooted in technological innovation and scientific progress. Bataille argues that whilst this age-old equilibrium was broken, there are rituals and processes in modern industrial capitalism that do not differ so widely from so-called primitive societies. Accumulation requires the production of a surplus; more than what is necessary through objects. What are the cultural and economic differences between surplus, waste and by-products? Culture forms from excess, from what is left over. The origins of the solar system, of life on earth, our existence, relies on the excess and surplus energy. The sun gives more than it takes. Life colonises space that is open to it, the lilies in the pond push to the edges but then stop, unable to expand beyond their watery world (Perec 1972:182). Unless there is an excess, an abundance of stuff, then existence becomes purely utilitarian. The separation of humans from nature, it is argued, begins when the mastery over the excesses of life occurs. Mastering time and extending dominion over space. Edging nature far from the spheres of human activity – the objects and things surround us take technological forms and techniques of rationalisation and ontological being. Cultures of consumption that form from the excessiveness of stuff, from a wide array of things we pick and choose; with picking and choosing there is inherently wastage, loss – the undesired (Bauman 2003). What is a necessary amount? On one hand what is necessary for the individual and what is necessary for the collective. Defined within the parameters of a process, this involves demarcating different processual forms from another.

When categories and definitions like the ones provided by government agencies (Environment Agency 2014) maintain a kind of utility that the individual is responsible for, it provides a framework but the ultimate arbiter of what should be done with a product is the person themselves. This individual/collective responsibility has been a particular development of organisational

management – rather than a centralised authority (such as a ministerial department, or court) providing rules or procedures for people to follow.

5.4. By-products of Potato Production

As Table 5 on the following page shows, potato by-products have a wide variety of uses - probably the most famous being vodka. If you can't eat it then turn it into something you can drink instead! In the 1950s and 1960s, the forms of potato production had not reached the technological advancement and levels of processing capability seen today. Concern about the environmental impacts of potato processing plants and the starch effluents, alongside economic concern for resource and cost efficiency led to a wave of research and development into potato waste at the beginning the 1970s. The story of the interventions in that time has been one of technological developments in processing potatoes solving problems, only to create new ones, which in turn were solved and then again creating new ones. Indeed, it represents an example the cycles of unintended consequences and problem-fixes in the scientific rationalities of industrial capitalism.

There are predominately two main (i.e. economically valuable) substances that can be derived from the by-products of potato production: starch and protein. There are a number of factors arising out of the mass mechanisation of potatoes that has resulted in new technologies to capture valuable commodities from the production process. What drives these processes of by-product resource capture and the heavy financial and scientific investment in extracting every last drop of use from potato starch? Many in food scholarship and waste studies would argue for a description of a particular model of agricultural production in the corporate food regime – principle founding blocks being profit maximisation, capital accumulation, efficiency of production and minimisation of waste (McMichael 2009; Nally 2011). The potato industry in the UK is well established, and as Hallsworth (2013:291) argues, food retailing is “a mature industry that has been seeking new avenues for profit for some years”, so the same can be said for the potato industry.

Starch has long been valued in potato waste (British Potato Council 2004) – its high level of carbohydrates has made it a popular choice for cattle feed. It is estimated that nearly half of all Russian and Eastern European potato production is used to feed livestock (FAOSTAT 2017). ‘Filter cakes’ are fine particles of potato “pumped from settling or clarifier tanks through a vacuum drum filter to remove part of the water” (Hinman & Sauter 1978:1) and contain up to 75% starch. What comes out is a slurry which can be added to dry ingredients and then fed to cows for subsequent human consumption. The abundance of the potato crops has also led to other uses – from a filler

for paper to meet FSC targets for renewable sources and pharmaceutical tablets. These forms of by-product use from potatoes have been established for a number of decades, predominantly originating in the United States in the 1970s and making their way across the Atlantic.

Table 5: *Food and Non-Food Uses of Potato By-products*

Food	Non-Food
Gummy sweets	Paper (beater sizing, tub sizing, calendar sizing & surface coating)
Noodles	Textiles - sizing fabric
Crisps	Sandpaper
Hot dogs	Abrasive cloth
Instant Soup	Bookbinding
Coating for grated cheese	Bioplastics (polymer)
Caramel	Packaging - cups, disposable plates etc.
Marshmallows	Medicine tablets
Cheese	Soap
Baking powder	Oil-well drilling
Sausages	Clarifier
Crisps	Adhesive on stamps, envelopes etc.
Cream	Flocculation (drinking water filtration)
Cakes	Toothpaste
Plant-based alternatives (e.g. vegan cheese, meat substitutes)	Washing powder
	Pet food (treats)
	Shampoo
	Silage
	Alcohol (vodka, akvavit)

Contemporary uses of potato starch have taken on new, more sophisticated and institutionalised directions (Keijbets 2008). Since the EU Landfill Directive (99/31/EC), Essential Requirements (Packaging Waste) Regulations (94/62) and EU Animal By-products Order (ABPO) 1999, techniques of using and recycling potato wastes have increased. Common forms of plastic such as polythene, polystyrene and polyvinyl chloride are non-degradable, they are manufactured to be water repellent and thus unable to allow enzymes to react and for it to break down. The

environmental effects of plastic across all forms of life are now well documented and regulations such as the ones outlined were, in some ways, created to directly address these issues. Interest has been placed in the last decade on the use of biodegradable and compostable ‘bio-plastics’ from plant crops such as potatoes and sugarcane with Coca-Cola trademarking PlantBottle in 2009.

The two main methods for peeling potatoes in the processing plants are either steaming or mechanical peeling. Peeling enables starch to be recovered whilst steam exposes the potato to high temperatures which makes the starch cold water soluble, and thus only suitable for certain purposes. In addition to the peelings, when the potatoes are washed the starch wastewater contains high levels of chemical oxygen demand (measure of organic pollutants in surface or waste water), nitrogen and phosphorous. Hence, potato processing plants are subject to regulation and audit to maintain environmental controls over wastewater production.

In response to these changing regulations, the EU Commission Decision of 15 February 2002 “authorised the placing on the market of coagulated potato proteins and hydrolysates as novel food ingredients under Regulation (EC) No 258/97 of the European Parliament and of the Council (OJ L50/92 21.2.2002)” (Times Higher Education 2002). Potatoes have an average crude protein content of 5% and extracting pure protein from the starch by-product has been attempted since the early 1970’s with Strolle, Cording Jr. and Aceto’s (1973) Steam Injection Heating experiment shown (Figure 13).

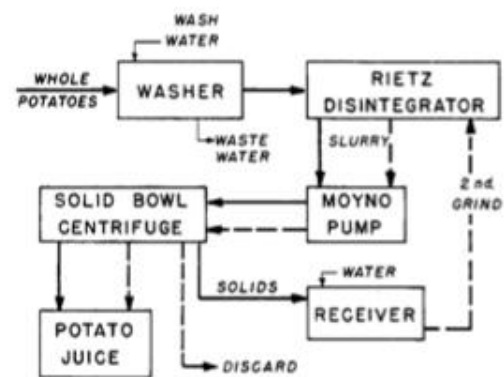


Figure 1. Preparation of potato,protein water.

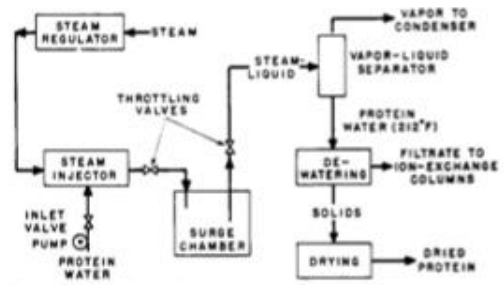


Figure 13: *Potato Steam Injection Heating*

Since early experiments and the authorisation of coagulated potato protein as a novel food, crude potato protein has become a valuable by-product for uses in a variety of goods and products. With the rise of meat consumption across the world since the 1980s, it is plant products like potatoes which have filled the growing demand. To what extent it makes sense to grow potatoes unsustainably to then feed to livestock animals which in turn degrade the natural world is obviously a subject of much contention and discussion within environmental and food justice movements worldwide. Another significant development in the last decade has been the use of potato peelings for anaerobic digestion (Liang & McDonald 2015) and with legislation relaxed on what defines ‘food

loss' as opposed to 'food waste' and taxes are cut on sending food to aerobic digestion, this sector will continue to grow.

These developments outlined and examples used show that potato waste and by-products never stand still – their value is not fixed and changes quite quickly as new innovations and regulations being new stages in the life cycle of commodities.

5.5. The Rise of the Manufacturer

Oven chips. A simple yet revolutionary product. In 1979 McCain released their first television advertisement for frozen oven chips. In front of an empty chopping board, a man dressed in chef whites shuffles his hat and reaches into the freezer and pulls out the frozen bag of chips as a narrator speaks over the top:



Figure 14: *Monsieur V and Oven Chips*

“Monsieur V, one of Europe’s foremost chefs claims to cook crisp golden chips with no oil, no mess and no deep fried smell.”

The footage then cuts to ‘Monsieur V’ putting the chips in the oven, which he describes in a French accent: “I put McCain oven chips...in the oven” and shortly after twiddles his curled moustache before showing the television audience the perfectly cooked chips that ‘only take fifteen minutes’.

It wasn’t until the late 1980’s however that oven chips began to displace ‘Smash’ (mashed potato) as UK consumer’s convenient potato product of choice. Another popular McCain television advert from the 1990’s centred around the fundamental moral question of whether a young girl preferred daddy or chips.

On the bus back from school, the elder sister, in a soft Welsh accent, turns to her younger sister and asks: “Sophie, what you like best daddy, or chips?”. We then have an internal monologue in Sophie’s head as she revisits the question over and over in her head. She continues this questioning as they get off the bus, as their mother takes the oven chips out of the freezer and then places two plates containing two fish fingers, chips, frozen peas and tomato ketchup at the table – a familiar meal for me, too. The father appears from nowhere, takes one of her chips which leads her to proclaiming her preference for chips. ‘You Just Can’t Help Yourself’ the tagline reads at the end of the advert.



Figure 15: *Triptych of Post-School Potatoes*

Fast forwarding again to the modern day, McCain's adverts focus on the hectic life of modern families – children rampaging around the house, stressed parents, all manner of chaos solved when the hand reaches into the freezer, the oven tray laid with chips and without effort, preparation, time or skill, food is served and families are happy. Everything is okay as long as we have chips. These advertisements I find fascinating. You could examine them from a number of points of view: what do they tell us about changing food habits? What is the role of advertising in shaping food production and consumption? The implicit gender roles (Allen & Sachs 2007), the societal expectations of domesticated women (in one McCain advert from the 1980's a van full of men sing aloud “we hope it's chips for tea”), the cultural production of taste and pleasure, how perceptions of culinary expertise and skill are framed, the role of processed food in everyday eating and the rise of convenience and time pressures.

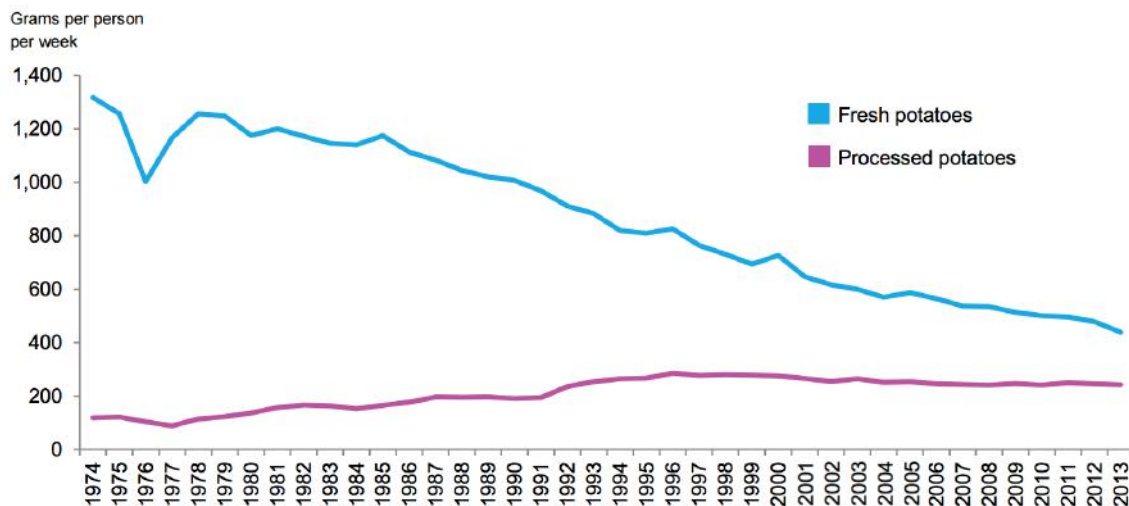


Figure 16: *UK Fresh & Processed Potato Consumption Since 1974*
(AHDB 2016)

When we observe data on potato consumption in the UK, there are strong indications of a shift away from fresh products, with a slight increase in processed potato products. Whilst the amount of fresh potatoes consumed per person in the UK has dropped significantly from 1.3 kilograms per week in the mid-1970s to 500 grams to the start of this decade, the consumption of processed

potatoes has stayed stable at around 200 grams per week per person (Figure 16). Figure 17 indicates a very high consumption of frozen potato products in the UK compared to other countries, with nearly 20kg of frozen potato products consumed annually (note this does not include ambient potato products, such as crisps).

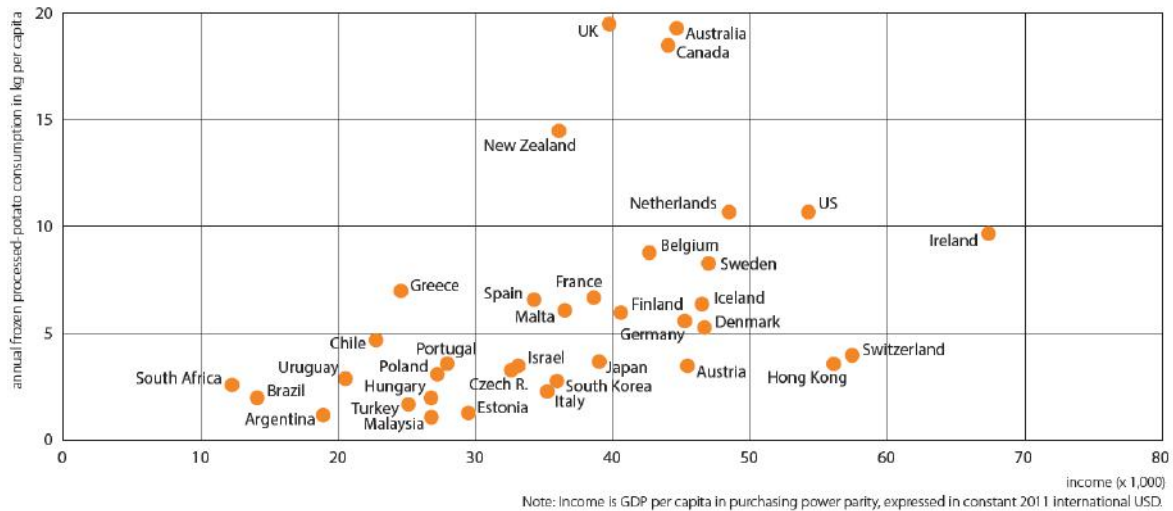


Figure 17: *GDP per capita vs. frozen processed potato consumption 2017*
(Rabostar 2018)

Manufacturing and processing areas of the potato industry have been integral in the growing expansion of different markets and uses of commodities. Manufacturing requires the linking up of trade flows across the world, fresh potato consumption is much more local and domestic. Increasing manufacturing results in a hyper-global system of agri-food networks. Manufacturing and processing of potatoes is dominated by European and North American countries – indeed, this is where ‘higher value-added’ activities are clustered in the global political economy of potatoes. By-products of the production process are becoming even more valuable than the primary use of the commodity itself. This illustrates the expansion and creative destruction and disruption of capitalist innovation. This, however, gives the appearance of progressive change – that technological solutions to the problems brought about but industrial agriculture can be solved by more industrial agriculture and technology.

The rise of manufacturers is particularly important in this story of food regimes being established across global corporate lines (McMichael 2009). The potato industry and supply chain in the UK and across Europe is very different depending on fresh and processed markets. As can be seen from the figure below, manufacturers in the UK potato industry are highly reliant upon imports to supply operations with roughly 1.5 million tonnes being imported every year for processed products (Figure

18). The UK is the second highest importer of processed potato products in the world, behind the United States of America (FAOSTAT 2017).

The majority of imports for processed products comes from the main suppliers in Europe: France, the Netherlands, Belgium and, to a lesser extent, from Israel. The former countries have formed the North-Western European Potato Growers (NEPG) association which aims to improve growth and standards across the processing supply chain. These organisations, as will be discussed later in Chapter Seven, have grown in their responsibilities across the supply chain. These form part of contemporary governance structures their main role is to provide transparency. Transparency across competitors roots out market distortion and creates ‘best practice’. The extent to which transparency and public-private forms of institutional and organisational governance have contribute towards systems of overproduction are discussed later.

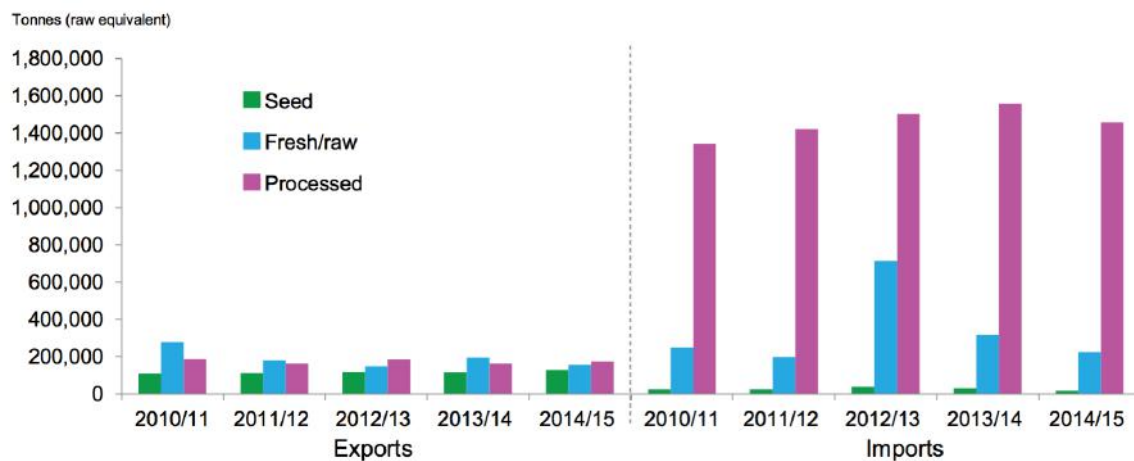


Figure 18: UK Imports & Exports of Seed, Fresh and Processed Potatoes (AHDB 2016)

The continued acceleration and growth of the manufacturing industries of potatoes have important implications on waste generation and management. Firstly, the manufacturing industries produce more by-products. With these due to increase, the non-food uses of potatoes will also grow. Compared with Belgium and the Netherlands, the UK’s potato manufacturing industry is relatively small. Indeed, if the UK can import frozen or ambient potato products from the European continent, why do we need to grow them here? The increasing hyper-globalisation, commodification and valorisation of potatoes through the manufacturing process turns them into products, transforming their teleology – no longer as a food, but as a vehicle for capital accumulation via a path of least resistance. The consequences that this shift in the potato regime has on waste generation and management are significant and unfolding.

Tied in with this growth of manufacturers of food commodities has been the increasing rise and attention of circular economy. Manufacturers are particularly suited to this, as through their production methods large amounts of by-products and waste are generated. In Belgium and the Netherlands, which are the world's largest exporters of processed-potato products, these developments are particularly important. Take this recent EU funded project (Agrocycle 2016):

“AgroCycle is a 3 year project funded by the EU (Horizon 2020). AgroCycle's main aim is to increase the recycling and valorisation of Agricultural Waste, Co-products and By-products (AWCB) 10% by 2020, across the EU and China. The project will further develop, demonstrate and validate novel processes, practices and products for the sustainable use of AWCB. We want to know your view of the key barriers and opportunities to valorising (utilisation for higher value) agricultural and food supply chain by-products, co-products and 'wastes' - such as straw, slurry, forestry residues, livestock wastes, unsold bumper crops, potato peelings, food processing residues, unsold retail food e.g. bread.”

Advanced capitalist societies are now increasingly pushing green capitalism and international trade as the solutions to what they see as the main problems facing societies: economic stagnation, declining competitiveness, environmental degradation and ageing societies. Can the meta-crises of capitalism be solved by these technological and governance fixes which promise the aims of continued expansionary economic growth alongside the preservation of the natural world and the flourishing of human societies? Whilst many of the proposals around circular economies and green economies take the role of producers and manufacturers seriously, often the responsibility is framed as being one of overconsumption on the part of consumers. It is the responsibility of consumers to change their wasteful practices, with the help of producers, manufacturers and retailers. However manufacturers and those at the heart of the extraction model of resource use taking stuff out of the ground, transforming it, selling it and making money, they are actually outsourcing the externalities to someone else. This also depoliticises the urgent issues facing our planet, subjects them to techniques and procedures, placing trust and faith in the guardians of knowledge production who see the world they have created as being the only possible one (Stengers 2015).

The prevalence of demand-sided approaches to social change or ‘consumer change’ has created the idea that in order to change the problems inherent in contemporary agriculture and resource use, it is demand that must change. However such approaches ignore the historical development and structural effects, particularly in food, that these systems produce. Supply-sided approaches which have fallen out of favour in recent decades provide not only a political emphasis on the problems

generated by our unsustainable forms of economic organisation but turn the moral responsibility away from those who do not have the agency or autonomy to play a game of consumer choice in which the cards are already stacked against them.

5.6. Fieldwork with Potato Manufacturers

In food waste research, there is somewhat of a dearth of research and scholarship on large private corporations, with greater focus on alternative food networks or food movements (Edwards & Mercer 2007; Giles 2014). Studies often focus on consumers, households, niche consumer markets and social movements. One of the main reasons for this, I believe, is problems over access to the corporate world as an academic outsider. I struggled getting interest in my research, sceptical voices picked up the phone. I was denied visits and discussions with some of the largest manufacturers (and processors) in the UK. Emails went unanswered. Fortunately however, the contacts I had made in other areas of my fieldwork did enable me to visit and to interview food manufacturers.

5.7. H.J Heinz Company

My first fieldwork visit to a manufacturer was to Heinz, a global food conglomerate that is merged with Kraft. The potato processing plant in Norfolk was the production site of Aunt Bessie's products including 'familiar favourites' like croquettes, hash browns and chips. Under the ownership of the William Jackson Food Group, Heinz had the licence to manufacture Aunt Bessie's products. However in October 2014, Heinz's licence over the production of Aunt Bessie's goods came to an end. William Jackson Food Group announced a lack of manufacturing volume as the reason for the closure. Upon opening new bids for the Aunt Bessie brand, Belgian potato supplier Agristo won the contract, moving production to Belgium and the Netherlands with Aunt Bessie's products being imported back into the UK. Six months after the closure of the plant in Norfolk was announced, Albert Bartlett, a leading potato company in the UK, purchased the plant and continued producing the same products.

The ownership of plants, brands and labels is constantly changing. Contracts opened up to new bidders, mergers formed between different food companies; the role of manufacturers in food supply chains has grown significantly and the operations have become more complex. There seems to be no Machiavellian plan to this, neither is there an end goal, no fifty or two hundred year plan – just carry on from day-to-day, keeping ahead of the competition, ensuring the bottom line. There has been consolidation, or concentration, within each section of the supply chain as has been

discussed in the previous ‘Growers’ chapter and as will be discussed in the ‘Retailers’ chapter that follows this one.

With these circumstances surrounding the future fate of the processing plant in Norfolk, I was unable to visit the main potato processing centre for Heinz in the UK. However, I was able to visit their site at Kitt Green, near Wigan. This is the largest food processing plant in Europe and the largest Heinz factory in the world. Despite potatoes not constituting the whole operation, I was able to discover the processes and developments of waste management at the factory; how they have changed over time and how overproduction and waste are integrated into their operations.

I was guided around the factory by the Waste and Sustainability Officer at the plant. Often the way waste management works at large manufacturers is through subcontracting. This in itself is quite an interesting development over the last thirty years. Not just in food waste, but in the wider industry of waste management, there has been the growth and development of specialised waste management firms. From residential bin collections to municipal sewers, what was once the domain of local councils is now under the remit of large multinational corporations. Across Europe the main waste management corporations are: Cory, Veolia, Biffa, Sita and Amey. These organisations have turnovers exceeding £1bn. According to Biffa, the waste management industry was worth £3bn in 1992 – by 2015 it was worth £16bn.

There is a central dynamic here that is worthy of attention. The more waste there is, the more money that can be made. Fundamentally, it is against the self-interest of waste management companies for there to be a reduction in waste across the value chain. The more waste there is, the more potential value – the more waste there is, the better it is for them. If there is a drop off in the production side which would reduce waste at the consumer level, or, for example, changes in laws and regulations which banned non-biodegradable plastic packaging, then the growth and profits of waste management companies would slide, and their financial profitability decrease. Overproduction and the waste of resources in the excessive productivism of capitalism is necessary despite the mantra of efficiency – the more there is, the more money there is to be made. Regardless of the amount of resources that are required to produce things in the first place, cutting down on production at the start would result in consequences across the whole network of market activity.

Waste and surplus are by themselves considered dirty and offensive. Waste smells, it's annoying, it gets in the way; a big food manufacturer would rather outsource and pay for someone else to have the responsibility of sorting out the waste, finding brass in the muck. Yet those companies who

specialise in the sorting of waste, who take what is worthless and annoying for someone else and turn it into money – valorising the waste – have found themselves with growing roles within the food system. Is this the only reason things are sorted out – because of their value? Is the utility of something the only property which means something is acted upon? Would the waste pile up until it suffocated our societies unless it had value? Not surprisingly, even the profit motive has not cleaned up and made efficient waste management techniques. Rather than increasing efficiency, reducing resource use and developing new technologies, waste management companies have taken large sections of production and increased revenue for themselves and their shareholders, whilst failing to reinvest money back into improvements in quality provisioning. Worryingly, people can show a remarkable resilience in the face of waste to ignore it and carry on living their lives around the detritus, weaving their way past the rubbish until it is no longer possible and the waste is really at your door.

We started on the factory floor, a whirring of cans above our heads zipped around the factory on metal tracks. All the food that is brought into the factory here is pre-prepared, the factory acting as an assembly point, like the end-point of the automotive industry where things are pieced together. Extracting value from these points in the value chain has become increasingly difficult, with very low margins. With the transition to knowledge-based economies, the amount of money that can be made from selling tins of baked beans or potato and leek soup has dwindled; the plant at Kitt Green has suffered from large scale job cuts and diminished workers' rights including lower pensions, reduced holiday pay and annual leave.

The pounding of machines left swirls of steam billowing across the factory floor, thousands of tonnes of soup alone are produced here every year; the procedures and techniques for analysing waste in such large operations is a very interesting development. Double-entry bookkeeping systems, that is accounting, were seen as essential to the development of capitalism in the sixteenth century (Weber 1968). The tools and devices that are used by human beings construct the internal subjectivity of action; it is through devices and objects that we understand the world external to ourselves and others, which in turn shapes how we view ourselves and our role in society. How is waste measured at the factory? How can we accurately measure inputs and outputs, providing margins of error? In a capitalist organisation which rests on efficiency of production, then the reduction of wastefulness is paramount. In retailing, which is different from manufacturing although there are overlaps, it is called shrinkage, which occurs when there are fewer items in stock than are listed on the inventory because they have been lost, damaged or stolen at some point along the supply chain. Within such large factories, what are the techniques for accounting for shrinkage?

“We count them” the officer tells me.

On each delivery into the factory there are barcodes on pallets of produce which state the supplier, grower and where in the factory the food needs to be sent to in order to be processed. This involves a worker with a stock taking ‘gun’ going through each pallet individually scanning each one, checking the delivery against the order. Every day someone does this job. In an era where the machine has supplanted the human as the main productive force for the economy, there are still jobs that humans do which increasingly seem superfluous. Companies are already starting to incorporate more automated and technological innovations into their operations, making this kind of accounting procedure for the minimisation of loss and waste increasingly archaic. These innovations include radio-frequency identification which can track goods and products across supply chains without the need for human interaction, reducing error in the process. Goods can be traced; a life history of their movements codified and analysed. As Ellul (1964) argues, it is the techniques in technological society which really produce the reality and norms we encounter, rather than the technology itself. The techniques make the human increasingly obsolete from decision-making processes in order to improve efficiency, thereby reducing waste and rationalising all productive forces and life into that of economic and monetary value which overrides all other considerations.

As long as the loss, waste and shrinkage in a company does not eat into the profits and revenue of organisations too much it is manageable; the problems of environmental catastrophe can easily be parcelled off or ignored (Foster 2015). Despite the attempts at efficiency, it would be difficult to describe these operations on such a large scale as anything approaching efficient when the externalities to these methods are considered only in their isolated space (the factory).

As we wandered through the different areas of the factory, I wondered what it would be like to really follow the thing. In following the life of the potato across the UK supply chain I have seen millions, if not billions, of potatoes. Once numbers start getting that large it is hard to comprehend. Following six different potatoes – where would you end up? If you took six individual potatoes and traced them as far across the world as possible, would you, like the six degrees of separation hypothesis, end up in all the places in the world? (Hulme 2016). Thermodynamics states that all things are moving into an entropic state, yet still we have this quite individualistic view of following an identifiable thing that maintains its teleology – it was born a potato and will die a potato.

The point being, as we moved to the outside area where the waste collection area was centred, we were surrounded by thousands of tins of vegetables and food stacked up in pallets. “Where are these

going?” I asked, “oh these will be thrown away” they replied, “what do you mean thrown away? In the landfill?”, “Yeah”. It’s moments like this during the exploration of the phenomenon of waste in the potato industry that, despite all the developments made in reducing risk and developing resource recapturing technologies, we still have extremely wasteful forms of production. These tins did not meet standards and clearly it is better they are thrown away rather than being fed to humans or nonhuman animals if the content is only going to make them sick. However, where can they go? These are stainless steel cans, full of food that will eventually rot. It is estimated that the majority of stainless steel cans used for food production will take over 1,500 years to show any signs of decay. Day after day these materials are brought and then dumped. Where was the management side of these *waste management* practices?

The sustainability officer working at the plant spoke of their frustrations with working by themselves in such a large factory. “I want to change things, to buy machines which can make briquettes, to create a generator on site, but I’m on my own in this big business and things happen slowly and people don’t really listen.” Working for a subcontractor within an organisation only added another layer of complexity to the situation. This echoed similar statements made by the farmers, I had visited, people stripped of agency in institutions and organisations where the pace of change is slow in a world that appears to need to change, and change quickly. Rather than multi-stakeholder engagement, working across sectors and developing relationships, people go to work, they come home, go to bed, wake up the next day and do the same again.

I wanted to explore more of the part of the factory that dealt with by-products from the processes used at the plant, and discover how resources were being recaptured by technologies which would then be valorised into other products. With so much food being processed at the factory – thousands of tonnes a day – the waste systems must have been under constant stress and pressure with the build up of coagulants and detritus. I was led outside to a large cylindrical concrete structure out of the centre of which protruded a pole with what appeared to be two giant brooms attached to each side. “This is for collecting all of the crap” they told me, and I smiled at their choice of word. “One person’s crap is another’s gold!” I replied. Gallons upon gallons of water came down a slide that jutted out of the corrugated iron side of the factory. The water was foaming, and had a nondescript ‘gone-off’ smell that was kind of yeasty. As it came coursing down into the cylindrical structure, it was pushed around and around by a motor as the brushes swept up the excesses. From here the centrifuge installations have a screening system which further separates the waste into what is acceptable to be sent into public water ways and what the company have to dispose of correctly according to the law. The screening system then allows the capture of that which is considered

valuable, that is, the starch, the coagulants and the polymers, which can be sold on to other companies.

I wanted to ask who was responsible for ensuring these regulations and rules were followed, but I felt I was not in a position to ask this employee. After leaving Kitt Green I headed for the nearest chip shop and bought a bag of chips. Staring at the polystyrene container, I thought that this might contain one of those six potatoes I had daydreamed about earlier, and then thought about the 1,500 year stainless steel never decomposing and thought the same about the polystyrene; leaving behind traces of ourselves long after we are gone.

5.8. PepsiCo

After visiting the farm in Harrogate, I was given the names of contacts in PepsiCo to find out about about waste in their value chain. Indeed, the ‘value chain’ is particularly used by manufacturers such as PepsiCo, who see their operation as adding value along each linkage. PepsiCo are the largest purchasers of potatoes from growers in the UK. They own the brand of Walkers crisps, the biggest crisp company in the UK along with a number of well known brands. Getting access to PepsiCo was the most difficult of all. I was able to conduct a telephone interview with the sustainability officer who was responsible for PepsiCo's environmental flagship strategy '50 in 5' initiative. When introducing my research to others involved in the potato industry it has been quite interesting to see what people first think of when they hear I am researching ‘waste’.

For the sustainability officer at PepsiCo, ‘waste’ was not just the potatoes themselves, but everything involved in their production:

“Well it depends what you mean by waste doesn't it? Throwing the potato away because it has scab is loss, not waste. That often can't be helped. What is wasteful is too much water, too many pesticides, doing things you don't need to do...wasting your time.”

The 50 in 5 initiative for PepsiCo aimed to reduce amounts of greenhouse gas emissions from their potato production by 50% in 5 years, starting in 2010 and ending in 2015. This is the aspect that the sustainability officer wanted to focus on:

“It is a really good example of how we worked with ADAS (an agricultural sustainability consultancy firm) and growers to develop best practice, many farmers were sceptical but we got them on board.”



Figure 19: *Produce More With Less*

In 2016, the report was issued on the success of the '50 in 5' initiative. Whilst there was no publishing of data, the following developments in the production of potatoes were identified as playing a part in reducing greenhouse gases by 50%:

- Improved storage practice;
- Implementation of renewable energy sources on farm;
- Improvements in yield driven by switching to new varieties;
- Optimisation of nitrogen applications; and,
- Use of new technologies such as drip irrigation and GPS systems in tractors to reduce fuel usage.

As can be seen, the focus here isn't about reducing the overall amount of production which would be the easiest way to reducing greenhouse gas emissions. Indeed, Figure 19 clearly states PepsiCo's aim to produce more food to meet growing populations, eliding the fact that 50% of food currently produced globally is not consumed. Indeed, 'waste' is not identified as specifically potatoes themselves, but instead focusses on identifying the 'wasting' of inputs that go into producing and manufacturing potatoes, even time itself. Instead of reducing overall volumes, the focus is on life-

extending technologies such as improving storage practices, improving yields, optimising fertiliser usage and developing new forms of water use. At the production level, 'waste' is conceptualised firmly as an efficiency problem that can be solved via technological innovations and improving relationships with growers.

Since 2015, PepsiCo have produced an annual 'Sustainability Report' which details their commitment and actions on sustainability. For firms like PepsiCo, sustainability is a "byword for leadership in the 21st century" (PepsiCo 2015). Indeed, Figure 21 states how they view industry's obligation to lead. As powerful multinational corporations – indeed in 2017 PepsiCo had an annual net income of over \$7bn – manufacturers of potatoes are increasingly in a position to dominate and control the supply of food.



Figure 20: *PepsiCo Strategies for Reducing Food Waste*

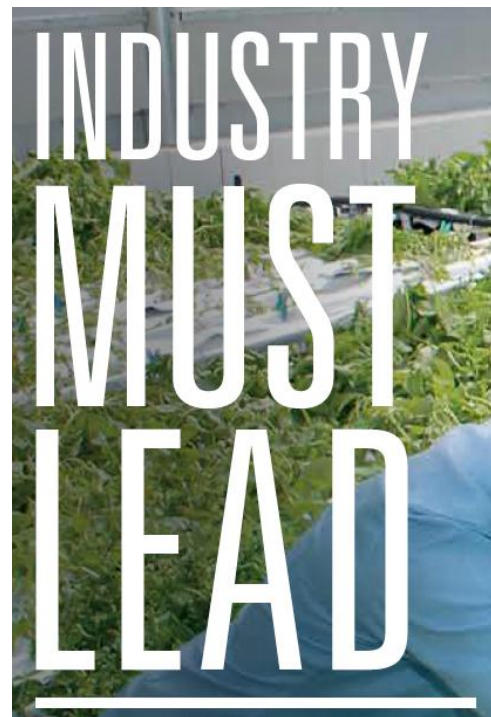


Figure 21: *'Industry Must Lead'*

Furthermore, as processed and manufactured potatoes become consumed more than fresh potatoes, their higher profit margins and value-added potential give manufacturers even more power within the contemporary potato regime. Indeed, if continued, the rate of change will mean fresh potatoes will soon fall off the plate; but crisps will still remain. In their Sustainability Report, PepsiCo recognise the importance of providing nutritional food, supporting environmental quality, labour rights and so on. However, PepsiCo do not sell fresh potatoes – they only sell processed potatoes. Despite reducing salt, frying in different oils or even baking them, crisps are not as nutritious as fresh

potatoes. There is a fundamental tension here, as is also discussed in the Retailers chapter, between capital accumulation and the moderation of excess. Indeed, the moderation of excess is what frames the Sustainability Report; too many people, too much stuff, too many resources being used, together with the acknowledgment that this needs to change. Yet, ‘responsibility’ has become an important corporate word, reflecting shifts in ‘ethical’ or ‘sustainable’ consumption in which firms ‘speak’ to consumer’s ‘values’. Food waste forms an important part of the ‘sustainability agenda’. However, front-facing corporate social responsibility and the framing of food waste action is considered to be achieved through improving efficiencies in production and manufacturing whilst improving consumer awareness through nudging behaviours.

It is worth remarking that the first section of the Sustainability Report is the section on economic performance which focusses on shareholder returns. Between 2006 and 2016, PepsiCo doubled their shareholder returns – indeed, for PepsiCo, economic sustainability for shareholders is perhaps the most important sustainability measure of all. Sustainability, and food waste in particular, has been subjected to corporate greening which has managed to integrate what were once critical and radical perspectives on food production and consumption, and to fold them into the same logic which has dominated the corporate food regime; universalisation and homogenisation of production, more and more yields and the superiority of manufacturing and agro-industrial practices. Rather than focussing across the food system, there are small projects which are held as transformative agendas; entrenching individual actions (whether on the farm or in the supermarket) as solutions to systemic problems. Similar to the ‘distributed responsibility’ discussed in the next chapter on Retailers, PepsiCo see their integral role in the provisioning of potatoes. However, individual farmers are still under pressure from manufacturers to produce the most possible crop and the lowest possible price which provides problems for the human and nonhuman actors in the potato regime. The carefully managed distribution of responsibility positions powerful incumbents as central to any future provisioning of potatoes. This entrenches those with capital and power to act as arbiters of knowledge and money who pick and choose the winners of their sustainability agenda.

5.9. Reflexive Review, Critical Interpretations and Understandings

The chip rumbler was my first introduction into the mechanised potato world. Rumlbers are essential to any serious chip shop operation; they make everything much more efficient. Inside the rumbler are ridges to peel the potatoes without damaging them. A brute steel chassis meets sensitive potato design. My boss didn't know where the peels went – why did it matter? For him, the peelings were not important. However, other forms of waste were very important. Towards the end of the

shift, we only made chips to order so none were 'left to waste'. We used the familiar refrain towards the end of the night that people will have heard up and down the country: "we are just waiting on the chips". Customer waits extended and convenience suspended for managing waste reduction. In the chip shop waste regime, peelings weren't considered important waste, but chips left at the end of the night were. The peelings were washed away through a labyrinth of pipes that disappeared into the thick concrete walls of the basement – concealed and out of sight. The chips, on the other hand, glistened under the glare of a heated lamp.

5.10. Workings and Shifts – Reflexive Review

As detailed in the empirical chapter, the rise of manufacturing in the food system has been one of the most significant developments, not just in the potato industry but across arable sectors. The increasing role of manufacturers and processors in the UK potato regime has developed a particular potato waste regime focussing on the rematerialisation and repurposing of otherwise valueless wastes. In a heavily industrialised potato regime, manufacturers gain increasing control and power. This has manifested itself through the simultaneous institutionalisation and substitutionalisation of potato waste relations.

Institutionally, the expanding realm of law and regulations governing the trajectories of potato waste has adapted to the changing systems of production resulting from innovations in manufacturing processes. As discussed, the beginnings of industrialised potato innovations date back to the middle of the nineteenth century. However, with the technological developments in the late 1960s, this acceleration of industrial manufacturing of potatoes has taken on particular characteristics. These processes have focussed on the diversification of potato products to meet changing consumer practices (such as the widespread adoption of ovens and/or microwaves for cooking processed potato products) and deliver efficiencies in manufacturing processes across national borders. Indeed, the manufacturing aspects of the UK potato regime are the most internationalised – relying on imports from other countries and the exporting of by-products to other sites of production (namely China and Germany). Correspondingly, there is a institutionalisation of waste management practices through regulations and standardisation. Importantly, the regulations guide the responsibilities of individuals and/or organisations in their personal management of wastes whilst more prescriptive standardisations of practices are for products themselves. The intersection between manufacturers and state institutions thus seeks to balance the overproduction of wastes (causing environmental harm) with new avenues for capital accumulation (new products) and social legitimation (persuasive marketing of deliciously salty and

fatty food *products*). Thus the material composition of potato products and their overflows of waste shape the waste infrastructures required for their management.

The commodification of the potato in which its use and purpose are interchangeable allows for the irritating waste to become something new and valuable, deferring the original problem whilst creating markets from the previous trouble. The slipperiness and non-teleological approach to the potato allows for the commodification of what is ostensibly a foodstuff, and thus serves capital accumulation rather than, say, ending hunger. With increased volume and variety, the ensuing accumulation problem has led to the emergence of new devices and processes for moving along the problematic excess. The accumulation problem extending from efficient mechanisation of potato manufacturing leads to the intervening requirements of governance bodies to shift the classifications of waste so they can be valorised into new products which extend the career of the potato. Thus we see the particular power relations and arrangements required in order to ‘move waste along’ and the processes behind food becoming non-food.

The shifting of the UK potato regime towards concentration, specialisation, rationalisation and professionalisation mirrors wider shifts in the food regime. Central to this changing potato regime is the role of manufactures in accumulating wastes to be repurposed and rematerialised across international networks, extending the careers of commodities but at a high ecological and nutritional cost. Due to the high level of capital investment required in developing technologies that move along repurposed and rematerialised waste, this has important consequences for concentration and specialisation within the UK potato regime. As such, the role of manufacturers in the current food regime makes them central to future waste policy and practices. Therefore increasing focus will be placed in this area of manufacturing of food products with emphasis on circular economies and sustainable development.

5.11. Overproduction, (Surplus) and Accumulation – Critical Interpretation

Focussing on the potato itself and its relational traversing of the layers and scales of agro-industrial production allows us to understand the broader processes at work in the UK potato regime. Indeed, as described by Friedland, Barton and Thomas (1981) in their study of the United States’ lettuce industry, the interactions and relations between industrial organisation and agricultural production have profound impacts on the structure and relations of a given commodity. As detailed in the chapter, the increasing mechanisation and industrialisation of agriculture has significant impacts on not only how much waste is produced, but on what kinds of waste are produced and how it is all

managed. In manufacturing, the biological properties of the potato create the conditions for its management. As mentioned later, these developments in the management of wastes are unique to the potato – such repurposing and rematerialising of wastes could not occur in other vegetable or fruit industries such as oranges, peppers or broccoli.

Potatoes enter the factory but depart it having been completely transformed; the processes for the materialisation from raw material (potato) to be valorised into something else (e.g. hash brown or potato soup) are wildly complex and technical. The biological characteristics and materiality of the potato overflows extend beyond the factory into the external environment, leading to the variety of interventions set up in order to manage the problem of waste. Capturing overflows of potato production requires the invention of sophisticated technologies. The impurities in potato wastes need technologies which are able to create a quality product which can be used for its insertion into food and non-food products (Table 3). The research and development required for the invention of said technologies require significant amounts of investment and knowledge, again furthering specialisation and concentration. At the same time as acknowledging the highly complex arrangements for the moving along of potato wastes, we also witness the manufacturing version of a grower ploughing back into the soil. That is, the landfill. The potato undergoes a process of simultaneous deactivation and activation through its multitude of uses, where previously discarded valueless things are now activated for capital accumulation. However, the susceptibilities of potatoes during the manufacturing process are also high – they are quick to spoil and if not prepared properly are hazardous to human health. Despite the ability for industrial organisation and manufacturing to radically extend the life of the potato, its precarious state as a lively food renders it open to wasting.

Manufacturing and processing plants are interconnected to the wider socio-ecological world encountered in the previous ‘Growers’ chapter. The factory is part of the social and ecological network for the UK potato regime yet isolated and compartmentalised. An ANT approach emphasises the interconnection of processes and actors, however much the affective sights, sounds and smells of the factory transfix in their almost magical ability to compartmentalise and segment. Thinking relationally, we also see how the increasing power of manufacturing in the UK potato regime influences the characteristics of the potato. Manufacturers have extended relations with growers, indeed PepsiCo is the largest purchaser of potatoes in the UK, and as such potatoes are increasingly selected for their performance and viability within a manufacturing and agro-industrial regime. Thus the selection process for choosing potatoes narrows – the variety and resilience of

potato come under threat from a more narrowly defined set of characteristics which serve an increasing industrialised system of production.

5.12. Food Waste Meanings – Critical Interpretation

In the manufacturing sites of the UK potato regime, waste has a greater plasticity of meaning. Guidelines provided by organisations such as the Environment Agency over whether something is a by-product or is waste is left to individual subjectivity. In many ways, this reflects the plethora of different approaches which categorical definitions could not completely cover. Rather than providing a centralised schema, decisions are made through individual circumstance and sensibilities towards waste. In this area, there is a blurring between the classifications of waste, by-products, excess, and loss. Manufacturers are more likely to see value in hitherto valueless things. The factory, however, has a remarkable power in its ability to transform and to rationalise wastes as by-products and shrinkage. By-products extend the commodity, shrinkage is seen as unavoidable loss, whereas waste is just, well, wasted. The performativity of different classifications of potato waste therefore frames what can, or cannot, be done to manage the overflows of potato manufacturing.

Substitutionally and in the microlevel practices of human-potato relations we also see the restriction of agency, management of hygienic risks and deferment of responsibilities. Like the potato's ontology, our lives have become slippery too. The places we work and their organisational structures and cultures emphasise and enact flexibility, adaptivity, agility and temporariness. For those working in the manufacturing of foods, waste is very much a problem to be managed; the moral economy of waste understands it as something entirely exogenous, rather than endogenous, something that needs to be got rid of by any means necessary (disposability) or turned into something of value (sustainability).

The individual imaginations and conceptualisations of waste reflect the wider representations and politics of waste; this in turn allows for continued reproduction of waste relations that retains repugnance and disavowal whilst allowing for creativity and innovation. Thus we have the twin dynamic of the simplistic materially ploughing back in (e.g. cans of food going to landfill) or “throwing away”, and the complexity of the web of valorisation and accumulation across the globe. The synergy between these two relational processes furthers overproduction and the accumulation of wastes.

5.13. Food Chain Concept – Critical Interpretation

The industrial and manufacturing trajectories of food commodities disrupt the veracity of chain approaches to the study of food. As mentioned, the overflowing and extended life of the potato as a result of manufacturing and processing means it extends far beyond traditional and dominant concepts of chains. For example, where do oil companies who use potato starch to lubricate underwater pipes fit into the chain? The farm-to-fork or chain concept elides waste. The mechanical networked world of the factories where potatoes are manufactured, processed and transformed can be fruitfully examined through the notions discussed previously: waste transfer, waste disguise and waste deferment.

Going back to the chip shop experience, this microlevel example of potato waste transfer, disguise and deferment is illustrative of wider examples encountered in the manufacturing of potatoes. From the chip shop basement to the biggest food factory in Europe, we see overlapping potato relations across different scales. Manufacturing requires the management of processes. If there is nothing identified to be managed, then it cannot be subject to a process. Thus the potato peelings detritus from the chip shop rumbler were not subject to waste management processes whereas the leftover chips were; the tins of potato soup are not waste whereas the starch effluent was. I consider this an act of waste transfer, a transferring of responsibility. The peelings flushed down the pipes would become someone else's problem; similarly for the tins sent to landfill or the starch coagulants restricting oxygen in waterways. In the factory I visited, the management processes for waste were simultaneously elaborate and simplistic. The microlevel waste relations encountered translate across geographical spaces and scales; there are similar patterns of manufacturing waste practices that map across social scales and relations.

Wastes are collected outside the factory itself, spatially distanced from the main activity of production – the place where value is created and where waste doesn't belong. So there is the physical and geographical disguise of waste itself – 'out of sight, out of mind'. The interaction order established in the factory creates particular conditions for the accumulation and overproduction of wastes which are only partly repurposed. The material transfer of waste 'out of sight' renders it beyond measurement, action and value and thus exempt from conceptualisations of value-producing chains. Another issue of disguise is the resource intensity and requirements for the rematerialisation and repurposing of potato waste. With linear extractive models challenged by circular, closed loop and sustainable systems of manufacturing, whilst better than being sent to the landfill, increasingly circular approaches to the management of manufactured potato wastes still

require significant amounts of energy and investment. Once these practices become embedded in the potato regime, they become locked-in and difficult to shift. Thus they are disguised from the incremental costs over time and space as a result of overproduction and waste.

Again I refer to waste deferment as being as much time-based as spatial. For manufacturers of potatoes, who have suspended the vulnerability of potatoes through life extending interventions, this is particularly interesting. The networked effects extend to the domestic household, where the technological developments in household refrigeration and freezing extend the potato's career. Conversely to the discussions in the 'Growers' chapter, here we can see how manufacturing process offers different findings regarding waste and sustainability. The moving along of specific potato products from manufacturers could reduce waste in the home; the most wasted potatoes are fresh – perfectly sized portions of ready meals of mashed potato are less easy to waste in their sealed plastic containers. Yet, at the same time, the technological solutions offered by a heavily industrialised potato regime that rematerialises and repurposes potato wastes for more valuable products and new markets defers the problem itself. That is, rather than address the issues that arise from an agro-industrialised potato regime that overproduces and wastes, it offers solutions which distract from the problem itself.

5.14. Distillations – Understandings

As with the end of the 'Growers' chapter, I use this section to distill key understandings to help the reader:

- Structural and process similarities between a chip shop and factory: machinery generates waste; waste variably classified.
- Structural and process differences between a chip shop and factory: value potential is recognised or ignored; broader considerations of efficiency in a factory.
- Key manufacturing processes in response to the biological perishability and economic potential of the potato: rematerialising, repurposing, innovation and diversification.
- Key manufacturing meta-processes re-enforced by legal and regulatory frameworks: institutionalisation, concentration, specialisation and professionalisation.
- Co-evolution of domestic and manufacturing core technologies: storage (warehousing), refrigeration (cold/frozen chain), eating (e.g. snacks) and cooking (e.g. microwave).
- Development of internationally integrated supply/manufacturing networks to manage overproduction and legitimise unhealthy potato products.

- UK potato regime part of a global regime.
- The role of manufacturing in circular economies of food, by-product waste and food-waste.
- Manufacturing has a key role in both the diversification of potato food products, and the valorisation of by-products.
- Relationship between the scope and potential of manufacturing and commodification, overproduction and accumulation: waste becomes commodified and valorised resulting riskless overproduction and capital accumulation.
- Particular biological properties of the potato lead to wide range of industrial uses unlike, for example, lettuce.
- Contrasting ‘potato fates’: for example, simple grower plough-backs versus complex manufacturing processes of de-activation and re-activation of biological potential.
- The rematerialisation of the potato has unquantifiable effects on the environment and on nutrition – waste transfer often negative e.g. water quality and fatty and salty foods.
- Surprising role of PepsiCo – nature of multi-national conglomerates and networked non-linearity of production and manufacturing.
- Plasticity of potato waste meanings especially in manufacturing – problem of categorical definitions of waste.
- Performativity of different waste meanings: identifying forms of waste leads to new products and new waste – the cycle of performance.
- Relevance of waste transfer, disguise and deferment to manufacturing in relation to network organisation – inadequacy of the linear chain approach to follow the potato as commodity in all its guises.
- The ‘out-of-site/out-of-sight’ role of factories in the processing and generation of waste.
- The supply chain concept does not adequately deal with the issues of ‘excess’.

6. RETAILERS

6.1. Introduction



Figure 22: *'Every Little Helps'*

The development of food retailers and supermarkets as the key mediators between producers and consumers has been fundamental to the hyper-globalisation of food (Freidberg 2003; 2007). Whilst the globalisation of food has occurred for centuries, hyper-globalisation entails financialisation, technological advancement and acceleration. Such changes in the global economy have had significant impact on local and global food systems with the expansion of capitalist markets and logic of accumulation across the planet (Arrighi 1994). This has resulted in the supplanting of traditional forms of food production, distribution and consumption based around subsistence and peasant farming (Weiss 2007; Patel 2008). This reorientation towards a new logic of food overproduction and accumulation takes place across the world. From the potato fields of Lincolnshire to the alfalfa fields in Jordan to wheat futures being traded on stock market floors, it is within this circulation of goods and products that retailers take up their position in the corporate food regime to influence the spheres of production and consumption. The pressures to produce more and to dispossess people of land and wild animals of habitat to meet a seemingly insatiable demand involves the concentration of land and resources. Multinational corporations hiring near

indentured labour and the degradation of local ecological environments using highly toxic chemicals, are just two examples. Whilst smallholdings and small-scale producers provide much food for communities around the world with 80% of global food produced by small scale farmers, peasants and businesses (UN 2017), food production and distribution in the UK is dominated by four major chains – Tesco, Asda, Morrisons and Sainsbury’s.

This chapter begins by outlining the idea of supermarkets as penumbral spaces, then moves on to describe the major changes in the food retail sector in the UK. As this has been done in depth elsewhere (Hallsworth 2013), I shall not spend a long time examining these changes but rather focus my attention on potatoes and retailers. After discussing three key trends in food retailing – standards, traceability and transparency; yields; and contracts, I use my fieldwork with a large UK retailer, alongside documentary evidence, to consider some of these issues whilst drawing on my own experiences of working in a supermarket to provide an ethnographic account.

6.2. Supermarkets as Penumbral Spaces

...
In my hungry fatigue, and shopping for images,
I went into the neon fruit supermarket, dreaming of your enumerations!
What peaches and what penumbras!
Whole families shopping at night!
Aisles full of husbands!
Wives in the avocados, babies in the tomatoes!
– and you, Garcia Lorca, what were you doing down by the watermelons?
...

– Allen Ginsberg *A Supermarket in California* (2015:31)

“You know where the [supermarket chain] is?” is a phrase I hear regularly. It comes up in a variety of conversations, usually around directions for a particular place or other and I’ve always found it an interesting question. It says something about our relationship between places and spaces. I wonder whether people used to say “Do you know where the [name of pub] is?” or “You know where the mill is?” as a sort of micro-sociological reflection on the important practices and (social) institutions that exist at various points in time, geographical markers of importance. Asking for directions or explaining where something is obviously requires a geographical orientation. Knowing where the supermarket in question is requires knowledge of the surrounding area through social interaction.

What sort of relations and practices do supermarkets establish? This has been a source of debate since the inception of the supermarket in the United States during the 1930s. The self-service supermarket offered consumers a radically new way to shop – but its impact extended far beyond the front-end exchange at a local shop; the supermarket has developed into a globalising force in the production and exchange of goods, affecting billions of lives and ecosystems across the globe.

Whilst cautious of overly fetishistic accounts (Latour 2004) that stray into hubris, and wary of deconstruction without constructing an alternative, I want to develop the idea of supermarkets as ‘penumbral spaces’. Penumbral is a word used to describe a stage of an eclipse, a space which is partly illuminated and partly shadow. In Ginsberg’s poem, the line “what peaches and what penumbras!” provides the inspiration whilst drawing in particular on Freidberg’s ethnographical work on supermarkets (2003; 2007) and, more broadly, on a long strand of research concerned with commodity fetishism related to contemporary forms of food consumption (Cook & Crang 1996; Carrier 2010).

In recent decades, the responsibilities and roles of retailers in food systems have increased dramatically. The number of food scares that came out of the 1990s and 2000s placed attention on the inability of governments to adequately protect and regulate food systems. The developments in food echoed those in many other industries and services, that is the retrenchment of the state and the encroachment of large multinational corporations, quasi-states in their own right. For supermarkets to gain greater control of the food system required a movement along the entire ‘supply chain’, from standardisation and audit controls at production, to packaging and front-end services at the supermarket itself. The concerns surrounding the traceability and sourcing of food drew supermarkets towards greater control of the supply chain in order to reduce the risks involved in food provisioning. Risks to the legitimacy (and bottom line) of supermarkets came through the usual routes of competitive pricing and issues over quality, taste and security but also increasingly from ethical consumer movements regarding forced labour and environmental and social destruction. The increasing emphasis on ‘sustainability’ and ‘corporate social responsibility’ has put supermarkets on a path towards transparency and openness, something made more achievable through their expansion into every sphere of production, distribution and consumption. It is common to find a packaged piece of fruit or vegetables with a picture of the farmer, his (rarely her) name and a gushing narrative about their commitment to environmental protection. These strategies have been an attempt by supermarkets to allay consumer fears over where their food comes from (enabled by the dislocation of production and consumption and distancing over

geographical scales) and the increasing expectation of individuals to act as responsible and sustainable ‘citizen consumers’ (Stolle et al 2005).

This covers the illumination part of the eclipse, but what about the remainder of the penumbra, the shadow? Behind the green colour coding, the pictures of smiling workers and certification labels lies a darker side to supermarket food provisioning, one that is kept a little more quiet. In Joseph Conrad’s (2001:34) novel *Lord Jim*, there is a passage when the protagonist is hauled in front of the court for abandoning ship. He is questioned on his act of treachery and abandonment to which Conrad, in his usual play on narration, muses that “they wanted facts. Facts! They demanded facts from him, as if facts could explain anything.” What can the facts tell us? In the worlds of business and politics, not very much, where dissimulation (hiding the real) and simulation (showing the false) are well established rules of the game.

The fruit and vegetable aisles in the supermarket act as a sluice for the excesses of production. What we see under the tube lighting and LED spotlights of blemish free bell peppers, perfectly round tomatoes and spherical oranges are the chosen few. Some of the motivations for this research stem from my own personal experiences of working in a supermarket. It is a job familiar to many people – the stacking of shelves; the irritable department manager; the conversations that revolve around the football match and the TV; the relentlessness of trade, and the monotony of tasks. It was in this cathedral of consumables or what Franck Cochoy (2011) calls ‘the garden of choices’, that my ideas around the role of supermarkets in contemporary society developed. I was profoundly alienated from my work: other than my knowledge of the names of different types of fruit and vegetables and their likely country of origin, I had no expertise whatsoever. Yet here I was, being questioned by people on what goes well with what, when the *Jersey Royals* (a variety of potato) were coming in and why had we run out of Brussel Sprouts by 11am on a Sunday morning. I found my hesitancy over these questions symptomatic of an ever distancing form of social and economic organisation. My interests were born out of my own curiosity: there was no expectation or requirement however for the employers to educate their workforce – how could they when those employees were responsible for the presentation of over 50,000 items? The whole idea of the consumer as the knowledgeable one, the informed one, the one who could make their own decisions based on the information given to them was placed under great scrutiny during my work experiences, for they seemed as unaware and uninformed as I.

6.3. Major Changes in UK Food Retail

In Frank Cochoy's *On the Origins of Self-Service* (2015) he traces the development of a self-service economy in the United States from the 1920s onwards. Cochoy's take on the rise of self-service retail, and in particular supermarkets, decentres the consumer (and by extension, the human subject/object) as the main unit of analysis and investigation. Rather, Cochoy picks up on the devices and objects that fill the retail space that shape the behaviour of the individual; rather than using market theories to explain the rise of retail in consumer society, we should focus on market matters, focussing on the things (techniques and tools) that make up our social world. As mentioned, in Cochoy's phenomenology he invites us to imagine the supermarket as a garden (2011:111). There are different shrubs and flowerbeds and different tools for different jobs:

“...contemporary supermarkets remind us of the extent to which markets, just like gardens, build bridges between cities and the open country, between sites of consumption and spaces of rural production. The supermarket has displaced the market not only geographically but also in terms of built space. When consumers enter a supermarket they are no longer in the public space of the street. They penetrate instead a curious house everyone can visit and leave, without revealing their identity, but also a house where circulation is restricted: we must first deposit or wrap up previous purchases before entering, we go out with a full trolley (provided you have paid for its contents) or perhaps with an empty one (provided you pass a human or electronic security check), and, of course, you do not steal or grab things and eat them on spot.”

The technical realm of the supermarket has transformed our relations with food. Cochoy's work centres on the USA but the changes are mirrored in the UK where the first self-serve supermarket opened in the 1950s. Much has been written about the retail revolution that transformed British food provisioning (Ducatel & Blomley 1990; 2000): from 'Home and Colonial' grocery stores, to self-service and the creation of out-of-town shopping retail parks, to what is called big-box retailing (Burch & Lawrence 2007). Indeed it is important to note that food consumption only covers one part of retail. Supermarkets in the UK have on average 30,000 items included home-ware, music and video, clothing, pharmaceuticals and garden furniture.

The movement from the scarcity of products, goods and commodities to their abundance has perhaps been the most defining transformation in UK food retailing over the last thirty years. Supermarket shelves stock an array of produce, products and goods with employees rearranging shelves based on plans sent from Head Office. Consumer choice, for those who have money, has undoubtedly increased. Much research has taken place on how supermarkets have shaped identities

and bodies through food consumption (Winson 2004; Johnston 2008). Supermarkets are not only sites of food consumption, but of a vast array of consumer products and commodities. The retail park, with its out-of-town brownfield developments necessitates the use of the car and the socio-temporalities of consumption including the weekly shop.

After the collapse of the High Street in many areas of the UK, retail chains have now moved back into areas in which food provisioning was supplied by a series of smaller specialised shops. For example, much has been written about the rise of 'food deserts' in the UK (Cummins & Macintyre 2002; Shaw 2014). Whilst I disagree with this use of the word 'desert', which assumes a geographical space of emptiness (*vasto*), there are millions people who are struggling to provide food for their communities against an economic backdrop of managed decline and impoverishment in areas that are deemed just not profitable.

Paradoxically, whilst the number of products and commodities on shelves for people to buy with money has increased, the supply has consolidated into fewer and fewer hands with economic exchange becoming by far and away the most dominant mode of exchange. The establishment of the food retailer and supermarkets as the key player in food systems has shaped the production, distribution and consumption of the potato, moving from supply sided markets to demand driven markets that meet the needs (desires) of consumers.

The changes in the rise of retailers and supermarkets have created an "oligopolistic UK food retail sector [that] operates through larger and fewer outlets and market share goes increasingly to the leader...Such trends give economies of scale, improved warehouse/logistic systems, new managerial structures, own brand, and global sourcing possibilities" (Hallsworth 2013:282). It is said that it is easier to imagine the end of the world than it is to imagine the end of capitalism (Fisher 2009). In British food provisioning, it is currently easier to imagine not buying food again than the end of the supermarket.

6.4. Standards, Traceability and Transparency

In the history of food, it is often crises and events that drive forward change (Loader & Hobbs 1999). Particularly within animal agriculture, the latest scares and outbreaks of disease are often what prompt changes in the regulations, laws, cultural practices and economics. The outbreaks of Salmonella and Bovine Spongiform Encephalopathy (BSE) during the late 1990s provide the most recent and notorious cases. Indeed, these events can have consequences for decades after. Only in early 2018 has China lifted the ban on UK beef imports.

Such food scares and problems have led to the use of biosecurity measures to maintain and control the supply and quality of food products entering the marketplace (Tennent & Lockie 2011) using biotechnological innovations in food preservation, packaging and disease control. Food safety means that the food people ingest will not be injurious. This is indeed quite a difficult thing to legally define – what food makes you sick? How do you measure injurious foods over time? Nevertheless, food safety in a corporate food regime has some essential characteristics.

The concentration of food provisioning in spaces of retailer-dominated markets has led to their central role in creating the regulatory environments in which they operate. Rather than following laws created by countries or international institutions, there is an interplay between private and public sectors. This will be discussed further in the following chapter on Overseers, although is raised both here and later in this chapter. In recent decades the risk of food contamination and disease has heightened with globalisation and the interconnectedness of markets. Despite trade liberalisation and the breaking down of borders to encourage the flow of goods and commodities, there is still a two-tiered system for food standards that restricts the flow of food and non-foods across the world.

There are numerous standard regimes: the Sanitary and Phytosanitary Agreement (SPS) was developed by the World Trade Organisation (WTO) under the supervision of the Codex Alimentarius Commission (CAC). In the UK, the British Retail Consortium developed a global food safety standard in 1998. French and German retailers developed the International Food Standard (IFS), the Dutch developed the Dutch Hazard Analysis and Critical Control Point (HACCP), the Food Marketing Institute (FMI) developed the Safe Quality Food (SQF) standard in 2000 and ISO 22000:2005. These multi-scalar standards exist across different geographical zones of food production, distribution and consumption. Why are there so many? In many ways, they all say the same thing: food must be safe for people to eat.

The WTO and FMI act as umbrella organisations, trying to harmonise the different standards set up by different retailers in different countries who seek to make their regulatory regime the one for others to follow. Dutch, British, and French global regulatory standards of accreditation and agreements have replaced the colonial governance methods of direct-rule that forced producers around the world to adhere to their model. The corporate food regime and its regulatory environment have the pretence of volunteerism. The coercion of former food regimes in which farmers and producers were told to grow X in order for Y to consume, now have the illusion of choice. The market is free to enter if you wish, but in reality absenteeism or non-market exchange is

not acceptable. If a producer or manufacturer wishes to export their product or good to another country, particularly to affluent markets, they have to gain accreditation from the standards agencies.

The cause-effect relationships in these transformations around food standards are heavily debated (Mensah & Julien 2011). Are retailers responding to external pressures or are these standards constructed by themselves? Where does the power for institutional change lie in the modern food regime? There is the power of the state that enforces legislation and law. There is the increasing power of multinational corporations who circumvent legislation and law by constructing their own voluntary standards and 'Best Practice' (for example, the Courtauld Agreement discussed later in the chapter). There is also the position of civil society – pressure groups focussed on environmentalism or animal rights. Civil society, however, would more accurately be described as consumer society. The pressure on organisations doesn't come from citizens but from consumers who vote with their money; their power comes from their wallet, rather than their vote or democratic will.

This then becomes a question of food politics and democratic engagement within the fields of food consumption. How does the difference between economic democracy and political democracy influence the modern food regime? What is the point in having a political democracy if economic democracy in modern food regimes is so unequal and uneven? By this I mean the ability for citizens and individuals within geographical areas to influence food provisioning systems. Kondratiev waves in the global economy applied to the world of food; cycles of production and consumption that after each collapse and crisis, such as in 2008 (McMahon 2013), concentrate power. Capitalist economic systems, particularly in the latest wave, lead to crises upon which those with assets (land, capital, intellectual property) entrench their positions of power (Amin 1974;1997).

These processes are also entitled in the history of the potato that has been beset by crisis events that shape its social life (its career). The historical imaginations of objects and commodities are important in how they are produced in the present and in the human relations and identities that are organised through objects and commodities. Indeed, with the focus of this research on the potato itself, the object becomes our ontology (Gallagher & Greenblatt 2000; Reis 2009). Our sense of being and understanding of the world is shaped through the objects we use. In the case of the potato, the perishability and crises-prone nature of its biology influence human relations that extend across the network.

Standardisation is particularly important in the potato industry. As such, traceability and transparency of supply chains have become essential to the performance of modern markets with

food safety management techniques. Potato blight still causes over \$8bn of crop damage worldwide and brown rot, blackleg and ring rot are again on the rise. Dickeya, a more recent plant pathogen discovered in 1972 (Mass Geesteranus 1972), has caused a number of problems across potato producing countries. As discussed previously, nematodes present a serious problem. In the European Union, 15% of the potato crop is spoiled by blight. The biosecurity control of commodities is strictly regulated; 99.8% of potatoes grown in the EU are from seeds developed in the EU. It only takes one bad seed within one box to contaminate an entire crop. Standardisation of seed is also important for the reduction of pests and insects: on a side note, the precarity of the potato crop to disease (from insects or bacteria) has even been a site of geo-political manoeuvrings and accusations. With the supply of food production a key site in national and international struggles, to weaken potato production was considered a strategic goal during the Cold War. In 1824, the ‘potato bug’ was discovered in Nevada although came to be known as the Colorado potato beetle (*Leptinotarsa decemlineata*). Having arrived in Western Europe during the 1920s, it wasn’t until the 1950s that it spread east towards the Warsaw Pact countries. The United States of America was falsely accused of introducing ‘imperialist koloradi’ to destroy the vital potato crop and mass propaganda initiatives were organised to catch the potato bug (Lockwood et al 2007:304).

It is difficult to talk about the potato without separating the seed supply from the ware supply (ware is a generic term used in the industry for potatoes destined for human consumption), and Scotland from England. Whilst this research focusses on ware potatoes, I will now take some time to talk about the regulation and biosecurity methods relating to seed potatoes. The propensity to overproduce, on the basis of perishability and insecurity, is particularly interesting here. Scotland is one of the main exporters of potato seeds in the world, sending seeds to forty countries around the world. All seed potatoes produced and marketed in Scotland fall under the Seed Potato Classification Scheme (SPCS), regulated by the Science and Advice Scottish Agriculture (SASA). Scotland is the only seed potato producing country in Europe that has adopted a zero-tolerance approach to the eradication of Dickeya from seed production. Interestingly, studies have shown that exporting potato seeds from colder areas to warmer areas increases the likelihood of certain pathogens, such as Dickeya, to flourish, limiting the trade and distribution of seed potatoes from Scotland.

There are a number of different approaches to improving food safety and quality. In Scotland, a highly controlled and regulated system exists through the state apparatus. In other European countries, such as England and the Netherlands, there is a prevalence of voluntary agreements and public-private partnerships created alongside seed classification schemes. Other approaches such as

on-farm techniques and diagnostics are also used. “In addition to climate change, increased trade is playing a major part in the spread of the disease and, whilst the distribution of seed potato tubers may be the main cause of this spread, other plant hosts (particularly ornamentals) are likely also to play a role. Indeed, there is evidence that *D. dianthicola* and *D. solani* have spread to potato via this route.” (Toth et al 2011:396). The aims of these approaches towards the strict regulation of potatoes are to reduce waste and loss.

6.5. Yield

What role have retailers had in moving into systems of abundance in agriculture? The questions raised throughout this thesis have been attempts to understand how and why overproduction exists, and what role it has in accumulation strategies. This has involved looking at the circulation of commodities in capitalist economies; in some ways this mystifies the central role of production in overproduction and accumulation. Should we focus our attention on where production takes place in capitalist systems? Focussing on the circulation of goods often entails looking narrowly at the consumption of goods which “forces us to limit conceptualisations of consumption to the first cycle” (Crewe 2000:280). Whilst interest is placed on circulation, how commodities and products are transformed and valorised across new markets, it is the amount of production itself, that is the yield, that is still paramount.

What drives the need to produce more? The origins of the domestication of plants and crops entailed the necessary production of a surplus (Harari 2004:23). Contrary to the assumption that the establishment of domesticated crops and arable farming developed abundance and the creation of an excess (and with it the necessity to store), the origins of a new accumulation model through domesticated agricultural production entailed the creation of scarcity rather than abundance. Selecting from a variety of plants to consume, early farming necessitated the growing of few crops upon which people became reliant. As such, because of the scarcity in the number of crops available to grow, this required an accumulation model centred on the production of many of the same thing. Therefore, yield and the amount of food that can be produced from one area of land became paramount – from potatoes to maize to grain.

This accumulation model of agricultural development existed for millennia, but in the last few centuries, the yield model for accumulation based on the necessity to grow enough food to feed expanding populations, changed with the expansion of global capitalism (Patel & Moore 2018). The accumulation model becomes one of capital accumulation – higher yields are required in order to sell on more than one invested in the first place. Increased yields aren’t necessarily about feeding

populations or providing sustenance, but about increasing capital accumulation through extending the market economy. Once you have a surplus or excess of food, this can be converted into capital, into wealth from which individuals can be incorporated into a capitalist economy. Indeed, the potato is a hugely important food in these debates around the historicisation of what counts as food and how plants become a commodity. The yields from potatoes are often considerably more than other staple crops; more potatoes means more people, more people means more potatoes.

“The threat Malthus spies in the potato, moreover, is worse than the mere irrelevance of the marketplace to *homo appetitus*, for no bodies inside a nation can actually be completely outside its economy. Those seemingly redundant creates multiplying on its margins press inward as potential labor, no matter how unwilling to work, cheapening the general price of labor until the difference between the industrious and the nonindustrious has disappeared. Hence, the potato is in fact no hedge against the marketplace, but is instead that unruly thing that, itself only very indirectly controlled by the price mechanisms of the larger economy, can profoundly disequilibriate it. The economy will never be in equilibrium, adjusting itself to overpopulation, and population growth will eventually slow, but only when people become too weak even to copulate. What Malthus saw when he looked at the potato was the destructive potential of the creatures his own imagination had conjured.” (Gallagher & Greenblatt 2000:131).

What Malthus and other political economists such as Arthur Young and William Cobbett of the late eighteenth and early nineteenth centuries, saw in the potato was a disorderly vegetable, one that accumulated rapidly and was followed by expansions of populations, only for the next year to be marked by scarcity and death. Growing potatoes allowed peasants to exist outside of the market economy – yields and production existed in a cycle of primitive accumulation (De Angelis 2001) and it was deemed necessary to integrate production into the market economy involving the expropriation of land.

Once a system was established in which the accumulation or yield of potato production was tied to a market economy rather than an agrarian model based on subsistence, yields began to increase. The market economy has culminated in the expansion of multinational retailers whose interest in the production of agricultural produce is tied to capital accumulation – the more production there is, the more surplus there is, and the more profit that can be realised that in turn can be reinvested back into new modes of accumulation, thus keeping the cyclical aspects alive.

Yield is difficult to measure for commercial potato production because when the decision is made to desiccate or harvest them, they have not actually reached the end of their life. That is, the final yield

after sorting, processing and so on, may result in a lower amount than when first harvested (Neaverson & Burgess 2013). Nevertheless, it is possible to say that since the 1980s, there has been a dramatic increase in the amount of yield achieved by potato growers. Some point towards the number of different *Solanum* species that have been created such as *S. demissum*, *S. stoloniferum*, *S. verrucosum*, *S. spegazzinii* and *S. vernei* (Jellis & Richardson 1987) which have met the three desired phenotypes: resilience against disease, storage longevity and high yield. At the start of the twentieth century, the main interest in developing different cultivars and strains of potatoes often came from interested farmers and amateurs. However, from the mid twentieth century onwards the state controlled the research and development necessary to meet the needs of the potato industry (Mackay 1987) though in recent decades this has changed with companies such as Greenvale dominating the seed market. Other countries, the United States in particular, have seen companies like J.R Simplot use biogenetics and bioengineering to create new strains of potatoes that were developed through ‘biopiracy’ that has resulted in “significant yield drag and reduction in size profile...losing the sensory attributes that make potato foods so attractive” (Rommens 2018:23). As such, the direct role of retailers in the development of varieties has been negligible. However, because of their influence in the distribution and provision of potatoes, their role is still important in the types of potatoes that are deemed desirable for consumers, as will be discussed later in Section 6.9. of this chapter.

6.6. Contracts

In potato production, with its notoriously complex supply chain, how retailers have shaped issues of waste and overproduction in food systems is particularly salient. As discussed briefly in Chapter Four, the role of contracts within potato industry is an important development since the establishment of supermarkets and retailers. As with many other commodities, the role of retailer power within agri-food supply chains has been much discussed (Winter 2004; Burch & Lawrence 2007). Contractual agreements between growers and retailers underpin most potato production in the United Kingdom, and whilst a significant volume of trade is conducted by manufacturers’ control of growing (as discussed in Chapter Five), the domination of own-brand products in supermarkets has transformed the industry in recent decades.

Contracts between growers and retailers form the heart of an accumulation model built on overproduction and surplus. Contract prices between growers and retailers are fixed at a set amount per tonne, depending on a variety of different factors including previous harvest, demand, potato imports, cost of land and so on. Retailers are incentivised to achieve as cheap a contractual price as possible – the less the amount paid for potatoes, the more profit margin can be gained. For

commodities and products like the potato where there are small margins for profit, future speculation forms an important part of a model that tends towards overproduction. Because retailers want to guarantee an abundance of potatoes in store, there needs not only to be a guaranteed supply from UK-based growers, but for there to be access to international markets for import in the case of shortages or high tonnage prices in the UK. This must also be considered within a wider retail landscape; at times potatoes may be undersold, they might be price-leaders which lure consumers into the shop where they then spend more money on other products and goods which have higher profitability. Because potatoes represent only a handful of items within a huge ‘garden of choices’ (Cochoy 2011), the considerations and importance for retailers is often at odds with those for whom potato production is their livelihood.

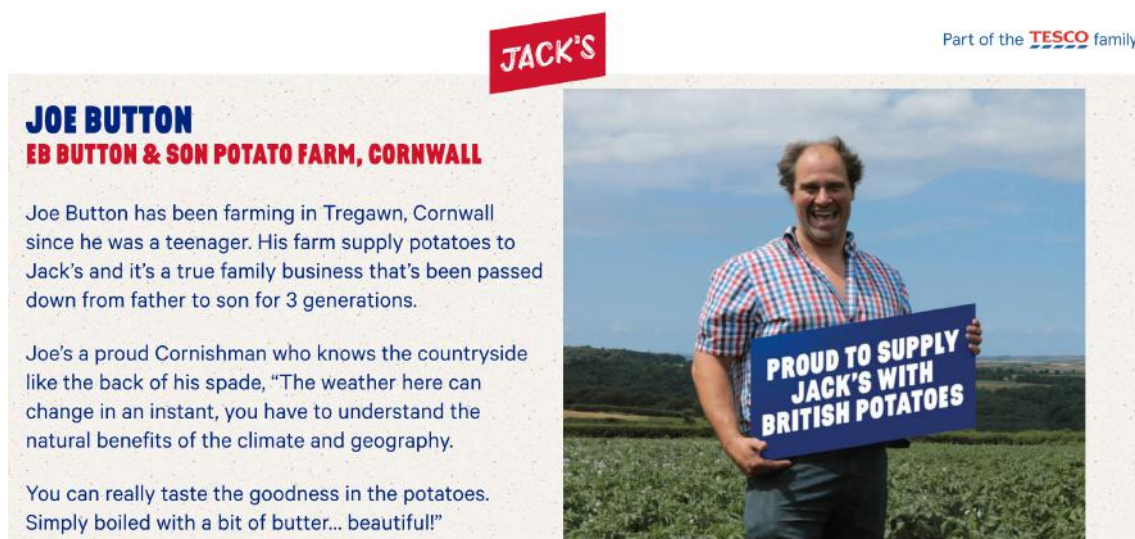


Figure 23: *A True Family Business'*

Whilst retailers are keen to promote the provenance and localism of their supply chains (Figure 23), because of the variations in production, retailers ensure their sourcing and supply of produce is from a diverse set. This involves not only contractual agreements between retailers and suppliers but also involves a free-buy market which operates within the UK and Europe, with some importation from Israel during periods of low trading flows in the UK. At times, the free-buy market may be below the agreed price, but sometimes it may be higher. Retailers hedge their bets against future market changes and variations in supply through contracts with suppliers. In recent years, there has been much attention placed on how retailers fail to build long lasting relationships with suppliers, with contracts often lasting no more than one year – a guarantee to buy the crop at a given price at a particular point in time.

As discussed in Chapter Four, this chapter and the next, the issue of risk is an important part of the accumulation of waste (Gille 2013). The potato itself, because of the precariousness in its very

nature, weaves its way through social relations that exist within the supply chain. Despite the appearances (I refer back to the penumbral spaces) of continuously stocked supermarket shelves that give a sense of formality and inevitability of excess and abundance, the spectres of risk and precarity within potato production that are attempted to be ameliorated through contractual obligations lends itself towards the overproduction and waste of potatoes.

6.7. The Co-operative

The data that provides the some of the basis for this chapter comes from my fieldwork and the interviews I conducted with employees at a large national retailer in the UK – Co-operative Food. I contacted employees within departments related to sustainability and waste management who could describe and explain how their approach and actions around food waste has changed over time, what they saw as the reasons for overproduction, and what can be done with the waste and loss generated.

In Chapter Two I described how I used a snowballing technique to recruit participants to this research: it was in this way that I gained access to individuals in the retailing sector. As already mentioned, some of the growers I interviewed had commercial links with the retailers and were willing to pass their contact details on to me. As I was able to piece together different aspects of the potato supply chain, it became possible to draw upon the different ideas of how people negotiated the world of institutional excess and overproduction. Through these meetings I was also able to visit a regional retail waste facility site that informed my understandings. Whilst the interviewees at the Co-operative were not directly involved in potato procurement or waste, their senior positions in the sustainability and waste areas of the business gave some interesting broader insights.

Angel Square is the Co-operative's national headquarters. Situated in the city centre of Manchester, the rattling of trains and trams crossing the city provided the audio backdrop, a stone's throw away from the consumption kingdom of Manchester Arndale. "This is the most eco-friendly building in Europe", I was told by the Head of Food Sustainability as we settled down to an interview. I glanced to my right and saw a mini Co-operative supermarket filled with plastic-wrapped food from around the world; I looked up and saw rows upon rows of glass offices and workers tapping way on keyboards, sending data and information across the global network.

At the time of my research, the Co-operative was the fifth largest retailer in the UK. Since then, however, the rise of discounter retailers such as Aldi and Lidl have somewhat changed the retail landscape. As mentioned in Chapter Four, after the financial crisis in 2008, the food arm of the

retail group underwent significant changes. With its origins and history in Britain's co-operative and labour movement, the Co-operative is a mutual retailer with over 4,000 stores in the UK, employing over 70,000 people and having 4 million members.

6.8. Vertical, Horizontal and Subcontractual Integration

The Co-op Food's approach to potato supply chains was quite unique compared to the other major supermarkets. Whilst it is customary in many retailer-producer contracts for the supplier to take as much of the risk as possible, the Co-op decided to have whole control over their potato supply chain – “this way we could treat our suppliers better and reduce costs along the supply chain – leading to less waste”. This involved everything from growing, packing, distributing and finally having the shops in order to sell to consumers.

In organisational theory, firms operate along horizontal and/or vertical axis. As discussed in Chapter Four, horizontal integration refers to the strategy of a company whereby it acquires, through mergers or acquisitions or takeovers, other businesses (usually smaller competitors) along the same part of the supply chain who are producing similar goods or services. With potatoes, for example, that would involve horizontal integration along one part of the supply chain – such as growers. This would mean that a company would integrate as many growers as possible in order to trade with other sections of the supply chain such as retailers or manufacturers. This is not common practice for individuals or businesses within the potato industry, instead companies and businesses group into associations or unions. The more common practice for retailers is vertical integration of the supply chain.

There are a number of different ways in which organisations can vertically integrate the supply chain for their products or services. As mentioned, for the Co-op, this involved the total integration from start-to-finish. As discussed in Chapter Four, the long-term viability of this strategy failed. Indeed, the developments which happened over the last two decades at the Co-operative offer a worthwhile example for some of the challenges around waste and food surpluses that organisations face in a networked and financialised system in which food forms but one small part. The complexity of the issues present here were regularly being stated: “If food is coming from the European Union, we can't control what packaging is used there, we try to have a level-playing field of standards and rules but then you have local authorities, different administrative levels, it gets really complicated...” Much scholarly research has focussed on the role of retailers in their dominance and their attempted rationalisation of supply chains through “restructuring their operations, maintaining core managerial and administrative functions while outsourcing

manufacturing to global ‘production networks’ of subcontracting organisations” (Wright & Lund 2003:138). The subcontracting of what to do with and what happens to waste in food systems is an important development: on one hand it is the private responsibility of brand owners or manufacturers to develop, for example, different packaging (recyclable, compostable, and so on) which may lead to reduced waste; on the other hand it is retailers who must also ‘act responsibly’ but with a ‘common’ and ‘joined-up’ approach. Throughout the interviews I conducted I had difficulty over terminology – what actually counts as waste? As we know, what constitutes waste is still a subject of much discussion within both food scholarship and business: as these debates have been discussed elsewhere I will not go into them now, but it is important to note that for individuals in a retailing environment waste referred strictly to products and goods that failed to be sold or eaten.

The attempted rationalisation and incorporation of the waste streams in retailing environments is due to two reasons: efficiency and cost. The Co-op’s organisational structure, like that of all large organisations, is complicated. There is the Co-operative Federal Trading Services arm, responsible for the procurement of food in Co-op stores. After the financial crisis of 2008 and the restructuring of the Co-operative, there were attempts to create a more diverse procurement strategy with smaller groupings able to have more control over purchases with local suppliers, for example. Facing insolvency, many of the key aspects of the Co-op’s supply chain systems for food production and distribution were sold off. The Co-operative’s vertically integrated model was seen to be too risky in an increasingly volatile economic situation and, following the examples of other major retailers in the wake of the financial crisis, their strategy became one of flexibilisation through externalising responsibility whilst ensuring key competences were maintained within the business.

With vertical integration and total control of supply chains from start to finish, the idea is that waste can be minimised along the supply chain. With more control there is greater ability to intervene, to make changes, to trial new methods and to share information without distrust. The model of top-down processes where education and experimentation are conducted by external organisations entails the concentration of power and control within small segments of the food system. This model that was trialed and implemented by the Co-op for decades ultimately gave way to a ‘leaner’ supply chain model with arms-length subcontracted agreements with suppliers and waste management firms. One noticeable development in this subcontractualisation of responsibility is the transferal of agency onto objects, to devices that make up food systems – packaging itself becomes something with autonomy, something that can shape and influence behaviours that may lead to less wastage.

The social processes of wasting, of when food becomes waste, and when waste can become food, is influenced by these organisational and institutional structures and is linked the whole way across food networks (Alexander et al 2013). In many ways, the Co-operative's model for integrated and vertically managed supply chains was characteristic of a previous food regime (McMichael 2009), organised around centralised mechanisms of control that aim towards a particular goal: the provision of food. Collectivisation of resources, especially food, invokes for many in the Western world, imaginations of Soviet gulags, famine and poverty (Reis 2009) and a state-controlled means of production. However the main goal in these models as developed by the Co-operative and that existed until very recently, was the minimisation of resources for maximum return and the provisioning of food at the lowest possible cost. Have collectivised systems of organisation been replaced by subcontractual and flexible supply chains based on managerial oversights and control made achievable goals more difficult (e.g. ending food waste)? The assumption underlying much of the movement away from collectivisation is that individuals who operate within these complex systems do so out of their own self-interest; it is in the growers' interest to reduce inputs, it is in the waste management companies' interest to take waste away and add value. The flexibility and rationalisation of food systems have replaced models of collectivism and vertical integration designed to achieve a stated goal or aim and become spaces of inertia. Inertia and stability are necessary in order for complex systems of production, exchange, distribution and consumption to occur – especially in things like potatoes with long time-scales. Yet what we appear to have now is inertia in areas in which there needs to be change, and flexibilisation in areas that need stability.

The Co-operative provides particularly interesting example in which to study the changing role and position of retailers in the United Kingdom over the last thirty years. With its history in the collectivisation of resources and food in the United Kingdom going back to the nineteenth century, it has faced increasing pressures to diversify and financialise, undermining the long established relationships that existed previously. It is important to note that the improvements made by the Co-operative regarding their potato supply chain over the last twenty years did not cease because of their own internal failings but because of the inter-connectedness of retailer operations stretching across a multitude of different industries that created particular pockets of risk; these pockets of risk brought down areas of the organisation that were not responsible. Thus the interconnectedness of supply chains within a global production network risks the longevity and sustainability of food systems going forward, with short-term and subcontractual agreements becoming the dominant practice of retailers. Goal-orientated behavioural change for institutions and organisations has become a key component of governance, as will be discussed later in this chapter. Whilst we may all be able to agree on substantive topics such as the elimination of waste, the reduction of hunger and

the availability of nutritional food, how we get there is still a matter of much debate within and outside of incumbent organisations and institutions.

6.9. The Retail Supermarketplace for Potatoes

“Where are the King Eddies, lad?”

– Shopper at Asda Hunt’s Cross, Liverpool

Of the thousands of varieties of potatoes, shoppers choose from a selected few. As the above quote shows, some shoppers they have their favourites (Koch & Sprague 2014) – in this case, ‘King Eddies’ (King Edward). In an average supermarket there are a few fresh varieties to choose from: those for baking, those for boiling, and a good all rounder. Most are sold in pre-packed bags, though baking potatoes are often sold loose. “Make sure you pile them nice and high” I was told many times by the manager – produce aisles must give the appearance of abundance, encouraging the customer to rummage through the highly standardised produce to find one that suits their needs and individuality. Individually plastic-wrapped potatoes. New potatoes bring seasonal familiarity and continuity – such as the late Spring arrival of Jersey Royals. Food consumption is still tied to seasonality and established patterns – boiled potatoes in a nice summer salad, mashed potatoes for a mid-winter’s cottage pie whilst operating within an increasing unpredictable and destabilised climate.

The fresh produce section of the supermarket is placed near the front of the store – giving the first impression of freshness. At the front of the store, there are often promotional sections with the latest produce that is on offer. On many days, hours would be spent ensuring that the promotional area was brimming over and never depleted. Shoppers must navigate the aisles, unaware there are elements of potatoes in the medicines in the pharmacy aisle, and in the paper in the stationery aisle. Making their way to the freezer section they stock up on potatoes reformed into smiley faces, dinosaurs, waffles and numerous variations on salt, fat and heat. The retail supermarketplace for potatoes is bewildering in its plethora; from ready-made mashed potato to pet treats made from potato starch – the ever-widening gaps between what we eat or consume and what we imagine and understand.

6.10. Retailers and Surplus Food

The questions here are: do retailers place growers under pressure to produce more? What role has the supermarket itself had in systems of overproduction, waste and excess? Agri-food companies, in

hand with retailers, often promote the importance of producing more food to feed the world's growing population. The focus is primarily on increasing yields, even at the expense of quality and nutrition. However, there is enough food for every human being on the planet to eat healthily and sustainably. For many, the primary issue facing not just food systems but many parts of economy and society, is no longer one of accumulation but one of overaccumulation (Clarke 1989).

On one hand, retailers have the requisite for profit maximisation. On the other, the rising interest around corporate social responsibility and sustainability has placed retailers in the position of being responsible retailers. There is an interesting dynamic in the retailer market in the UK where each of the big retailers is in competition with each other, but yet also have to work with each other to maintain dominance in the marketplace.

In 2014, Tesco took the step of publishing its food waste data. In neoliberal governance, this transparency of information is integral. Transparency is now a social virtue, the idea of the corporate firm shrouded in mystery and obfuscation is no more, and openness is key to corporate social responsibility. Following the transparency of the demilitarisation of Western Europe after the Second World War, during which time countries disclosed to each other how many tanks and frigates were destroyed and so on, the transparency of information between nation states and private firms is a governance phenomenon that has now spread to all industries and sectors of society. Even in our own private lives, being open through informational society and big data is considered important; no one has anything to hide and if you do hide it, then you are worthy of suspicion and with it, the obsolescence of privacy. This transparency has the effect of legitimising the position of the retailer. Rather than trying to cover up how much food is wasted in supply chains, retailers are praised for being 'open and honest' and 'trying to improve what we do every day'.

Retailers, keen to prove their sustainability credentials, have jumped on food waste in recent years as a problem that they can solve. As a social issue, food waste receives wide-spread condemnation. Since 2012, the focus on much food waste discourse in the media and society has been around household food waste. Campaigns by groups such as '*Love Food Hate Waste*' point to the myriad of ways in which individuals can reduce their food waste. As the second most wasted food in the home, potatoes have been part of nationwide campaigns about raising awareness (also discussed in the next chapter) that involve the anthropomorphisation of vegetables, and small behavioural changes designed to reduce food waste at the home (Figure 24).



Figure 24: Love Food Hate Waste's Campaign to Reduce Potato Waste

However in more recent years, and especially since 2014, 'tackling' food waste is seen by some (Welch et al 2018) as a matter of *distributive responsibility*. Rather than the delegation of responsibility onto consumers who are expected to be educated and engaged in their food consumption, the responsibility of food waste is a matter of 'multi-stakeholder' engagement between different institutions and organisations within the food system. The role of retailers in shaping the entire food system from production – including grading standards at processing (seen with the branding and marketing of 'wonky vegetables') – to presenting consumers with selected choices. Indeed, there has been an interesting movement in recent years towards a scaling back of choice, towards a more critical approach within retailers that perhaps more choice is not necessarily better; this has led retailers to a 'streamlining' of their product lines, making choices for consumers based on a variety of metrics and data. In terms of waste, the abundance or excess of choice is seen as contributing towards individual wastefulness; for example consumers are 'sucked' in to deals or offers. It is of note that UK retailers have the highest number of products on offer in the EU with 42% of all products on offer any one point in time.

As long as the retailers are making money, the fact that consumers are filling their baskets or trolleys with more food than they could possibly eat is not a problem because once the food has been purchased then what happens afterwards is not really a retailer's concern. Indeed, the whole 'responsibilisation' paradigm that has arisen in recent decades is problematic in that it focuses on *who* is responsible in the food system. It is the responsibility of retailers to *care* and act upon what happens to food purchased in the stores even after it has reached the home. The personification of responsibility into different groups in the food system leads to the identification and targeting of certain areas or spheres in which people have responsibility to act – power rests in those places where some people have more responsibility than others. The unequal and concentrated food

system, has meant that responsibility becomes a tautological problem – those who are responsible are responsible. Questions of responsibility turns the question of *what to do?* into *who to be?*



Figure 25: WRAP's Food Waste Reduction Roadmap 2030

By positioning themselves as key players in the reduction or elimination of food waste, retailers ensure their incumbent position within existing systems. Rather than being seen as part of the problem, they are seen as part of the solution towards a more equitable and sustainable food system despite constructing and maintaining that very system. As such, the institutionalisation of waste occurs and is evidenced in WRAP's creation and implementation of a 'roadmap' (Figure 25). The Food Waste Reduction Roadmap (FWRR) uses a framework of 'Target, Measure, Act' to halve food waste at the retailer and consumer level by 2030, using the UN's Sustainable Development Goals (SDGs). The FWRR appears to act alongside the Courtauld Agreement, established in 2005 by WRAP. The Courtauld Agreement is a voluntary scheme in which large retailers, manufacturers and hospitality organisations commit to reducing their food and drink waste. With over 150 signatories, the Courtauld Agreement is similar to FWRR in that it is the establishment of goals and aims that compel organisations to changing their practices. The creation of a roadmap in itself limits the possibilities of change, the materiality of a road means that the direction of travel is decided, there is only one path that can be taken. Unlike the Talking Heads song with lyrics by

David Byrne – “we’re on a road to nowhere, we’re on a road to paradise” – the road we are being taken on is supposed to take us to somewhere that is still paradise – a more sustainable future with zero hunger and zero poverty. As David Rieff (2016:53) says, “in our era utopianism has for all intents and purposes been institutionalised as the moral conventional wisdom”. With goals, aims and targets being the main form of institutional and organisational change – from the Millennium Development goals to the Sustainable Development Goals to the FWRR – this creates a particular politics of food and the future of food. The prioritisation of aims and goals depoliticises food – rather than demands, for example, demanding the right to food, the issues surround the production, distribution and consumption of food are operationalised within the language of private-public partnerships in which businesses take the leading role. Old governmental institutions no longer exist and instead act only as the providers of essential services – the provisioning of food thus becomes matter that is decided by the market, business and corporations. It is at their volition and will that change will occur, voluntary agreements that are not binding and when overly ambitious aims and targets are not met, new ones are created (Ehgartner et al 2017).

It is not just in the institutionalisation of waste into food system to valorise food waste into economic growth for capitalist organisations, but the institutionalisation of food surpluses within a wider food system. This is, for example, particularly noticeable with retailers’ approach to food banks in the UK over the last decade. With a huge increase in the number of households unable to afford food due to austerity measures and wider economic difficulties, retailers have joined with charities such as the Trussell Trust and FareShare to distribute surplus food to those in need. As time goes on, food banks become embedded within the food system; those who are reliant on food banks have no other option but to visit them and indeed they provide an important role in that without them people would suffer in hunger even more; but their existence points to some fundamental failures in the contemporary food system to provide safe and nutritional food for all. The framing of food waste and surplus becomes a case of institutional scarcity, as Richard Swannell, Director of Sustainable Food Systems at WRAP (2016), said: “the pressures of resource scarcity, population growth and our changing climate will have profound effects on our food supply in the coming years, and business efficiency”. The framing of these problems is situated within the politics and economics of scarcity – the scarcity of resources, time, and money as the image and text created by Tesco show (Figure 26).



No time for waste.

Figure 26: '*No Time for Waste*'

This image and slogan from Tesco is very interesting. The vegetables organised into a telephone. In Anson Rabinbach's (1990) *The Human Motor: Energy, Fatigue, and the Origins of Modernity*, he argues that modernity entailed the domination of time over space. Whilst geographers, arguing for the central importance of space to modernity, may disagree (Massey 2005), Rabinbach makes an interesting point that the acceleration of time became an integral part of modernity. As Georges Perec (1972:54) quipped, "we are forever meeting people with watches, seldom people with compasses": modernity is about the efficiency of time – no time to waste, no time for waste. From human labour to vegetables, the commodification of things requires its activation, activated in order to bring to life its meaning and purpose. The idea of productivism requires a case to be made against the idleness of human beings, patches of land and so on – they must be converted into something of use, something that has a productive utility. The productive utility of food waste is important in the sense that food has been realised as a form of commodity production even when it goes to waste. That is, its purpose has been unfulfilled – it is not only a matter of economic failure but enters into the realms of moral failure, or the moral economy of wastefulness. The moral economy of waste in this case is not the moral failing of hunger or malnutrition but that commodities have failed on two grounds: they have contributed to inefficiency and to loss of potential profit. Production is on a continuous cycle. Time is money. All waste will be rationalised away through the efficiencies of capitalist organisation – technological innovation and marketisation. Inefficiencies will be washed away, supply will perfectly meet demand, retailers will act as the intermediary between those who

sell a commodity and those who demand it. Whilst this somewhat caricatures a position that disavows or ignores any institutional necessities for market activities, it isn't too far from what is expressed. Although imperfect, it is deemed to be the best system we have and there is no alternative.

6.11. Reflexive Review, Critical Interpretations and Understandings

Whether it's Allen Ginsberg's neon fruit supermarket, Frank Cochoy's garden of choices or a place to get your King Eddies, the supermarket appears to many as a gateway. A gateway that offers an opening to a range from capital accumulation to social distinction to nutritional necessity. Linking global spaces and sites of production and consumption, their economic, social, cultural, political and environmental influence has been huge.

6.12. Workings & Shifts – Reflexive Review

This chapter has traced the development of retailers and how they have shaped the potato regime and waste relations more broadly. This has focussed on the roles of standardisation, yields, and contracts whilst providing a case of one major UK retailer. Food waste scholarship that has researched retailers has primarily focussed on the relations between retailers and consumers. However, this chapter has looked at the relations not just between retailers and consumers but the connections retailers have across the potato regime and what this means for wasting.

From setting standards which restrict availability and variety to influencing production cycles, the impact of retailing on the overproduction and accumulation of potatoes is significant. Retailers not only act as intermediaries between spaces of production and consumption, they actively create concrete social relations of wasting across geographical scales.

As detailed in this chapter, for some retailers controlling the supply chain was important as a way of improving efficiency and productivity. As such, attention was placed on reducing inefficiencies across the supply chain. Thus waste was predominantly conceptualised as an efficiency problem, something which could be reduced and managed through improving relations and technologies along the supply chain. With the wider shifts in the food regime (i.e. hyper-globalisation), this vertically integrated model, however, has not had long term success. The interconnection of globalised networks of trade has created a more dispersed and emergent set of waste power relations: this is particularly so with the diversification of retailers into other areas of the global

economy to increase capital accumulation, such as finance, which has much greater profitability than growing food. As such, a more flexible approach is taken which shields retailers from associated risks of fragile and volatile international markets. With subcontractualisation, lean and agile just-in-time markets of interconnection lead to greater risk which leads to more waste. With greater market volatility through climate change, international trade flows and the financialisation of agriculture, ‘hedging’ against scarcity and shortages of supply becomes more important. As such, despite reputational pressures that emphasise strong and long-lasting relationships with producers and national provenance, the risks of undersupply and broader insecurities enforce a general rule: It is better to have too much, than too little.

Emergent and dispersed power relations doesn’t mean, however, that no power relations exist or that they do not cluster in concentrations. Retailers are still able to use their institutional power to exert control over the flows of waste as discussed in previous chapters and later in the Conclusion. Yet, rather than focussing at the level of production and circulation, there has been greater retailer emphasis in recent years on the sustainable consumer. Supermarkets focus on technological changes (for example, plastic free aisles or compostable packaging) and co-education with the consumer to shape waste practices. As has been mentioned, there is an underlying tension here between the necessity for capital accumulation (economy) and the moderation of excess (morality). Interestingly, retailers emphasise the importance for this to be done ‘together’.

As has been witnessed, the changing of social practices considered unsustainable such as wasting is incredibly difficult. For example, witness the difficulty in moving toward plastic free produce or the selling of ‘wonky vegetables’, let alone systemic changes in the production of food. Yet, it can be done. Moving forward, distributed responsibility across the regime has the ability to entrench existing waste relations leading to overproduction and uneven development. Retaining power whilst promoting the distribution of responsibility is a highly political move: it accepts the legitimacy and incumbent relations, reducing the likelihood of transformation. Indeed, it represents a more politico-cultural turn in the representations of food waste, with the terrain more ideological and symbolic which in turn concretises overlooked relations of waste.

6.13. Overproduction, (Surplus) and Accumulation – Critical Interpretation

Looking at the relations between retailers and other network actors, both human and nonhuman, we can better understand how the shifts described have occurred. Emphasising the materiality of the potato and how it shapes social relations allows us to understand how a regime of

overproduction and accumulation establishes itself. Thinking through the idea of a potato ontology (Reis 2009), the institutional arrangements and flows of potatoes are shaped by the potato itself which in turn shapes the potato and wider waste relations.

The livingness of the potato causes problems. The invention of time-saving and life-extending technologies from refrigeration to starch extraction delay the necrosis but only temporarily. Suspension or reactivation of the biological properties of the potato are discovered and invented creating particular forms of knowledge which are used to shape the biomateriality of the potato towards core characteristics: uniformity, longevity and generalisability. The unruly market-averse potato imagined by Malthus did not materialise; instead it provides the adaptability for shifting and flexible market economies based on growth and accumulation. For retailers, central to the development of the expanding global market economy for food, the flexibility and adaptability of potatoes matches up the broader regime characteristics which reproduce waste relations.

As discussed, retailers' greater orientation towards the consumer in the co-construction of demand has seen more market research and understanding of what consumers know and how they behave. Retailer expectations regarding the limitations of consumer knowledge has led to the generic selling of 'White Potatoes' and the necessity for a 'good all rounder' to cover all bases – roasting, mashing, boiling and frying. Whether or not these desired characteristics are suitable or advantageous for a sustainable food system is thus brought into question. The importance of the retailer continues in acting as an intermediary between production and consumption. Because of their position in the food regime, retailers actively shape the possibilities of cultivation and desirability of potato varieties which in turn has consequences on waste across geographical scales. However, this is also constrained by the varieties of potatoes available and where they can be grown. One finding from this empirical chapter is that the development and enforcement of standardisation and biosecurity have had significant impact upon the potato waste regime. The synergies between standardising the processes of production/selection and the biomateriality of the potato reinforce each other and produce a broader whole which institutionalises overproduction and waste. Thus selection processes are always shaped by the wider socio-ecological system yet the boundaries of this system are expanding and exist across multiple geographical scales, allowing for avenues of new accumulation and valorisation to exist.

Rather than seeing the regime changes outlined as chains of human beings busying around creating new arrangements and institutions which guide and shape the trajectories of goods and products, the focus on the biomaterial characteristics of the potato allows for a different perspective.

Another key finding is the dominance of contracts. Drawing on Cochoy and Latour, I see contracts, along with packaging, as market matters which are themselves vital in the reproduction of the potato waste regime. Contracts are vital in the calculation of value and worth, indeed without them, the contemporary food regime would cease to function such is their importance in auditing and accountability. This will be expanded on in the summary of the Overseers chapter and Conclusion, but it is worth noting that fixed contracts which guarantee prices have long been held to contribute to overproduction and waste, whereas flexible contracts and increasing spot markets reduce an individual organisation's waste generation but create wider waste and surplus across the regime.

6.14. Food Waste Meanings – Critical Interpretation

Understanding the changing management of potato waste through a political economy approach which focusses on the macro arrangements and institutional frameworks fails to capture all the shifting relations of waste – particularly how waste is culturally symbolised and represented. In turn, these shifting meanings and representations impact on how waste is managed by different network actors.

The penumbral space of supermarket spaces simultaneously obfuscates and illuminates the networks of waste relations. Waste is something that needs to be hidden away but also managed, and as such presents an interesting example of the penumbra in action. Obfuscating the reality of waste is important for retailers; throwing away food that is otherwise edible meets with moral condemnation. Thus, alongside the management of food waste itself through efficiency savings or flexible contracts, managing the cultural taboo of waste is an important exercise for retailers. Whilst sentiments towards waste and non-utilisation have a long history in the moral economy of capitalism, this is particularly the case in recent years, where there has been an increasing focus on food waste by retailers under pressure from consumer society. This continues a general trend towards emphasis on sustainable development and corporate social responsibility where businesses need to be seen as 'doing the right thing'. Against a backdrop of stagnating standards of living and increasing food poverty, the phenomenon of food waste intersects politics and socio-economic inequalities. Corporate social responsibility and the moral economy of wasting food have also increasingly shaped retailer conceptualisations and practices of waste. Importantly, and as discussed, this focusses on the distribution of responsibility between retailers and other major stakeholders. One particular area of development in recent years has been the distribution of food waste in partnership with charities, where food waste is less problematically coined 'surplus'. The categorical

shiftings of waste in this regard dictates that food which is longer of immediate use to the retailer (that is, it no longer has economic value to be sold) but still has value, such as improving reputational branding, is therefore not classified as waste, but surplus. The framing of food as surplus rather than waste thus allows for the moving-along of foods that are yet to be waste; processes are extended which enables the classification of 'being something else rather than waste' which then opens up avenues for new relations in its career.

The shifting cultural representations and definitional categorisations of food waste have performatively manifested themselves through how retailers approach and manage waste. Again, this marks the politico-cultural turn towards the symbolic and towards the meanings associated with waste. Improving productivity and efficiencies within their contractual arrangements with growers and other network actors involved in production and manufacturing is still a significant area of action; however the management of potato waste, and food waste more broadly, increasingly focusses on in-store technological changes and shaping consumer behaviour in the home. This has significant implications for how the phenomenon of food waste is approached as will be further discussed below.

6.15. Food Chain Concept – Critical Interpretation

The concepts of supply chains and value chains, of vertical and horizontal organisation and upstream and downstream have all been used in this chapter. However, how accurately do they describe the relations in the UK potato regime? Focussing on the relations, connections and processes involved in the UK potato regime, such depictions of the regime, whilst instructive, fail to capture the circulatory and social aspects involved.

An ANT approach allows these aspects to be captured. Alongside the networked relations of waste in the UK potato regime, the construction of socially legitimate trajectories of waste or alternate categorisations allow for waste to be moved along – or not. In recent years, the relations of waste have expanded to new geographical sites of food distribution and provisioning. Following previous summaries, I use the notions of waste transfer, waste disguise and waste deferment to provide grounding and consistency within and across the thesis.

Firstly, the notion of waste transfer has been used to explain the shifting responsibilities of waste across the regime. This is particularly salient in retailing as has been discussed. Here retailers retain significant power within the regime, but have reorientated resources and focussed actions on more

symbolic and ideological terrains of waste relations. These developments which intersect and shape relations struggle to be captured by a chain approach. ‘Tackling waste’ is thus primarily transferred onto domestic consumers, the individualised responsible sustainable consumer whose demand and practices in turn shape supply. However, retailers also stress the importance of the significant role they have in this co-education and co-construction. Indeed, there is a tension here, as discussed, between the accumulating consumer and the sustainable consumer, the consumer who spends lots of money in your shop but who is also responsible and sustainable in their practices. Hence, there is the simultaneous acknowledgement of responsibility of retailers as self-appointed guardians of the food system, and their transferal of responsibility onto domestic consumers.

Waste disguise is performed through the penumbral space of the supermarket itself. Retail spaces themselves act as constraints on our geographical and sociological imaginations and understandings of food; the penumbral supermarket obfuscates the realities and complexities of food production and circulation. Instead linkages between spaces of production and consumption rely on market matters, particularly packaging and marketing, to orientate understandings of where and what food is being consumed. The boxed container, separated from sites of production with deskilled division of labour and knowledge by itself, creates an act of disguise. The realities of waste generation are mystified through the technical realm of the supermarket and the commodity form. Waste disguise is also performed through the categorical definitions of excess food. Importantly, that which is not measured, can never be part of the chain. Retailers categorise excess food as loss, shrinkage, waste or surplus. Loss and shrinkage are morally neutral terms and reflect the unavoidable impacts of trading as a retailer. Surplus represents something which is no longer has immediate economic value but still has other value. Waste, on the other hand, represents something that is morally repugnant and useless. Yet the waste thrown away by retailers is not useless; it can still be eaten or used for the variety of other purposes in the expanding and increasingly circularised global market economy. Such categorical distinctions allows for waste disguise to reinforce retailer power and legitimation in the regime whilst allowing for overproduction and accumulation that lead to loss, shrinkage and surplus (i.e. waste) to continue.

I treat waste deferment as more time-based. Firstly, this has been examined in the temporal deferment of reducing waste to future targets. Whether it’s reducing the amount of waste at in-store bakeries and delis by 50% by 2025 or promising to release annual reports measuring waste by 2030. Within this, there is still the categorical issue of what is actually waste. Indeed, loss or surplus is currently not classified as ‘waste’. Nevertheless, acknowledgement that waste is an important social, environmental and economic issue should be welcomed. Yet at the same time the deferment of time

entails the institutionalisation of existing social relations of waste which are left without critical examination – we are left with reproducing the same institutionalised relations and processes iterated over time, based on an existing position that is problematic to begin with.

6.16. Distillation – Understandings

- Role of retailing in shaping UK potato regime: standardisation, yields and contracting.
- Retailers as intermediaries and co-creators of concrete social relations – consequences for waste management. Operate at the interface between growers, manufacturers and consumers.
- Conventionally, retail control of supply chain so as to improve efficiency and productivity - waste viewed as an efficiency problem, remedied using relationship management and technological fixes.
- Remedies of vertical integration stall in hyper-globalisation due to complexity of networked arrangements – rise of spot-market flexibility and deeper financialisation. Role of subcontracts, just-in-time and hedging.
- Safeguarding of risks by encouraging oversupply and a consequence of protecting supply is increased waste downstream.
- Despite various structural changes, retailers retain institutional power which, in this context, they have used in co-constructing a ‘sustainable consumer’.
- Underlying tension between capital accumulation and moderation of excess – tension mediated by marketing communications emphasising retailer-consumer togetherness.
- Difficulties of changing retailer practices in really making a difference to consumer waste, likelihood of entrenched retailer-consumer waste relations.
- Need to recognise and understand the politico-cultural turn in food waste representation – retailer retain real power whilst promoting ‘distributed responsibility for waste’. Distributed responsibility leading to less accountability by the various actors in the potato regime.
- Biological properties – especially perishability – of potato shape its commodity flow and wider relations.
- Co-construction of demand impacts on potato varieties and growing locations, with implications on waste. Standardisation and biosecurity impact on potato waste. Resulting synergies further institutionalise overproduction and waste.
- Role of contracts. Fixed contracts can lead to localised overproduction and accountable waste. Flexible contracts can lead to systemic surplus and widely distributed waste.
- Use of “linguistic detoxification” by retailers to disguise waste as shrinkage, loss, surplus. Same object, different language.

- Penumbral space of the supermarket: hides the industrial sources of waste and condemns the waste of the consumer society. Role of Corporate Social Responsibility includes forming charitable partnerships to manage surplus: framing of food as surplus rather than waste.
- Valorisation of waste as potentially reputation enhancing.
- Technological trends: improving industry efficiencies and application of marketing technologies to shape consumer perceptions of waste.
- Retailers as 'self-appointed guardians of the food system' transfer waste responsibilities to the consumer.
- Use of time distant targets for waste reduction part of the temporal deferment of waste.

7. OVERSEERS

7.1. Introduction

In this chapter the term ‘overseer’ is used to refer to the organisations in the British potato industry that have adopted quasi-governmental and regulatory roles that have supplanted traditional forms of state involvement and regulation. I chose this word as it describes an arms-length position of responsibility and power that oversees the industry and its regulation without having a centralised power or authority; that is, acting as organisations who try to oversee changes and developments in the industry. As described in the previous chapters, the movement towards a corporate food regime has included “the incorporation of market strategies into previously State-led functions and the emergence of partnerships that devolve responsibilities to private and/or civil society groups” (Maye et al 2014:402). The integration of these organisations into governance structures and the economics of food has been of particular interest to scholars in geography, economics and sociology. These organisations are popularly referred to QUANGOs (quasi-autonomous non-governmental organisation) and their jurisdiction in the fields of public life has been heavily debated not only in food, but in all aspects of social life. They are non-departmental public bodies which are created and funded either through a levy (taxation) and/or by government funding.

This chapter will outline the development of overseers in the British potato industry starting in the 1930s. Charting the historical trajectory of overseers, and the role they play in potato provisioning and overproduction, is critically examined within the framework of this thesis. This chapter utilises my fieldwork and interviews conducted at the Agriculture and Horticulture Development Board (AHDB) at Kenilworth in Warwickshire, England.

7.2. Brief History of Potato Overseers

In 1931 and 1933, Agricultural Marketing Acts were passed in Parliament allowing groups of producers to market their goods (HM Government 1931). These marketing-monopolies were created in response to price volatility and overproduction across commodity markets, particularly prevalent in agriculture and potato production, in the late 1920s and early 1930s. With the Great Crash in 1929, and the erection of tariffs and quotas to protect American industry and exports in the early 1930s, European producers found themselves increasingly susceptible to dramatic changes in prices (Galbraith 1954:198).

The crisis of the market economy during this period led to a number of different approaches to deal with the overproduction and surplus of commodities; these issues were seen as a failure to stimulate enough demand in the economy. In 1934, the Potato Marketing Board (PMB) was established by a majority of potato growers under the Agricultural Marketing Act, ensuring the standards and processes set out by the PMB were enforceable through law. This wasn't the first time potato producers had asked for government assistance in production:

“...in view of the difficulties of controlling a crop so liable to gluts, so difficult to store for any length of time, and so costly to transport, it was not surprising that when the farmers asked for the government control to be extended into 1919 they were met with a polite but firm refusal. Indeed, the control of the potato can only be prolonged beyond a period of crisis if provision is made to deal with gluts by methods which would convert the excess tubers into some processed material such as flour, dried matter for cattle-food, alcohol, or the like. And when such as been done the problem of the economic disposal of such products under peace-time conditions remains.” (Salaman 1985:576-577).

The PMB was an organisation of potato producers who attempted to control the production and consumption of potatoes. As profits fell, the circulation of commodities in the market economy stalled, resulting in huge surpluses and waste. The distribution aspects of the potato market were considered to be corrupted by middlemen, that is wholesalers, who did little to add value to the economy but instead took large profits (indeed we still see these same debates in the contemporary food regime). In the UK, an agricultural co-operative movement that attempted to increase the bargaining power of producers struggled to materialise with increased competition during the depression, the heterogeneity of farming practices and traditions and individualism (Blythe 1969). Alongside the increasing awareness of how consumer practices can be shaped through advertising and marketing (Figure 27), the PMB was also significant in its approach to the management of the market economy (Woodland 1971;1974).

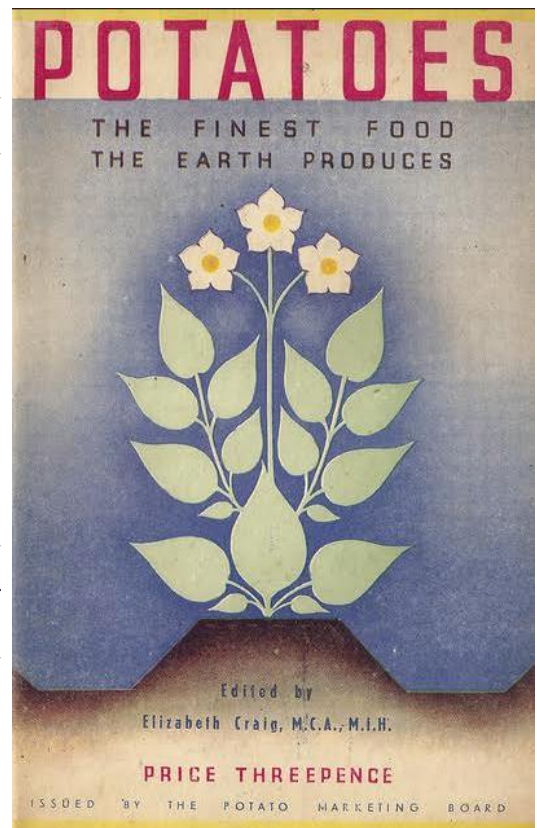


Figure 27: 'Potatoes: The Finest Food the Earth Produces'

The Marketing Acts were intended, according to the Labour Minister of Agriculture and Fisheries Christopher Addison, to ‘equip the British farmer for the first time with a machine that will enable him to be the master of his own market’ (cited in Self & Storing 1963:89). The PMB attempted to control the supply of potatoes through a number of mechanisms: the control of production through allocated quotas, prohibition of sales of tubers below a certain size, fines for excess production and the destruction of undesirable surpluses. The continuation of these market inventions trying to address the issues of overproduction and surplus worked with some success up until 1939, when the Ministry of Food took total control of potato production during the Second World War during which production dramatically increased (Gurney 2009).

After the war, the newly elected Labour government commissioned the Lucas report which investigated the position of agriculture and the continuation of the marketing monopolies and the role of the National Farming Union (NFU). The Lucas committee report, alongside the co-operative wing of the Labour party, was critical of the role of Marketing Boards in agriculture; they were seen to monopolise production in the hands of too few powerful producers which didn’t work in the public interest of providing safe and affordable potatoes. Even so, the Lucas committee suggestion failed to gain political support. The subsidy model that was put in place during the war was phased out, and not wanting to undermine the Labour party’s position as the protector of national agricultural industries, the Marketing Boards and NFU retained their legislative and political power over the production of food resulting in the Industrial Organisation and Development Act 1947 (HM Government 1947) that cemented state and private interests (Self & Storing 1963). In 1949, Dr Edith Summerskill, Parliamentary Secretary to the Ministry of Food, addressed a question raised over potato accounts during the Second World War. In her response, she discussed the subsidy model that was phased out in 1947:

“...so far as a section trade adviser is concerned, he is the principal of a potato merchanting firm. We chose these advisers very carefully during a time when my Ministry was concerned with a large volume of potato business. We had to choose men who we felt would command respect in the area, men of the highest integrity who knew the potato world. We had to choose a man who particularly knew the conditions...which is a very fine potato growing part of the country. Those men, who are interested in potatoes, and have done well in their business could best advise us.” (UK Parliament 1949).

The existence of the PMB continued under successive British governments through the 1960s, 1970s, and 1980s. As outlined in the previous chapters, it was during this period that the potato

supply chain underwent significant structural changes: the rise of retailers, the concentration of producers and technological changes in consumer practices. What the PMB and British government also offered during these decades was a guaranteed floor price for potatoes in order to create price stabilisation in what was otherwise presented as a free market. Any surplus production would be bought by the government at a guaranteed price if the average price per tonne was lower than the guaranteed price: “so in any season when a deficiency payment is likely to be incurred, the Board may, with Government consent, operate a support buying programme. The Board aims to find an outlet for potatoes offered to it under this programme and which are surplus to human consumption requirements...the effect of these market support operations is a better balance between supply and demand.” (Woodward 1974:158). Whilst the governments, PMB and NFU often celebrated the successes of the free market, the collectivist underpinnings through state subsidies and organisations was central to this period in the potato industry that continued a system of overproduction and waste. Indeed, regardless of whether too few potatoes were grown, or too many, producers with close ties to the state received income and subsidisation through subsidies.

These organisations that developed out of the Agricultural Marketing Acts stayed in place until the late 1990s though they had lost many of their original functions as outlined. The PMB was dissolved in an act of parliament in 1999 (HM Government 1999). Two years previously, in 1997, the Potato Industry Development Council Order was established which created the British Potato Council (BPC) (HM Government 1997). It is during this period that we begin to see the start of what food scholars describe as the emergence of public-private partnerships. Rather than intervening in the market through guaranteed prices, quotas and previous forms of intervention discussed, the BPC involved itself more in knowledge-sharing and market information. The BPC didn't last long, however, and with public pressure over the number of non-governmental public bodies that had increased dramatically, the UK government created the Agriculture and Horticulture Development Board (AHDB). The AHDB was founded in 2008 after the British Potato Council, the Home-Grown Cereals Authority, the Horticultural Development Council, the Meat and Livestock Commission and the Milk Development Council were dissolved (HM Government 2008).

This brings us up to the present day. This brief history of the role of non-governmental public bodies, marketing boards and unions has attempted to describe the changing relationships in potato supply chains, the differing and competing interests that continue unsustainable systems of production. The next section of this chapter will discuss in detail my findings from my interviews with members of the AHDB potato section, how the role of non-governmental public bodies fits in with wider food economies and provisioning, and what role they have in overproduction and waste.

7.3. Fieldwork at the Agriculture and Horticulture Development Board

Passing the satellite towns on the outskirts of Coventry and into the rolling hills of the English countryside, the AHDB main office is situated in Stoneleigh Park. Stoneleigh is an agricultural hub managed by LaSalle Investment Management that “stimulates new thinking on food, fuel, water and sustainability” (Stoneleigh Park 2018). The new offices for AHDB were constructed in 2014, merging the previously separate buildings into one space in which knowledge and expertise can be collaboratively exchanged. The purposes of the AHDB defined in legislation are:

- a) increasing efficiency or productivity in the industry;
- b) improving marketing in the industry;
- c) improving or developing services that the industry provides or could provide to the community; and
- d) improving the ways in which the industry contributes to sustainable development.

That is, the main role of the AHDB is to act as an intermediary between producers, manufacturers, retailers and consumers. The AHDB collects a levy from those potato farmers who grow more than two hectares of potatoes and who are charged £39 per hectare. Alongside payments from growers, who are often already subsidised, the AHDB receives £30 million per annum from the UK government. Interestingly, state aid number 225/2009 lodged by the UK government to the European Commission found that there was no objection to the State aid scheme outlined in which growers are subsidised to main competitiveness against other producers particularly across Europe but also the world. The primary responsibility of the AHDB potatoes as told to me by the Director of Research and Development: “we have a primary responsibility I think to the industry, but overarching responsibility to society, you know we are a part of society, the economy is part of society, and I think the problem is that we should only be responsible to agriculture then yeah, who are the stakeholders? Our consumers.”

I had three different perspectives on what professionals and practitioners at the AHDB involved the potato industry are doing in the main, and how their activities tie into ideas and practices around waste, overproduction and sustainability.

7.4. Marketing

The first viewpoint was from the marketing side, which placed emphasis on the end consumer, namely women aged between 22-45. The main concerns of the marketing side were lack of product differentiation and the negative branding of potatoes. Unable to meet the changing demand, there

needed to be a 'recalibration approach' to realise growth and value in the market - however, not necessarily selling 'more' but perhaps, 'more of less'. The AHDB along with Bord Bia (the Irish food board) started a project in 2015 known as 'Potatoes: more than a bit on the side', slogans that continue to reproduce the highly gendered nature of food campaigns. The campaign ran until 2018 and the key aim of the marketing campaign was to change women's attitudes to potatoes. Because women are still the primary consumers of household food shopping, and responsible for the meal time decisions of their families, the focus of marketing was based on the findings of consumer surveys, focus groups and shopping data. With potatoes, the AHDB found that the main concerns over the decline of fresh potato consumption was lack of time (convenience) and health related issues - the idea that potatoes are high in carbohydrates and therefore fattening and bad for you. AHDB potatoes came up with a marketing campaign and secured £3.6m in funding from the EU bidding process. The campaign focussed on promoting recipe ideas to fit in with 'hectic lifestyles', promoting the health benefits of fresh potatoes and the sustainability of consuming 'fresh' and 'local' produce (food descriptions that consumers say would increase the likelihood that they would buy and consume these products).

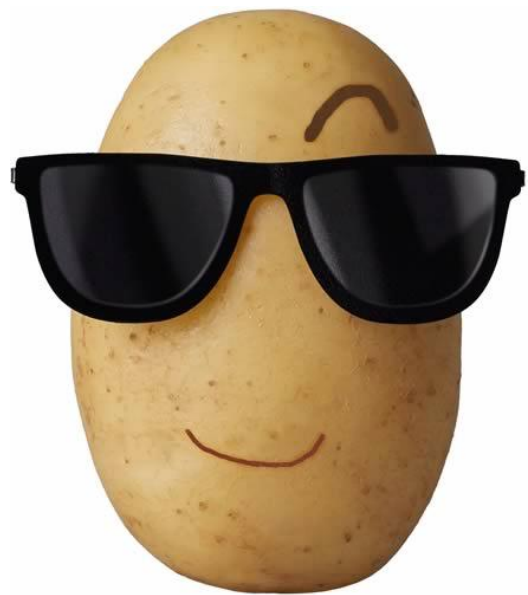


Figure 28: 'Bud the Spud'

In order to do this, the marketing team came up with 'Bud the Spud' (Figure 28) who is an anthropomorphised potato with sunglasses. The ambitious aim of the marketing campaign was to increase consumption of fresh potatoes by 25% over a three-year period by focussing advertising in high profile lifestyle magazines and digital and social media. In 2018, the AHDB considered the campaign a success based on Kantar Worldpanel data (AHDB 2018a) and the engagements of media campaigns (measured by numbers of impressions, views and clicks). However, more recent data has shown a -5.9% year-on-year change in the value of fresh potato consumption and over a three year period since the start of the campaign, it has not achieved anything close to increasing fresh potato consumption by 25%, mirroring similar failures to meet targets in Scotland. The focus of this campaign was particularly aimed at increasing fresh potato consumption because consumer trends had pointed towards the continued growth of processed potato products. Indeed, the year-on-year percentage change from 2017 to 2018 for potato snacks increased by 12.1%, frozen potato products by 6.9%, canned potatoes by 18.2% and reconstituted and converted potatoes by 20.4% (AHDB 2018b).

Because there are different competing interests within the industry - manufacturers and processors want to encourage more consumption of their product - the role of the AHDB, to protect both the industry and society, becomes difficult. There is the necessity for growth, but this necessitates more consumption which ties in with health concerns about obesity: fresh potatoes are known to be healthier than processed potato products, but are also not as profitable or show less future demand from consumers. In this period of growing food insecurity and poverty, cheap food is produced at the lowest possible cost and sold predominately to poor consumers who are mainly motivated by price. The less income one has, the higher proportionally the expenditure on food and food preparation. One question here is how marketing campaigns aimed at encouraging the consumption of more potatoes, fuelling the waste stream and overproduction, are aligned or in conflict with sustainable development and climate change. Because potatoes exist in a competitive marketplace of food consumption, other industries are also trying to grow their businesses and increase profitability. Marketers and advertisers try to do the same things for all other produce - mobilising campaigns to sell their product. If there isn't constant innovation and the stimulation of consumer desire, there is an existential threat and fear that no one will continue to buy their produce and therefore people will lose their livelihoods. The problem here however, is the fuelling of the waste stream and overproduction of crops to increase consumption. Regardless of health concerns, whether the goods and products are being used in the home or whether they go in the bin, what matters is that they have been sold. The measurements and targets for success are built on the continued selling of things predominantly at the supermarket but also to restaurants and takeaways (i.e. chip shops).

7.5. Market Intelligence

The second area of discussion within AHDB potatoes came from the 'Market Intelligence' side of the organisation with the Head of Market Intelligence (MI) and Data Analysts. Much more emphasis was placed on the supply and production questions, with the 'end consumer' (i.e. shopper (woman) in a supermarket) a peripheral figure; the 'consumer' was anyone willing to purchase a commodity at a given price, so this included the whole industry. The main focus here was on producers of potatoes, as they are the ones who pay the levy that supports the AHDB. As previously discussed in Chapter Three, in 2012 the potato industry went through a crisis. As such, much of the discussion with the Head of MI on the long-term sustainability of the potato industry focussed on ideas of 'recalibration' and 'reconfiguration' - accepting the changes in the demand of potatoes and recalibrating the supply of potatoes to satisfy such changes. Rather than looking to increase

production the emphasis was on lean and flexible supply and production of potatoes in order to meet changing consumer demand (frozen products or no potatoes at all). In tailoring supply to meet demand, this is made particularly troublesome in many crops where conflict between flexibility and acceleration sits uneasily against the longer rhythms of the environment seasons and scientific research that takes time (as discussed in Chapter Four).

The two key concepts of productivity and efficiency are important within the UK potato industry when they are compared with other competitors around the world. Productivity and efficiency are subsumed into ideas around resource use and the inputs into production. By lowering the amount of inputs such as water, fertilisers or labour, less wastage occurs. As the Head of MI said:

“...if you are wasting resources, if for every one unit of input let’s say you’re only getting 1.1 unit of output whereas France and Germany, and the rest of Europe might be getting 1.2, that figure’s made up, but the point about it is, efficiency, business efficiency is, if you like, the measure of waste... everything has an element, has degrees of efficiency, nothing will be 100% efficient, and that is exactly my point about the perpetual motion machine, it’s you know, business and energy, it’s the same sort of thing, there has to be some sort of loss, so yeah, the waste in all these things is measurable but progressive and um, yeah, it sort of becomes a measure of efficiency.”

As defined in the legislation, the primary aim of the AHDB is to improve efficiency or productivity. The framing of discussion around waste is situated within the concepts of scarcity - there are a finite number of commodities and resources, and the inefficient allocation of these resources leads to waste and failures in the market. Indeed this has been the focus of much agricultural economics, particularly microeconomics that focuses on microeconomic efficiencies in markets and how these can be overcome by more information and transparency (more on that later). The meanings and values assigned to what we mean when we talk about waste is important. In my interviews and questions I was trying to focus on the issue of potato waste itself as this is the thing that what we are talking about, the potato - that is why this organisation exists. However, the meanings and values (O’Brien 2013) surrounding waste were separated and disconnected from the commodity in which social actors are involved.

Rather than the interview and topic of conversation being about the potato, the issues of overaccumulation and surpluses skip the main object in question as ideas around the reduction of waste involves a web of commodities and goods that are tied to the potato and have a relational aspect to it such as fertilisers, machinery, water, labour, storage and so on.

The intra-industrial networks of the modern food regime dominated by corporations and agribusiness means that the main commodity in the system - commodities that are suitable for human consumption i.e. food - becomes just another thing within a network of commodity production and flows. This is important as it furthers the commodification of food, not as something whose role is to feed people, but as a vehicle for accumulation (Corvellec 2014). Waste and surplus generated by systems of agricultural production, particularly in the modern corporate food regime, tend towards overaccumulation encouraged by state subsidies; this feature is reproduced by individuals engaged in the industry who hold the view that food crops are just like any other commodity. Therefore the waste and surpluses that are generated are transformed along the chain of accumulation to achieve profitability. Food waste is something considered not necessarily as inconsequential, but not worthy of attention in and of itself. It can be understood and perceived through orthodox economic understandings of supply and demand and market efficiencies and as an inevitable consequence of agricultural production (in contrast see Martins (2013)). I brought up these broad issues with the interviewees when using my interview aides to discuss waste and the future of food production:

P [interviewer]: “Do you think agriculture requires a reinvention of the wheel kind of thing then?”

G [interviewee]: “Yes, and that is the whole thing, agriculture is incredibly conservative, and conservative in its thinking, and as a result of that, it is also very stable, because it is subsidised, and this is an argument I’ve been having with whoever stops long enough to listen, but that actually subsidy is going to stifle agriculture because subsidy creates a sort of stability that prevents innovation, people make changes as a result of regulation and a result of dissatisfaction.”

P: “Dissatisfaction with what? Life?”

G: “Yes, anything, they are pissed off, basically, so I’m going to change something, but you never change anything when there is no regulation, you’re happy and the sun is shining, if you know what I mean, everything is working your way, so you don’t change anything, you only change things when the shit has hit the fan and it is all going wrong, and that is exactly right, if you look at the way innovation has happened since the war [World War Two] all the innovation and change came during or after the war, all the progress, okay we have the IT bubble now, and that is sort of competitive thing but um, yeah, out of adversity comes innovation.”

In beginning to really question the dispositions rather than the actions within organisations that are responsible for the oversight and trajectory of the industry, some interesting ideas emerge. On the surface there is the justification of the reduction of waste through efficiency and market mechanisms, but then when this justification is pushed, there are other explanations as to why modern industrial systems of agricultural production continue to overproduce food unsustainably. Often these fall outside of the market economy - regulations and crises. Changes in practices around agriculture are often reactive rather than preventative; it is impossible to future-proof agricultural production - especially with increasing climate volatility. Yet often we are told that the market economy and market solutions to the problems surrounding food waste and distribution can be solved through these means alone, it is just a matter of fine-tuning existing practices rather than systemic change. The idea that people don't change their ways until forced to, that agri-businesses will keep on growing food and businesses will keep on sending waste to landfill unless there is either regulation or crisis - only under these circumstances do things change.

One key role in the fine-tuning of existing practices is to provide transparency and information to AHDB's levy payers and to the marketplace. Through more transparency and information in the market, better decisions can be made. Every week potato prices and information such as harvesting, crop forecasts, storage and levels of trade are provided for farmers:

“Power lies in knowledge and intelligence, and that is why market intelligence particularly exists, we open that up and create clarity in the market so every Joe Farmer on his tractor knows a price because otherwise the local potato merchant could come and tell him any damn price he likes and if there is no way of checking up on that and that's similar to the fertiliser market now...there was no way of checking up other than us standing over the fence and gossiping if you see what I mean, he [the farmer] didn't have any clarity or point of reference...I think farmers pretty much know what the price of a potato is and what is a good price and what is a bad price.” [R].

7.6. Research and Development

From the research and development side, a more nuanced perspective of the relationship between production and consumption was discussed with the Head of Research and Development. By this I mean that the marketing side of the organisation was solely focussed on the consumer, whereas market intelligence was concerned with primary producers of potatoes in the field. Because the potato industry is so varied, with producers operating in different markets, there are difficulties in creating a 'common vision and approach', that is, who is the AHDB trying to help? As previously

mentioned the AHDB has a primary responsibility to ‘the industry’ but also to wider society. The difficulty is, which aspects of the industry are considered most important to promote? As research and development is more aligned to the scientific aspects, with regard to seed programmes and agri-tech companies, ensuring the safety and security of the supply chain was considered paramount, therefore the area of the potato industry in this perspective was not necessarily growers or consumers, but the intra-industrial companies and business that operate within the industry. Because of the emphasis on safety and biosecurity, the issue of food waste, whilst a consideration, was not central or that important. Indeed, more pressing concerns were considered to be about the long-term viability and sustainability of growing potatoes successfully in the UK:

“...you know the whole potato life-cycle is falling off, we are coming to the end of the potato, its had a very grand and brilliant life-cycle, but basically it is in decline, and, you know, accept it, whereas the oven ready chip is in its ascendance now, you know, new products, wedges, fast overtaking them, the question is whether those products will become overtaken by a new product...” [R - Head of Research & Development].

The constant innovation of new product development is seen as one way of ensuring the continuation of potato production in the UK. However, as the quote above from the Head of Research and Development reveals, there is a tension in that whilst these organisations such as AHDB are set up by the government to maintain the supply and demand of potatoes to market, there is not really a necessity to grow potatoes. As discussed in the previous chapter, potatoes are fungible goods. There is really no need to continue growing potatoes - so why do we do it? We need food is the obvious answer and without producers to grow it, there will be no food. However amongst individuals involved in the modern corporate food regime there is little discussion around food sovereignty, there is the discussion of food security, a more nebulous term adopted by governments and business which refers to the need for a safe and nutritional food supply for the population of a given territory. Arguably, it is not the commodity of the potato itself that is of interest or keeps it from being planted, but the relationships and intra-industrial connections between individuals and firms across the food system that ensure the continuation of overproduction and accumulation. Thus the issue of whether or not we should reduce the supply of potatoes, thereby limiting the environmental cost of production, becomes entangled within markets and economies related to arable commodity production but also distinct - for example, the necessity for agro-chemical companies to continue to produce profit and growth through the manufacturing and distribution of pesticides and molluscicides.

From the research and development perspective more attention was given to risk and the environment. This was the most historical perspective too, with discussions going back to the agricultural practices of the last 70 years that have created a 'lock-in' effect in the industry that, as previously alluded to, is perceived to have 'held back' the industry from innovating and modernising; this was a common thread through the interviews with the AHDB staff. This could be perceived as non-governmental public bodies trying to balance what is historically a conservative system with laissez-faire free market economics. As food waste is ostensibly a problem of innovation and efficiency, with more disruption and competition in the marketplace there is less likely to be waste as the unproductive and uncompetitive producers and manufacturers are 'weeded out'. Coming from a non-governmental organisation, this viewpoint was somewhat strange considering they rely on what is really a compulsory farm tax. Indeed the blurring of roles and responsibilities and conflict between non-governmental public bodies such as AHDB, farming unions and actual government departments was evident:

“...the NFU (National Farmers Union) basically exists because they get individuals to pay them an individual fee, right, we exist because we collect a levy regardless of whether you want us to or not, so...our responsibility is to the industry as a whole, whereas NFU's responsibilities are quite clearly to their membership, so our responsibility really is to the development of the industry for society, because in the end we are a government body that is for the country, not just the economy, so maybe subsidies aren't a good thing...but we do work closely with the NFU and that can influence the process.” [G]

Many of the interviewees in all areas of the overseers expressed reservations about the subsidy system currently in place, with the view that subsidies restrict innovation within research and development. As these interviews were conducted prior to the United Kingdom's referendum on membership of the European Union, there was much discussion on the Common Agricultural Policy (CAP) and the effects this has had on the British potato industry. Potato farmers can apply for payments under the CAP's Single Payment Scheme (SPS). The subsidisation of agricultural production in the EU and UK (and United States of America) often continues the overproduction of food and leads to underconsumption, as Gille (2013:36) argues: “once the subsidies are in place for a long period of time...a set of political interests in maintaining them develops. Though the segment that one can call farmers is exceedingly small in both places (5 per cent and 2 per cent, respectively), the political leverage of the agricultural lobbies is enormous.” There are competing demands between what is considered sustainable production, nutritional value and industry survival. Sustainable production often entails the reduction of planting area and the limiting of production.

Nutritional value entails the idea that fresh potatoes are the best type of potatoes to eat compared with frozen products which often contain higher levels of fat, chemical agents and salt. Industry survival in the sense that, despite subsidisation, there is view that if competitors such as potato producers and manufacturers in other parts of the world can produce more efficiently, profitably and competitively then the industry will collapse as the UK will just import potatoes from other parts of the world.

Compared with other countries, particularly in Europe and especially the Netherlands, the UK potato production is geared mainly towards the supply of fresh potato markets (AHDB 2016). As such, the variations in the types of potato production differences between the waste generation entailed within fresh potato markets, processing markets, chipping markets and starch or protein isolate markets. These relate to the issue of potato waste because some potato sub-sectors like those growing for fresh potato supply have a higher propensity to be wasted (for example in the home due to greening), whereas potatoes destined for processing have other issues surrounding waste overflows (such as starch effluence) but less so in households (due to freezing and long lasting shelf lives etc.) (WRAP 2012). Because of these differences, research and development is interested in the idea of 'whole crop utilisation' that isn't possible when some potatoes are grown for ware as this often results in lots of wastage. This ties in with the research and development particularly through seed selection and varieties that are grown which can provide utility for different markets for potatoes, trying to select and breed potato seeds that can cover a wide range of uses. As the industry becomes more concentrated and professionalised, larger firms are able to horizontally organise across the industry. Because investment in research and development of new seeds (privately patented), machinery and agro-chemicals is costly and takes time, the market begins to self-select winners, resulting in the oligopolistic and oligopsonic market structure that exists today, with little sign of change.

Similar to discussions surrounding the CAP and the role of the EU, the discussions around governance were particularly important, with the roles of the European Food Safety Authority (EFSA) and the European Crop Protection Association (ECPA) seen as the most powerful actors in how future risks surrounding potato production, distribution and consumption are managed. The UK's Plant Health and Seeds Inspectorate (PHSI) is responsible for the enforcement of EU law surrounding the growing and transportation of crops. As discussed, the mobility of potatoes are strictly regulated because of diseases such as potato virus Y, blight, brown rot, potato cyst nematodes and ring rot that can devastate crops and result in waste. The administrative and biosecurity procedures for the control and distribution of potatoes are highly regulated and as such, so are the wastes generated from production. These developments are not just confined to potatoes could be

argued to have arisen because of broader concerns around risk (Beck 1995) and biosecurity (Braun 2007). However, as Gille (2013:37) argues, “current thinking on food waste does not merely reflect risk avoidance strategies, but also how that thinking affects how we actually produce food waste.”

The practitioners involved in this aspect of the potato industry saw issues of food risk and waste very much within what Ribot (2010) names ‘the hazard model of vulnerability’. This means that procedures and regulations that are constructed to avoid waste come from diagnosed hazards such as pests, diseases and environmental factors. Therefore, people involved in the potato industry are actively responding to *already existing* risks. The other perspective that challenges this hazard model of vulnerability is that what are perceived to be risks are part of the structure in which people are operating; and the risks present are not a necessary given, but arise because of the practices already existing and embedded within the industry. Because of the nature of the potato industry in the UK, practices such as growing on the same land which has been cultivated since at least the 1940s (which increases the likelihood of disease), risk avoidance and trying to prevent waste through technological innovation and research and development struggles to maintain control over waste. Importantly, and as discussed previously, the potatoes wasted as a result of disease are not even called waste, they are called loss. So waste prevention through biosecurity and research and development becomes a piecemeal scientific operation, breaking down the supply chain and targeting areas for improvement. Whilst there is a consideration of the historical and systemic issues surrounding potato production and waste in the UK, when it comes to devising actions, plans and interventions, from my interviewees and study of relevant documentary evidence, systemic change is considered unrealistic and one must operate and work within the existing practices and systems we have, however much waste is produced.

7.7. Stimulating Demand, Improving Efficiency and Maintaining Waste

This chapter has provided a historical overview of the role of government and non-governmental public bodies in the UK potato industry. The role of such organisations in the governance of contemporary agri-food systems and food regimes has been well documented and discussed (McMichael 2009). As previous research has shown, and as mine has further demonstrated, under the corporate food regime, governments in advanced economies like the UK have passed on much of the responsibility of food provisioning to the so-called free market and non-governmental public bodies. As such, the role of government becomes blurred. As one of the interviewees said and as already previously quoted: “in the end we are a government body that is for the country, not just the economy.” The AHDB is not a government body, but has been specifically set up to have the

legislative power of a government body whilst existing primarily to maintain the profitability and existence of the industry.

The state and governmental procedures built up around the production, distribution and consumption of potatoes focus primarily on issues of risk and hazard avoidance. The strict regulatory and administrative procedures for the management of crops such as potatoes entails the institutionalisation of potato wastes into the food system, the solutions to the problems surrounding the ever-widening term of 'sustainability' are reduced to the two ideas of technological innovation in supply, and creating new demand through new product development and differentiation. Indeed, these are the same arguments that have been made across the agricultural sector for decades; technological innovation to bring about more advanced and efficient techniques of production and the invention of the PMB in the 1930s was designed to manipulate consumer tastes in order to create demand and reduce the problem of underconsumption. This however belies the complicated and long-lasting effects of subsidisation of agriculture in the UK; there isn't really a free market and often, regardless of fluctuations in consumer demand, growers and the agricultural lobby are provided with money (and therefore political power) to carry on producing food even though it may go to waste or not be used for human consumption.

Overseers operate within what they perceive to be a free market of buyers and sellers who come together voluntarily to buy and sell commodities and products. The role of the government, or more accurately non-governmental public bodies, is to provide the frameworks (physical infrastructure and the regulatory environment) through which markets can operate, without picking 'winners' and 'losers' which is considered to be down to the market; see for example the previous section on transparency and price. However, such interpretations not only of how markets operate but the role of governmental institutions in correcting market failures (such as waste) lead to a position in which the decisions and frameworks established not only further the incorporation and institutionalisation of waste into food regimes, but also entrenches the position of power that those central to the industry already hold. Whilst non-governmental organisations like the AHDB make claims about their interest in wider society and the country, the strategies and attempts to improve the industry help those who already involved, those who want to restrict competition and allow as little change as possible, especially around the ideas of food not as a commodity, but as a commons or human right.

Individuals working within overseer organisations, in this case the AHDB, recognise the systemic issues surrounding the issues of overproduction and potato waste within the food system and indeed some argued over whether it was necessary to even continue growing potatoes. However, when it

comes to deciding what should be done to avert these problems surrounding food waste and food inequality, the solutions are around recalibration, or techno-fixes to problems made by those who are already in the industry. Rather than seeing solutions as existing outside of the industry or even beyond state or market forms of food provisioning, when it comes to deciding what we should do, the strategies always fall back onto the same ideas: improving efficiency and stimulating demand.

The efficiency and stimulation of demand paradigm that dominates thinking and action maintains and exacerbates the systemic problem of potato waste, relying on a model of endless growth, expansion and accumulation. Rather than challenging the systemic issues surrounding the long-term sustainability and production of potatoes in the UK, piecemeal strategies are brought together which furthers the concentration of production and distribution of potatoes into fewer organisations and practices. Difficulties arise because of the number of different interests operating across the industry; developing a general ‘strategy’ that takes into account all the industry and wider society becomes impossible, so compromises are made. What we have as a consequence is simultaneously a controlled and planned economy underpinned by the state and enforced through legislation whilst operating under the principles of free market capitalism that tends towards private monopolies and oligopolies. The surpluses and wastes of such production accelerates environmental degradation whilst restricting access to food, furthering its commodification across the food system. These strategies and the role of overseers within the contemporary food regime hinder and restrict movement and any attempts to move towards an equitable and prosperous food future in which food waste must take a central role.

7.8. Reflexive Review, Critical Interpretations and Understandings

The relations between state institutions and agricultural industries are of considerable importance in the historical and contemporary maintenance of a potato regime that overproduces and wastes. Peter Self and Herbert Storing’s landmark *The State and the Farmer: British Agricultural Policies and Politics*, a particular source of inspiration for the background research of this chapter, was published in 1964. Since then, British agriculture has undergone significant changes, particularly in respect of the role of state institutions. As mentioned at the beginning of this chapter, rather than calling the chapter something like ‘The State’, I have chosen the term ‘Overseers’, to elucidate the movement towards a supervisory rather than interventionist model of governance by state and quasi-state actors in the UK potato regime.

7.9. Workings & Shifts – Reflexive Review

Tracing the development of overseers in the UK potato regime, we are able to draw out some key findings that can be related to the conceptual framework that has been developed.

Looking at the role of waste in the contemporary model of accumulation, we see increasing emphasis from overseers on circularity and the full utilisation of the potato crop rather than focussing on yields and providing national sustenance. Whilst yields and national food provisioning are still important, there is more focus on the diversification of potato production and manufacturing. This comes as a result of increasing competition from international potato producers and manufacturers, shifting consumption patterns towards processed potatoes and rising demand for value-added products requiring potato by-products. The UK's potato regime is seen to have global competitive advantage in the areas of research and development, and technological innovation; these need to be 'nurtured' by a supportive state apparatus that facilitates the sharing of knowledge and intelligence. Thus, the potato's increasing function and utility is to extend regimes of capital accumulation; the commodification of the potato entails its expanding (dis)use which moves it away from potato-as-food towards a future of potato-as-non-food.

Drawing out some key findings on the power relations between overseers and the rest of the UK potato regime actors, we see the decreasing power of overseers to govern and dictate the potato regime. In the words of one of the participants: "power rests in knowledge and intelligence." While overseers act as mediators of knowledge and intelligence, this is provided by private organisations under the principle of transparency. The question here, however, is what information is provided and deemed relevant? Indeed, waste is not counted. This is expanded on in the section at the end of this summary. As state actors are no longer able to govern and dictate the potato regime, institutional efforts are instead made to 'shape the market' through advertising campaigns aimed at shifting consumer behaviour and attitudes; yet consumption patterns have not shifted in the ways planned. There is a declining 'tool kit' available to policy makers in state and quasi-state institutions to intervene in potato regime as power shifts towards large corporate businesses. Thus we may see less emphasis on achieving specific *outcomes* of potato production, such as increasing consumption of certain types of potatoes or reducing waste, and more emphasis on more loosely-defined *principles* of potato production such as stewardship, innovation and competition.

Analysing the development of overseers through the concept of efficiency, the salience of this is most clearly represented by the encoding in law that a primary role of the AHDB is to increase

efficiency and productivity within the potato industry. Focussing on whole crop utilisation and sustainability, these attempts to develop a competitive and resilient UK potato industry are framed through the lens of efficiency. A commodity that came to prominence in the UK during the Industrial Revolution, the commodification of the potato thus also lends itself to such ‘reconfigurations’ in its unfolding career. The roles of the circular economy and the bio-economy particularly impact on the shifting potato regime and on waste management. The minimisation of inputs is not necessarily for maximum output, however. This has been a noticeable shift, instead the output required needs to be tailored and diversified where there is market growth and demand. This ties in again with the decreasing emphasis on yields, which are considered to be a historical problem that has by-and-large been solved, and increasing focus on shaping sustainable consumption habits and developing new products and varieties.

Finally, looking at the development of overseers in the UK potato regime through materiality, we again see the movement towards the whole utilisation of potatoes in order to maintain competitive advantage. The transformative biomaterial potential of the potato means that the total utilisation of the crop is possible. Utility is founded on economic value, if the potato wastes (or by-products) cannot be viably transformed into something new, then they are discarded, ploughed back into the soil. This waste transfer to non-food has also historically been to animal feed, however, this is low value and often more hassle than it is worth – hence the incentive for greater value added utilisation. Indeed, despite the complex intra-industrial and agricultural networks that move along potatoes, the ploughing back in to soil is still a widespread phenomenon. The biomaterial aspects of the potato shapes these waste relations, their knobbly uneven sized tubers, their susceptibility to disease and decay without heavy uses of fertilisers along with the other risks identified. So whilst there are complex networks for the intra- and inter-industrial and agricultural trajectories for potato waste, the principles that provide the grounding for the full utilisation of potatoes within a circular or bioeconomic potato regime are often sharply at odds with the already existing waste relations.

7.10. Overproduction, (Surplus) and Accumulation – Critical Interpretation

The biological characteristics of the potato can help explain the shifts in the potato regime towards concentration, rationalisation, specialisation and professionalisation. The particularities of the biological characteristics of potatoes enables their activation and transformation in an expanding waste regime. The emphasis on whole crop utilisation and potential for the diversification of markets could not happen, for example, in the tomato, lettuce or apple industries. The intra-industrial webs interlink potato production and consumption more so than in other food crops; it is

their high starch content and relatively high protein content which shape and in turn is shaped by a shifting potato regime. Indeed this builds upon existing research on the potato (Yakovleva & Flynn 2004) which stated the need for further research in this area.

The centuries-old potato growing areas in the UK are still in use today. The sites identified by the wartime government in recognition of the importance of the potato in the early 1940s are still being used. Despite increasingly declining crop coverage, potatoes are still planted in the same ground. As discussed in the 'Growers' summary, but also raised by overseers, the ecological conditions in which potatoes are grown reach a point where the viability of production is called into question. Ranging from widespread nematodes to declining soil quality, the embedding of practices over time in potato production results in an interaction order that fuels waste. Hence there is a perceived need for what was coined by participants as a 'recalibration' or 'reconfiguration' of the potato industry. There are three important findings here: firstly, potatoes grown in soils that are increasingly unsuitable are wasted (because of a lack of quality or diseased to the point they cannot be consumed); secondly, declining coverage due to unsuitable soils results in more specialised production towards processing and manufacturing which creates alternative waste regimes and thirdly, the reliance upon imports which can fuel the waste stream through risks of transportation. Therefore the wider network of potato production impacts upon the UK potato regime, with fewer quality soils and environments in which to grow potatoes in large numbers, specialisation becomes more important, which in turn concentrates production due to high capital costs, together with international imports. Importantly, and more aligned with a political economy approach, these trading arrangements are reliant upon state and supra-state institutions which has been brought into sharp focus with the UK's departure from the European Union.

Thus the materiality of the potato itself in combination with wider relations between human and nonhuman actors results in a shifting potato regime in regards to overproduction and waste.

7.11. Food Waste Meanings – Critical Interpretation

Waste is defined, negotiated and contested by overseers primarily through an efficiency paradigm. That is, it is predominantly imagined and acted upon as an efficiency issue that sits within economics and sustainability. The focus on the minimisation of waste for economic gain or sustainable development thus misses the ways in which waste is culturally or socially dispersed; the political consequences of this imagination and subjectivities are important. Indeed, the socio-cultural dispersion focusses the politics of potato waste on consumers and the minimisation efforts

are predominantly placed here. Indeed, the shifting politics of the potato has mirrored other areas of state activity where the emphasis on consumers is central; using a responsible and sustainable consumer to shape or drive up standards in production and provisioning. Therefore the meanings of waste are constantly being negotiated, imbricating the incumbent power relations to transfer responsibility.

Even though waste is primarily understood as an efficiency problem, waste also has imprecise meanings. For overseers, there is a broader conceptualisation of waste. Rather than just focussing on potato wastes themselves, attention is placed on the large number of inputs that go into potato production. Entangling potato wastes with other forms of waste such as water, pesticides or cold storage energy consumption, is important. This is seen in such knowledge-sharing courses and programmes such as reducing water use or developing better pesticides. Indeed, building up a wider picture that does not just focus on potato wastes themselves and brings in the variety of resources that are required in order to grow, manufacture and distribute potatoes is, in itself, a positive. Moving from the particular to the general, we can more accurately capture not just the environmental and economic *costs* of potato waste itself but the resource intensity of the multitude of inputs. However, this also has the affective ability to minimise the importance of potato waste itself. Firstly due to it not being measured, and secondly the phenomenon in question (potato waste) is made invisible with it being just a consequence of agricultural production. When it comes to waste management, what is important and acted upon is not potato waste itself, but the development and maintenance of the myriad of devices and actors that surround the complex social life of the potato.

Individual imaginations and sensibilities to the phenomenon of waste reproduce the subjectivity that waste is something out of place and needs to be minimised. Waste needs to be quantified, identified and measured in order to be acted upon and minimised. As will be discussed below, the role of overseers in this is vital. One of the primary roles of overseers is in the dissemination of knowledge. However, as mentioned, what information is given to them and who decides this? What is and isn't waste is contested, and when it is classified as waste there are particular politics involved. This has the affective power to firstly shape overseer action on consumers who 'waste' potatoes which is more interventionist while there is more hands-off engagement with producers who 'lose' potatoes. Secondly, and as a performative consequence, this has the moral and political affect of minimising the role of production and industry in the generation and overproduction of potato waste.

7.12. Food Chain Concept – Critical Interpretation

Adopting a single commodity approach that explores the networks of waste within the UK potato regime, the role and development of overseers are found to be important network actors. Where would overseers take their position in an orthodox understanding of food chains? Indeed, the chain approach for food production doesn't account for regulators or overseers – instead it focusses on producers, distributors, processors, retailers and consumers. Furthermore, increasing emphasis on the circularity and whole potato utilisation means this conceptualisation is even less likely to capture the networks and overflows in the UK potato regime.

I again use the notions of waste transfer, disguise and deferment. Overproduction and surplus, as discussed, have consistently required the intervention of the state in order to correct market failures whether in agricultural production or finance. In Marxian political economy, this interplay between crises of capital accumulation and state legitimation is well established and discussed. As O'Brien artfully describes, without state intervention to regulate and move along surpluses into organised industrial networks of production, the routinised crises of the market economy stagnate and recede. While there is still a strong involvement of overseers in the UK potato regime, the dominance of concentrated corporate actors results in the watering-down of the power of state overseers. As such, their governance role has moved towards their becoming a mediator between production and consumption. This is evidenced in their role of producing monthly, quarterly and annual reports on the state of the industry. These reports gather information from potato producers yet do not include waste. The lack of accounting and auditing of waste must mean it is not worthy of consideration – but why? Considering the other accounting of inputs which are important for the reduction of inefficiencies, the conclusion drawn from the lack of reporting and accounting of waste indicates the transfer of waste as a problem to someone or somewhere else.

The above is similarly at work in the disguising of waste. Again, if something is not measured or accounted for, in the contemporary food regime and more broadly in a knowledge-based service economy that places emphasis on transparency and information, then it cannot exist and be managed. As mentioned, potato waste is itself disguised by focussing on the surrounding inputs that go into the complex potato regime. Focussing on everything but potato waste itself has the power to hide the realities of waste in which there is significant ploughing in and overflows into waterways or landfills.

The methods of waste deferment by overseers have taken on particular temporal characteristics. Importantly, the temporal effects of waste deferment pass along waste to other geographical spaces, notably the domestic household and imagined techno-future of food production. The temporal shifting of waste towards the future entails has a powerful impact on the politics and practices of wasting. Steerings by overseers towards a more efficient and recalibrated potato regime that is more sustainable is predicated upon technological innovation and solutions which may, or may not, materialise. Thus there is a recognition of a problem, but that this will be fixed in the future through a relatively unproblematic technological solutionism. The complexity of the network is minimised – exogenous threats exist, but can be overcome. The role of production and industry fuels not only the amount of potatoes wasted by those actors themselves, but also has broader network effects in the products and food brought to market and from which consumers have to choose. For overseers, the politics of the potato is established where production and industry can by-and-large be left to create a sustainable potato future that minimises *loss* and improves efficiencies, whilst consumption in the household needs intervention to behavioural changes to stop *wasting*.

7.13. Distillations – Understandings

Following on from previous chapters, I provide a distillation of key findings and understandings to come out of and be drawn from this chapter. These are again used to aid and give clarity to the reader, to provide consistency through the thesis and be used in the final Conclusion in bringing together an analysis and understanding of ‘the potato wasters’:

- Overseer shift from dominating national potato politics and practices in the 20th century to a less interventionist role in a corporate food regime.
- Focus on diversification, recalibration and reconfiguration of the potato industry to drive competitiveness and innovation in a hyper-globalised potato regime.
- This focus could result in slow movement away from subsidisation of agricultural production for food to subsidisation of agro-industrial production of foods and non-foods e.g. circular economy and bio-economy.
- Diversification into new products and potato pathways extends capital accumulation – valorisation of waste relies on historic commodification of potato.
- Particular emphasis of overseers on creating efficiency; shifting efficiency away from increasing yields but towards sustainable development and circular economy.

- Circular economy focusses on efficiency, productivity and sustainable consumption but also the need for new products and capital accumulation and thus a difficult tension for overseers to overcome and manage.
- The diversity of potato materiality allows for overseer recalibration; potatoes align with state and quasi-state interests, potato career linked with state interests and rise of industrial society.
- Shifting commodity role and status, potato futures are unfolding and open-ended.
- Waste is conceptualised broadly by overseers but often understood as a consequence of agricultural production that can be minimised.
- Important role in dissemination of knowledge; in a knowledge-based economy, overseers act as a mediator of trusted information for network actors.
- The information itself is provided by private individuals and organisations – what information is provided and methods of accountancy, and indeed waste not being included, is given legitimation by overseers.
- Vital role of overseers in ‘moving along’ waste; potato waste pathways require involvement from state and quasi-state institutions.
- Waste is seen as a problem that can be fixed ‘down/along the line’; technological innovations and diversification to manage *loss* (i.e. waste) at production, and behavioural change to manage *waste* during consumption.

8. CONCLUSION

The final chapter of this thesis brings together the understandings and interpretations from the empirical chapters through the idea and construction of ‘the potato wasters’. Used in the title of my thesis, the potato wasters is used as a springboard to provide a discussion which addresses the research aims and objectives (1, 2.1. and 2.2.). Aim 2.3. is addressed in a separate section which discusses my contribution to the sociological study of food waste. These discussions are also framed through the development of my conceptual framework which structures the discussion. I conclude by developing future prospects for the potato and food waste research.

8.1. The Potato Wasters

In the introduction, I presented the potato wasters in reference to Van Gogh’s famous painting titled *The Potato Eaters* (Section 1.1.). In the painting itself, we witness a family gathered around a small square table sharing a plate of boiled potatoes and coffee. For some, the body language and expressions of the people may seem dislocated from one another, a supper scene of sorrow and detachment. The mother stares at the carefully poured coffee held by her coarse laboured hands; the father stares into the distance with a detached gaze as his daughter looks up to him expectantly. We do not see the youngest child, the only one standing with her face turned away; perhaps a signal to a betrayal of a younger generation that we cannot yet see, the fragility of life and hanging spectre of death in the rural scenes that Van Gogh depicted. Yet, in this painting I do not see dislocation and atomised lives but attachment and connection; the relations between people gathered intimately around the dining table of their small cottage, sharing food and drink. In the middle of the table, the steam from the freshly boiled potatoes billows gently towards the solitary light; we can almost smell it. The potatoes are central, they bind the relations between people; lives organised and shaped around these knobbly tubers. Like much of Van Gogh’s work that sees people as part of a natural process, I think *The Potato Eaters* is emphasising the intimate relations between humans and nonhumans too; between people, land, potatoes, the coffee pot, the sole painting on the wall and the crooked wooden dining table.

So when we come to the potato wasters, like *The Potato Eaters*, I emphasise the relations and connections between people and potatoes. In our minds, when first think of the potato wasters we think of people. Yet when I think about the potato wasters, I am not thinking about individuals but I am emphasising the intimate and interconnected relations between people, potatoes and wider natural processes. Focussing on the relations between people and things, we can unearth and

discover new ways of seeing and challenge some dominant assumptions on who are classified as the wasters. By focussing on the potato and the relations it establishes, I offer something different to conventional single commodity analyses and provides an original contribution to food waste scholarship.

The above remarks reflect two core concerns of the research: the need for different perspectives in understanding social phenomena and the need for relational understandings of the social world. But, in conclusion, what do these concerns lead us to understand about the lifeworld – substantively?

Returning to the origins of the research in naive questions, the substantive issues of the thesis can be framed by three inter-related questions:

- Who are the potato wasters?
- What is potato wasting?
- And, what is potato waste?

The conclusion details my considered, sociological responses to these questions in line with the research aims set. But, following Schutz, it is as well to record a ‘common-sense’ response to the above questions. As a result of my research, when I use the term ‘potato wasters’, I am referring to the potato regime as a whole: people, institutions, technologies, places, spaces and the relations that bind them. It follows that ‘potato wasting’ is a set of complex interacting processes that range from ‘losing potatoes’ to global financing. In respect of potato waste itself, within the scope of this research and as Section 2.2 of this chapter indicates, its nature is indeed elusive.

1. To present an account of shifts in the UK potato industry with reference to waste and the processes of hyper-globalisation.

From the empirical chapters, it is evidenced that the contemporary UK potato industry has greatly moved towards concentration, rationalisation, specialisation and professionalisation over the last forty years. These interpretations correspond not only with broader food research (Friedland et al 1981; McMichael 2009) but also corroborates and builds on existing academic research on the UK potato industry (Yakovleva & Flynn 2004). It is also suggested that these processes of hyper-globalisation are likely to continue and become entrenched, rather than be replaced or significantly

altered by different forms of agricultural production, manufacturing, distribution, and consumption such as agro-ecological, place-based or alternative food networks and social movements.

I will address each of these four hyper-globalisation processes in turn and how they have impacted upon how the shifting UK potato industry generates and manages waste. This aim focusses on the shifting political economy of the UK potato industry using my empirical chapters, especially the distilled ‘understandings’, as evidence whilst being understood through the conceptual framework. These processes are also closely linked to one another – concentration has a relational impact on specialisation and vice versa.

Firstly, the concentration of the UK potato industry is evident purely in the number of actors involved. Particularly for growers, only 4% of those farming in the 1970s are still growing potatoes today. Concentration is also apparent in the broader provisioning of potatoes, from breeders to manufacturers to retailers (e.g. supermarkets replacing greengrocers). The concentration of the potato regime has impacted on the management of potato wastes in the following ways.

Regime concentration results in fewer organisations having the resource capabilities to compete in the potato industry. Concentration of production in fewer yet larger network actors fuels the potato waste stream through higher yields and competition that has inbuilt characteristics and arrangements for producing more than is required. Smaller scale producers are unable to match high volumes of production and are squeezed out. Overproduction and advance mechanisms for the storage of surplus is an effective strategy for firms in crowding out market competition. High levels of capital are required in order to maintain competitive advantage and financial viability within a corporate food regime which is increasingly homogenised via reducing the variability of production. Concentration of the potato industry enables fewer network actors with the potential for the long-term storage of surplus to control surplus flows; the development of new technologies to move along waste; the ability to waste without financial cost; and the ability to hedge and protect against recurrent exogenous shocks to the industry.

The concentration of the potato industry is increasingly shaped along international lines. The dominant organisations in the potato industry are multinational corporations that leverage their power across national borders. The concentration of corporate power within the potato regime has led to a corresponding declining power of state institutions to shape and manage the potato industry. This has impacted on waste generation and management as potatoes are primarily used as commodities for capital accumulation, rather than serving other interests like national sustenance

(i.e. food security). The increasing global interconnection of potato industries also enables the continuation of previously valueless waste – with expanding markets comes new avenues for capital accumulation, fuelling the waste stream whilst providing expansion of emergent markets. If something cannot be transformed or repurposed at home, it can be abroad. Thus, this has an impact on the potato wastes generated due to geographical dispersion and movement across scales.

The concentration of potato producers and a shifting industry towards increasing manufacturing and processing concentrates power within fewer potato network actors. Routinised crises of the market economy for the moving along of surplus is central to the accumulation model. This requires state intervention to correct market failures which then furthers concentrations of power in the regime. Importantly, these market failures are seen as exogenous impacts upon the potato industry rather than originating from the structure and organisation of the regime itself. With increasing interconnection and commodification of the potato, this would be apparent, however there are particular already-existing characteristics of the industry that renders it susceptible to exogenous impacts; whether financial crises, climate change or geo-political tensions.

Turning to the second process of rationalisation, the UK potato industry focusses on the development of rationalisation processes that shape regimes of overproduction and waste. The rationalisation of the potato industry centres on the efficiency and productivity of potato production, manufacturing and distribution. Potato waste is rationalised through the relations between potato industry actors; processes and practices, which are constructed and reproduced to restrict or move along potato waste, becoming embedded within existing practices, cementing human-waste relations. Again, I provide main takeaways for how the increased rationalisation of the potato regime has impacted on waste generation.

One strand of the rationalisation of potato production focusses on the minimisation of inputs for maximum output. This efficiency model prioritises the reduction of inputs and costs involved in production but has also resulted in the overproduction of output. Thus, by focussing on rationalising systems of production, this has neglected the issue of waste and the overproduction of surplus. The impacts this has on conceptualisations of ecological sustainability are significant; the harmful externalities of waste that stem from overproduction cannot be rationalised in this regime. Waste is rationalised into the system of agricultural production as an inevitable consequence of said production; something that cannot be avoided, only managed. Thus, an expanding array of interventions and techniques are used to rationalise waste and the problems of excess within the potato regime.

Another competing strand in the rationalisation of the potato industry focusses on the repurposing and rematerialisation of potato wastes and by-products. This operates alongside the rationalisation model above, and in many ways challenges it. The rationalisation of overproduction and waste in this model is performed through the construction and idea of circular economy and sustainability (or, sustainable development). Rather than a linear rationalisation model of efficiency and productivity discussed above, potato wastes and by-products of production are captured within this new rationalisation strategy for managing excess and waste (framed as inefficiencies). This, however, is still rooted in a rationalisation model of technologically driven efficiency and productivity – perhaps even more so. Indeed, the worthless externalities in the model above can now be measured, captured and put in service to capital accumulation and valorisation. This has important impacts on the management of potato wastes in the regime as new and innovative mechanisms and interactions are created to move potatoes along, cementing the commodification of the potato by transforming it from a food and simple *good* into ever more elaborate food and non-food *products*.

Another key interpretation drawn from the empirical chapters is the increasing specialisation of the potato industry. The UK potato industry is known to be very complex; as such, particular knowledge and expertise is required and varies across the industry. The specialisation of the potato industry influences the generation of potato waste in the following ways.

Within a hyper-globalised corporate food regime, the UK potato industry's specialism is seen by all network actors to lay in advanced technological innovation and research and development. With its precariousness and well-known susceptibility to disease which can dramatically increase waste generation, which is still widespread within the regime, the interventions to reduce this focus on technological innovation ranging from hardy variety selection processes to specific chemicals to reduce waste and extend life. Specialisation is intimately linked to developments in science, engineering and manufacturing and thus ties in with the technical and strategic developments in rationalisation discussed previously. Correspondingly, this gives further corporate regime power to those who privately own knowledge (such as seeds) and technologies (such as starch capture and purification). This has important consequences on the generation and management of waste in that new and more advanced technologies and practices are developed to manage waste and overproduction; it also firmly places power for change within production in the practices of incumbent network actors with significant extant power.

As mentioned, there is an interrelation of these developments in the UK potato industry in how it generates and manages waste. A concentrating potato industry requires increasing specialisation; the links here between concentrating retail provisioning alongside a concentrating manufacturing sector are important in bringing together what waste is produced and how waste is managed. Retailers, with their institutional power have strong relations across the potato regime, co-constructing supply and demand across the regime. With changing potato consumption patterns in the domestic household (that is, away from fresh and towards processed), these changes align with increasing specialisation. Supplying fresh potatoes is no mean feat, but the specialist techniques and knowledges required for processed potato products and the myriad of non-food uses requires significantly more specialisation. Pressures for specialisation in a global corporate food regime thus produce different kinds of waste; namely those from manufacturing such as starch and protein. Specialisation thus shapes how much waste is produced and what is done with the waste that is produced. Without such interventions to activate otherwise valueless wastes, the potato's role in capital accumulation and valorisation ceases and as such its long and lively history as a food staple.

The last development in the UK potato industry that has been drawn from the empirical chapters is increasing professionalisation. This development also aptly captures the rising role of management in the potato regime. The professionalisation of the UK potato regime has influenced the generation and management of waste in the following ways.

The hyper-globalisation of commodity flows has, as mentioned, reduced the ability of nation-states to shape domestic food provisioning and cultures. During the twentieth century, the potato symbolised the sovereign individual, a symbol of self-sufficiency that made Malthus and the political economists of the late eighteenth and early nineteenth centuries so wary of its cultivation and threat to a sophisticated market economy. Overseers no longer actively encourage individuals or families to grow potatoes to channel a national spirit of resolve but have supported reorientation towards the professionalisation of food production to serve capital accumulation. Professionalisation constructs networks that require specific standards, contracts, codes of conduct, dispositions and ways-of-being. Closely tied with the development of an increasingly professionalised potato regime is the importance of law (O'Brien 2013). As has been described, the power of contracts in the generation and management of potato overproduction and waste is of significant importance; contracts are technical market devices which aim to match supply with demand and reduce uncertainty. However, with asymmetric power relations and the ever present risks within the broader food regime, these further waste and overproduction as a consequence.

The professionalisation of the UK potato regime is also strongly connected to the three developments discussed. In Figure 29, we see one casualty of the UK potato industry of this movement towards professionalisation. The rapid decline of potato merchants shows the radical transformation of the UK potato regime during a short period of time. Professionalisation has important impacts on the generation and production of waste; farming is a compulsive vocation for the network actors interviewed in the potato regime, yet how long will this hold with the shifts described? Professionalisation has impacts on the structuring of the organisation in the workplace, the division of labour and relations to the land in which potatoes are grown. Potato growing land has become an extension of the office; a rural/urban blending as the processes and techniques of concentration, rationalisation and specialisation that have dominated modernity since the advent of industrial society further expands in a hyper-globalised regime.



Figure 29: *Surplus to Requirements: An English Potato Merchant Lorry Circa 1965*

2.1. Understanding how human/nonhuman relations influence overproduction with consequences for waste and accumulation.

In understanding how the shifts in the potato regime have occurred, and what impacts this has had on the management and generation of potato waste, it has been demonstrated that focussing on the materiality and biological characteristics of the potato itself can be helpful. Indeed, the totality of relations that encompass the potato wasters are extremely complex. As such, discovering and applying methodological and theoretical perspectives that can understand this complexity is a significant challenge for researchers of food waste. My combination of political economy and

posthumanist approaches contends that whilst the materiality and biological characteristics of the potato have shaped human-waste relations, how exactly the human/nonhuman relations occur to create a regime of accumulation and waste are complicated.

Indeed, this follows from the classic structure/agency problem in sociology. I have argued that conventional political economy perspectives do not pay enough attention not only to food itself, but to waste. In particular, in overly structuralist and Marxist accounts, the materiality and agency of nonhuman actors in shaping social practices and relations is under-examined. Focussing on waste thus allows us to explore and understand the complex interactions between structure/agency. That is, I emphasise strongly that potatoes themselves have agency (Reis 2009). Their agency is shaped by, and shapes, the multiplicities of network actors that are imbricated by its material existence. Therefore I also emphasise the relationality at play across the potato regime, realised in the form of potato wasters. The biological characteristics of the potato shape waste relations and practices within the regime; which, in turn, shape the biological characteristics of the potato.

There is an aspect of determinism in my approach here - despite the technological interventions in the biological characteristics of the potato, the innate characteristics of the potato inherently create a regime that is perishable, precarious and susceptible, but also simultaneously hardy, adaptable and bountiful. There are, however, differences in the various stages or examples of food regimes which can exacerbate or reduce certain innate biological characteristics. Indeed, the reason the potato became so embedded and important in agricultural and industrial societies was because of its characteristics that resulted in high yields, a lack of processing requirements and high nutritional value. Emphasising the processual nature of social phenomenon, these developments accrue over time and in the contemporary potato regime, all these characteristics (perishable, precarious, susceptible, hardy, adaptable and bountiful) are realised simultaneously in both abstract and concrete relations across potato wasters. These specific shifts in the contemporary potato regime have changed how potato waste is generated and managed, as discussed in Aim 1 above.

The biological characteristics of the potato have led to the multiplicity of interventions and management strategies to prolong and extend its life. Over the last century, the susceptibility, precariousness and perishability of the potato has been a long-standing problem that is considered to be solved by a wide array of scientific and technological interventions and discoveries. Even if you can no longer store potatoes or send them for cattle feed, they can be used for a multitude of other non-food purposes. This, however, requires a universal expansion of markets and institutions to 'move along' waste. Substantial efforts go into the potato's commodification; the myriad of

network actors and devices that encompass the career of the potato reduces the focus and importance of potato-human relations themselves. Less attention placed on the potato itself means the causes of overproduction and waste are left unexamined, hidden under a historically embedded and processual regime that focusses on the management of waste without addressing the reasons why it occurs in the first place, and how this regime generates more waste than others. An increasingly wider range of nonhuman network actors are brought into human-waste relations; ranging from biocides to plastic packaging to advanced tilling machinery. As these scaffolded linkages of network actors increases, the strategies for managing overproduction and waste therefore expand and the strategies for managing become more processually embedded and concrete. It is argued that, in doing so, the further away we move the central issue: the reduction of waste and the provisioning of food. The ability for potatoes to almost-magically reproduce underground and thus their bountiful character means the production and supply-side of potatoes in advanced capitalist societies is by and large considered to be a historical problem that has been solved. As such, we can move on and focus instead on improving efficiencies in manufacturing (e.g. circular economy) and developing ideal consumers (e.g. behavioural change).

Another important biological characteristic that has been discussed and raised again here is the material adaptability of the potato. One of the reasons the potato has expanded and been so successful across the world is its ability to be grown in different geographical locations. In the contemporary potato regime, adaptability has taken on new agro-industrial possibilities. As has been showcased and described, there are specific aspects of the potato's commodity distinctiveness and how this distinctiveness shapes its career. Indeed, these particular strategies for the moving along (or not) of potato waste could not occur in other industries; therefore it is vital to highlight the importance of these biological characteristics in the wider formation of the regime. A key interpretation here is the biological distinctiveness of the potato results in the particular relations that are formed as a result; the social life of the potato shapes and is shaped by the relations it forms. Increasingly, this takes on manufactured forms - the repurposing and rematerialising of previously valueless wastes means they are now transformed and valorised into new products; extending markets and capital accumulation. Thus, the 'material habitus' (Hawkins 2006) of the potato is unique to the potato itself; its adaptable characteristics, and indeed adaptability is one of these, entail the possibilities for its overproduction, transformation and service to capital accumulation.

Despite this widespread material habitus that performs and reproduces particular human-potato relations, the underlying risks inherent in the biological characteristics of the potato still remain. Indeed, interventions in the biological characteristics of the potato to make it less susceptible to

disease, or to create a more uniform and homogenised tuber, are done to meet the demands and requirements of capital accumulation. In attempting to protect ourselves from the innate risky characteristics of the potato, we develop specific interventions and strategies to manage these risks but in doing so, create a potato regime that is permanently scarred by overproduction and waste. For example, developing genetically modified tubers that are blight resistant, can be stored for a long time, have high yields, are good for high-value added processed potato products, and so on, might serve the interests of capital accumulation and the pursuit of profit, but the impacts this has on crop diversity and resilience is significant. Indeed, the wild varieties of potatoes in numerous different forms is one reason they have been so successful, and their diversity is under threat with less than 80 varieties used in commercial growing. Furthermore, in a corporate food regime, the more intensive agro-industrial methods of production that are required in order to grow and harvest said varieties, threatens ecosystem health. These practices also have the knock-on impact of lower nutritional content of potatoes and the increase of harmful chemical substances on human bodies.

2.2. Describing how network actors define, negotiate and contest different meanings of food waste.

Part of the power of using a posthumanist approach and ANT methodology is highlighted in the ability to analyse different elements of the potato regime which would otherwise be lost in a purely political economy or commodity chain analysis of waste. Linking back to who are the potato wasters, I have demonstrated that by focussing on the relations between network actors across the UK potato regime, we can understand more about how waste is generated and managed. Indeed, focussing on the meanings of food waste to different network actors is important in the politico-cultural turn represented by particular approaches to food waste research (Hawkins 2006, Evans 2014). In understanding how potato waste is managed, examining the different meanings of waste and how these meanings in turn shape human-waste relations and practices is helpful.

Before proceeding with a discussion on the contested meanings of waste, at a broader level, there is a distinctiveness in the commodification of the potato that can shape these meanings and understandings. During my research, I have noted how the social history of the potato acts as a spectre for these performativities; accumulated collective experiences and imaginations that frames human-waste relations and practices. With the history of the potato marked most significantly by famine and framings of self-sufficiency during times of crisis (such as the Second World War and importance of the potato in ‘Digging for Victory’), to be a ‘waster’ is bad enough but to be a ‘potato

waster' perhaps represents even more of a moral and ethical failing. As such, elaborate strategies are developed by regime actors which contest and negotiate the definitions and classification of waste.

My research identified that actors in the UK potato regime define, negotiate and contest the meanings of food waste in different ways. The differences in the definition, identification and classification of potato waste impacts on how it is managed by network actors. That is, I have found the different classifications and identifications of what is 'waste' have performative impacts on the management of waste itself. As such, the language and descriptors of waste, as posthumanist and poststructuralist approaches would emphasise, have important implications in the management of waste.

Due to its hazardous risks both to human and nonhuman actors, the legal frameworks and classifications of wastes are extensive. Whilst food waste is less problematic than other forms of hazardous waste such as effluents from mining or nuclear energy, there are still legal frameworks that stipulate how waste is to be classified and what network actors should do with it. These taxonomies of waste regulations have primarily focussed on potato manufacturers; as such, classification and legal frameworks exist for the safe 'moving along' of waste (O'Brien 2013). It is also worth noting here that the discussed shifts in the potato regime have important impacts on the meanings of food waste. With declining overseer power, there is a lack of centralised authority that creates classifications of what is and is not waste. While there are guidelines and legal frameworks to guide the individual decision-maker, as evidenced in the Environment Agency's guidelines for deciding whether something is 'waste' or not, this power under a corporate food regime is more dispersed and emergent across network actors but with specific pockets of concentrated power. This is evidenced by the collection of powerful retailer organisations gathering together to create their own *voluntary* agreements of what is, and what isn't, waste, as evidenced in the WRAP Food Waste Roadmap 2050.

In the contemporary potato regime, there is a plasticity of waste meanings that are open to individual subjectivities; retailers choose what waste is, manufacturers choose what waste is, and thus we see the internalisation and importance of individual subjectivities and sensibilities in human-waste relations. For some network actors, such as farmers, this results in perceptions that they do not waste, that is: "waste is waste and loss is loss." I have also evidenced the plasticity of potato meanings for different network actors and how this shapes the management and trajectories of waste. For manufacturers, this is particularly the case. Due to the overflows and excesses of potato wastes as a result of new technological innovations in the manufacturing of potatoes, we would

therefore expect there to be more plasticity of meanings around waste here. Indeed, this is the area of growth and recalibration in the potato regime; valorisation of previously valueless wastes (or, less problematically termed ‘by-products’) into newly rematerialised higher-value products and goods.

Building on this, I have also described and found that waste is still seen by a majority of network actors in the potato regime as purely a matter of efficiency. As discussed, traditional concepts of waste minimisation and reduction have been framed through this perspective - minimising inputs to achieve maximum outputs (i.e. yield). I have found that whilst this performativity of waste as the minimisation of resources for maximum output still occurs in a contemporary potato regime that results in overproduction and waste, under the guise of circular economy, sustainable development or bioeconomies, waste-as-resource becomes a more widespread interpretation. Waste as a resource to fuel capital accumulation thus shifts the meaning of waste from a valueless nuisance, to a potential source of growth and profit. This is not a new development, and has been apparent since the industrial revolution and first discoveries of starch capture in potato manufacturing 150 years ago. However, I contend that under the contemporary potato regime this particular meaning of waste-as-resource has accelerated and will continue to gain in prominence in the future of the potato.

Thus the meanings and representations of waste shifts and changes depending on the positioning of network actors within the regime. For growers, waste is not waste but ‘loss’, and loss is an inevitable consequence of agricultural production that can only be minimised. For manufacturers, waste is a nuisance that requires ‘red-tape’ but is also a potential source of new markets and capital accumulation. For retailers, who have a greater proximity to consumers, the meanings of waste are more complex. For themselves, waste is not waste but ‘loss’, ‘shrinkage’ or ‘surplus’: When it does become waste this is intimately connected to corporate social responsibility (e.g. retailer relationships with food banks) and co-constructing sustainable practices to shape consumer behaviour. For overseers, waste is a matter of efficiency of production that can improve the competitiveness of the potato industry, waste also means focusing on shaping a consumer who simultaneously buys lots of potatoes but consumes them in a sustainable manner.

Performativities of waste is one thing - but what if waste isn’t even identified in order to be classified? If waste isn’t identified or measured, then it cannot exist. Indeed, this is an important interpretation and development in how network actors in the UK potato regime manage waste. In a knowledge-based economy with competitive markets, significant value and importance is placed on information and transparency. This has been evidenced in the chapters on Retailers and Overseers -

in a contemporary potato regime, particular emphasis is placed on knowledge. Without accurate information, markets are distorted and there is a lack of trust between actors. However, in the reports published by overseers that detail the specifics of the potato industry, there are no recordings of waste. If waste is recorded, it is classified as ‘loss’ so is not to be considered ‘waste’. Data was found in academic papers that detailed wastes in the organic potato industry in the early 2000s (Yakovleva & Flynn 2004) and indeed 50% of crop production was ‘wasted’ at farm level but no other data on waste has been published since. The evidence base that stipulates consumers are the potato wasters *par excellence* is incomplete at best, and at worst purposefully misleading; firstly, ‘waste’ does not have consistent definitions and classifications and secondly, data at farmgate, manufacturing, distribution and retailing does not exist. Yet in these same reports there are detailed breakdowns of how much and what types of potatoes domestic consumers ‘waste’/‘lose’. As such, the contestation of meanings of waste is very much a terminological issue - the strategies for managing waste in the potato regime focus on the findings and recommendations of academic and non-academic studies but rely on adequate data in order to perform quantitative data analysis. In doing a qualitative study of the potato industry, I have ended up arguing that in fact we need more quantitative research!

It is in the interests of powerful regime actors to contest the meaning of waste; by defining waste as ‘loss’ / ‘by-product’ / ‘shrinkage’ / ‘surplus’ exempts powerful network actors from the moralising narratives and discourses of waste under capitalism. Instead, it is consumers (and within this, there are issues of gender going on - the consumers being referred to are predominantly women who are the cooks, cleaners, shoppers and household organisers) who are the potato wasters.

In the contemporary potato regime, it is the consumer who ‘wastes’ potatoes - not the grower, manufacturer or retailer who merely ‘lose’ potatoes - an act of ostensible wasting that is categorised as something else and is an inevitable consequence of their activities. This linguistic detoxification of acts of wasting thus shapes particular human-waste relations in the potato regime. Therefore, I argue the meanings of waste are defined in these ways in order to bring about particular dynamics of responsibility and power. That is, protecting the interests of powerful actors in the potato regime whilst emphasising the responsibilities of other actors such as individual domestic consumers who have little to no power. This is nicely illustrated in the WRAP (2012) report, *Reducing supply chain and consumer potato waste*, in which the main recommendations only focus on consumers: “promote skills to help consumers portion correctly”; “raise awareness of the potential to freeze potatoes”; “help consumers understand ‘display until’ and ‘best before’ dates” and “promote composting”. The final

recommendation, and only one related to agro-industrial network actors, is listed under “other recommendations” which is to “progress commercial trials of novel materials to enhance shelf-life.”

Thus, what is going on in the contestation and negotiation of potato waste meanings is an elaborate and sophisticated *‘blame game’*. This manifests itself across potato waster relations, starting off as abstract semantics that have concrete and performative impacts on the generation and management of potato waste. Thus, I have provided evidence that adds to arguments from food waste scholars such as Martin O’Brien who emphasise the significant role of industry in fuelling the waste stream and critique the caricature of voracious throwaway consumers. I expand on this in the following section that details my contribution - these meanings and classifications of waste that construct particular human-waste relations are particularly apparent in my notions ‘waste disguise’ and ‘waste transfer’ which will now be discussed.

8.2. Contribution

2.3. Contributing to the sociological discourse on waste, notably in respect of single commodity studies and a critique of the food/waste chain concept.

At the start of this research, I began by investigating the potato industry. Due to the disproportionate emphasis of food waste interventions and academic and non-academic research on individual consumption and the household, I focussed on the role of production and industry in the generation and management of waste.

In focussing on the potato, I was drawn to single commodity studies and ‘following the thing’ approach. Whilst the potato is my unit of analysis or token object (in ANT), I also wanted to pay particular attention to waste. Typically, a ‘farm-to-fork’ or ‘seed-to-shelf’ investigation into the potato would consider waste, but not investigate it so centrally. Such unilateral conceptualisations of farm-to-fork or chain approaches that dominate academia and policy, treat crops only in their value-producing food sense. That is, chain approaches assume an incremental and unilateral moving along of commodities towards a final point which is assumed to be consumption in the household; with value chain approaches it is assumed that value is added at each linkage in the chain. By focussing on waste, it begins to destabilise the neat and intuitive chain concept, the spillages and overflows of waste that are recombined and rematerialised into new forms across different spatial scales and at different points in time.

Building on approaches to the study of the potato supply chain (Yakovleva & Flynn 2004; Neaverson & Burgess 2013), I develop Gille's idea of a 'food waste regime' to promote a 'potato regime' as a critical alternative to a 'potato chain' or 'potato industry'. In this depiction, I attempt to capture the intricacies of relations that make up the totality of the organisation of potatoes, including waste. Indeed, I have reversed a conventional approach of chains and viewed potatoes from the view of loss not gain, from value destruction rather than value addition. Rather than value being added at each time along a unilateral chain of production, manufacturing, distribution and consumption, there is the destruction of value at each stage. That is, where do potato regime actors actually add value? The supply or value chain does not add value at each stage to develop nutritional, sustainable or secure potato provisioning for all, but adds economic value to serve the needs of capital accumulation at the expense of nature and public health. A potato regime exists that is allegedly designed to increase value 'along the chain' but in reality it does no such thing.

In Yakovleva and Flynn's academic study of the potato industry, they argue further investigation is required into "a) consolidation of potato growers, packers and processors; and b) value adding and development of complex foods that use potatoes." (Yakovleva & Flynn 2004:39). In focussing on waste, I investigate these two areas closely. I identified and evidenced further concentrations (or consolidations) of power within the potato regime. I have also contributed and paid close attention to the 'value adding', new product development and complex diversification aspects of contemporary potato production, manufacturing, distribution and consumption, contributing to discussions on what this means not just for the potato, but wider developments in sustainability, circular economies and the future of agro-industrial production under capitalism.

In using the potato regime, we are able to understand and appreciate the politico-cultural dimensions in the construction of a potato regime that tends towards overproduction and waste alongside institutional changes in the composition and arrangements of the UK potato industry. Indeed, this is the hybrid approach to studying a hybrid phenomenon. In choosing the potato, I selected an interesting commodity to study the phenomenon of waste. There is a uniqueness to the potato, a commodity distinctiveness that I have described and analysed. This commodity distinctiveness has been able to be understood more critically through a posthumanist approach that focusses on the materiality of the potato; using materiality as a core conceptual parameter, I have unearthed something novel to say about performativity of potatoes, how they shape us and we shape them. In political economy approaches, this perspective would be lost. As such, I have contributed to sociological studies of food waste by producing a critical single commodity study that combines two main strands of research in the sociology of food waste, political economy and posthumanism.

Furthermore, using ethnographic research at sites of industrial production and waste is not easy, and indeed these accounts are thin on the ground (Krzywoszynska 2013). As such, I have used a qualitative approach drawing on ethnographic approaches but also relied on quantitative data that is often sparse. In doing so, I have recognised the importance for researchers of food waste to gather quantitative data of waste at industrial and farm levels, but also caution against applying these to uncritical assumptions of the relations across the food wasters. That is, I have contributed to emphasising the importance of the connections and relations that make up the potato regime in the generation and management of waste and the need for food waste researchers to treat these relations critically.

I have attempted to move past an artificially imposed demarcation (Abbott 2000) that political economy approaches are reserved for studying production and industry, whereas posthumanist approaches are reserved for studying consumption and domestic households. By combining political economy and with posthumanism, I have unearthed and said something novel about potatoes and waste which wouldn't have been possible if I had approached the research from one approach or the other. I have contributed to existing debates within the sociology of food waste that discuss the merits and disadvantages of each approach. Whilst it has been a difficult theoretical and methodological challenge to merge two strands of food waste research, by using an ANT-inspired methodology of following the thing that focusses on the intricate networks of human/nonhuman relations; by constructing a conceptual framework expanding on existing food waste scholars to bridge political economy and posthumanism, and by developing my three notions of waste, I have added to and provided an original contribution to sociological research on food waste.

Potato wasters who engage in various discrete, and not so discrete, acts of potato wasting are thus a product and consequence of the relations and processes within the regime. This is important in moving undue and disproportionate focus and blame on domestic consumers as the main drivers in overproduction and waste. As Friedland et al (1981:28) remark on their study of the lettuce industry in the United States: "The intent of the present study is to make the existence of...relationships problematic in order that we do not reinforce the acceptance of elegant but unquestioned explanations." This has been by intent too, and I contributed to the study of food waste research by describing and illuminating these relations that have, up until now, been unexplored and under researched.

The word 'regime' perhaps raises for some readers connotations with authoritarian dictatorships. I am not sure many involved in the potato industry would like to see themselves as 'regime actors' or

as participants within a potato regime. However, I do not mean anything pejorative by the word regime and following a number of food scholars (McMichael 2009; Gille 2013), I find it more instructive to understand and illuminate the highly complex production, manufacturing, distribution and consumption of food and commodities. In doing so, I presented a study that critiques the ‘elegant but unquestioned explanations’ of dominant perspectives in food waste research and policy which posits domestic consumers as the main drivers in overconsumption that fuels the contemporary ‘crisis of waste’ (O’Brien 2008).

In the Literature Review (Section 2.7.), I introduced Andrew Abbott’s triplet for understanding the collective strategies for dealing with the problem of excess. These include defensive strategies, adaptive strategies and reactive strategies. Combining them with my own triplet of waste disguise, waste transfer and waste deferment, I am able to illustrate and clearly explain not only my original contribution to the sociology of food waste, but how potato waste is generated and managed by actors across the contemporary UK potato regime.

In Figure 30 on the following page, *Model of Potato Waste Regime Strategies*, the X axis is a spatial element of the potato regime which represents the movements from abstract to concrete human-waste relations. In Gille’s development of a food waste regime, she emphasises the importance of levels of abstraction in understanding waste (Section 2.10.). This emphasises the relational approach to the phenomenon of waste, how certain waste practices and strategies concretise human-waste relations across multiple spatial scales.

The Y axis is the time element involved in the potato waste regime. Approaching the phenomenon of waste processually, this axis refers to the perspective that particular human-waste relations and practices are built up over time and become embedded and locked-in.

Combining the X and Y axes, this develops a spatio-temporal (Harvey 1990; Castree 2009) understanding of the potato regime. Waste disguise/defensive strategies for the more abstract management of waste have existed for centuries under agro-industrial capitalism, as Steinbeck powerfully describes at the end of this Conclusion. As time progresses, waste deferment/reactive strategies become more concrete and embedded within human-waste relations. Thus the strategies for moving along wastes through the construction of new markets, organisations and institutions will become more concrete and embedded as the regime ages. This signals that as the potato regime shifts, the ways in which waste is generated and managed vary. Whilst still disguising and transferring, waste deferment and reactive strategies become more concrete over time; this aligns

with developments in the UK potato regime around recalibration and reconfiguration towards greater productivity and efficiency via circular economy and bioeconomy developments. The shifts in the potato regime towards concentration, rationalisation, specialisation and professionalisation create conditions for deferment strategies to become more embedded and concrete. That is, a concentrated, rational, diversified and professional potato regime that operates through an efficiency paradigm which increasingly treats waste as a resource. Waste is something which can be used to further capital accumulation whilst attempting to address the problem of stagnating or receding economies, climate change, finite resources and population growth.

		Abstract -----> Concrete		
		Defensive Strategies	Adaptive Strategies	Reactive Strategies
Time ↓	Waste Disguise	<ul style="list-style-type: none"> • Ploughing In • Landfill • No Identification 		
	Waste Transfer		<ul style="list-style-type: none"> • Classification • Distributed Responsibility • Moralisation 	
	Waste Deferment			<ul style="list-style-type: none"> • Biotechnological Innovation • New Markets • New Products • Capital Accumulation • Sustainable Development • Circular Economy & Bioeconomy

Figure 30: *Model of Potato Waste Regime Strategies*

In contributing to sociological discussions on food waste, I will now build on and expand my notions of waste disguise, waste transfer and waste deferment for managing the lively excesses of potato waste:

Waste Disguise (Defensive Strategy)

Abbott argues that defensive strategies for dealing with the problem of waste primarily involve ignoring it. This correlates with my notion of ‘waste disguise’, however I contend that there is slightly more going on than a simplistic denial that waste exists. Whilst there are certain circumstances of complete denial (e.g. potato peelings flushed down chip shop pipes), the disguising of waste happens through identification, or the lack thereof. That is, acts of waste disguise (defensive strategies) exist at the abstract end of the UK potato waste regime. Disguising waste through its lack of identification is a defensive strategy to protect powerful network actors within the potato regime from the accusation of being potato wasters. In a knowledge-based economy that prioritises the transparent sharing of information and knowledge, not identifying waste as waste thus means, to all intents and purposes, it does not exist. I also understand the literal ploughing back in of potatoes or their disposing in landfills as an abstract act that is geographically detached, operating in hidden spaces of food production that are incomprehensible to most. Until you witness the sight of thousands of tonnes of potatoes being ploughed back into the soil or sitting in a landfill it is hard to imagine – it exists purely in the abstract; could or does this really happen?

Waste Transfer (Adaptive Strategy)

Moving along and down the X and Y spatio-temporal axes, the notion of waste transfer (an adaptive strategy) refers to the complex classifications and moralisations of waste. Classification is slightly different from identification; identifying means bringing something into existence whereas classification needs things to have already been identified in order for them to be grouped. Abbott argues that adaptive strategies for dealing with the problems of excess use abstraction and classifications to focus our attention on what is worthy. Classification and waste transfer are still abstract, but have more performative and concrete impacts on human and waste relations and practices than waste disguise. Thus the act of classifying waste not as waste but something else, such as ‘loss’, is a question of moral action – waste needs acting upon, whereas loss is less worthy of acting upon. Thus when it comes to quantifying waste for reasons of policy intervention or action, these spaces of the potato regime are exempt for they do not ‘waste’. In the classifications and taxonomies of waste (e.g. loss/surplus/by-product/shrinkage), potato wasters engage in acts of waste transfer through the moral classifications of waste which designates who are and who aren’t the wasters. As has been mentioned, to be a waster, let alone a potato waster, under the ethics and morality of capitalism, is a sin. The moral discourse of waste under capitalism dictates that those who are idle, things which are a waste of space or waste of time are deserving of contempt and disgust. Thus to be classified as a ‘waster’ entails certain personal failings, something that no one in the potato regime wants to be guilty of.

Waste Deferment (Reactive Strategy)

By deferment, I do not mean the conventional usage of the word in a deferring of a certain responsibility, indeed this is captured in the notion of ‘waster transfer’ as discussed above. Rather, by deferment I describe the act of moving along (both in terms of space and time) potato wastes through technological innovations and new market formations. The reactive strategies of waste deferment manage the problem of waste through interventions to extend its career (Appadurai 1983). Without the technological innovations, this aspect of deferment could not occur. Indeed, within a particular biotechnological potato regime, the reactive strategies for deferment take on novel and extended uses. However, what waste deferment (reactive) strategies do is two things: firstly, they defer the problem of waste itself through further commodification, creating new technologies and markets that move the waste along (for capital accumulation and valorisation), rather than focussing on the relations and processes that lead to overproduction within food waste regimes. Thus, the destructive environmental, social, economic and social consequences of a system of overproduction and waste are left unchallenged; instead the focus becomes on reusing and repurposing the wastes of production to aid capital accumulation. Secondly, it defers the systemic problem of waste onto individual domestic consumers; with the invention of sophisticated life-extending biotechnologies that materially suspend potato necrosis so advanced and finely-tuned at the agro-industrial stage, when they arrive in domestic households, its biological characteristic of perishability is unleashed, thus deferring the problem and morality of waste onto consumers who risk perishing for their supposed transgressions.

It is also important to state that all these strategies and notions for the generation and management of waste all exist simultaneously. From ploughing in to moral classifications to advanced biotechnological starch purification. That is, what exists is a hybrid potato waste regime (Whatmore 2002; Gille 2013), a heterogeneity of practices and relations that imbricate human and nonhuman actors in the generation and management of potato waste.

8.3. Future Prospects

In the movie *The Martian* (2015), when humans attempt to colonise Mars the first crop they attempt to grow is the trusty potato but it all ends in disaster and they are left with no food. Despite all the technological advancements, we still need sustenance. Putting all their potatoes in one basket might have been a cultural reference and nod to science fiction author Douglas Adams, who wrote that “it’s a mistake to think you can solve any major problems with just potatoes” (Adams 1984:425).

Indeed, potatoes will not on their own be a solution to the difficulties human societies face over food in the present and future, as we know from our over-reliance upon it in the past (Salaman 1985). However, we may do worse than to treat the potato as a ‘crop of last resort’.

In 2018, the International Potato Centre (CIP) released their campaign *Imagine a World Without Potatoes*. Similar to an idea of a crop of last resort, the CIP recognise the potato as a key crop for a future of food sovereignty, the alleviation of hunger and ecological harmony. Becoming a staple of diets and nutrition for hundreds of millions of people across the world, the history of potatoes as a food are culturally embedded in processes and relations over time. In the UK, through the history of the potato spilling out from from botany *collections* of the aristocracy and into the fields of the rural poor for *cultivation*, I suggest the historicisation of the potato as a food is moving into a new epoch in which it becomes a hybrid food/non-food in the contemporary potato regime – I call this ‘*modification*’. From collection to cultivation to modification. We may see a future world without potatoes, where they are not used for food but only to provide raw material to create new products and commodities, thus primarily becoming modified into a non-food. Understanding more about these shifts from collection to cultivation to modification and how exactly they occurred would be fascinating research; especially comparing different plants, flowers, foods and non-foods. I have illustrated through a combination of political economy and posthumanist approaches to food and waste regimes, shifts and changes in the provisioning of food can be further understood.

Further research is also required in the measurement and counting of potato waste, and food waste more broadly. Rather than not counting waste, or classifying waste as something else, there needs to be a broad definition of waste that doesn’t create a potato politics that blames consumers. This needs to occur at the farmgate, in manufacturing and distribution so we can gain data on how much waste is being generated. Then, combined with a more critical understanding of the relations with a regime, rather than a chain, we can begin to correct some of the misunderstandings surrounding food waste research and interventions.

Other potential avenues for research also include the growing interest in recent years over the use of plant protein crops in the UK; pulses and grains that once formed an important part of our diet that have been slowly replaced or forgotten. These arguments are around the shifting away from, or the significant reduction of, industrial animal agriculture (Harvey & Pilgrim 2011) which plays a significant role in food security and the climate catastrophe. These are issues that will only grow in importance. Indeed, what future will the potato have in these debates? Continuing the current

characteristics of the potato regime, will it still be for cultivation despite declining and changing consumption? Or primarily modification to be used for paper or adhesives?

With millions malnourished through either too little food or too much food, future research that explores how the activation, acceleration and utilisation of waste and by-products from food crops are integrated into food regimes to serve capital accumulation would be worthwhile. With manufacturing and processing increasing for potato products, rather than potato goods, this is an increasingly important area of study. There is a commodity distinctiveness to the potato, so it would be interesting to see how these processes and relations are different in other industries. Examining in greater detail how these processes and relations are interrelated and interconnected across borders would also be interesting; a global regime study of following the potato and its associated wastes and by-products would be best, and unfortunately this was beyond the scope for my research.

As the potato industry in advanced capitalist and agro-industrial societies such as the UK orientate towards greater efficiency and productivity through 'higher value added' forms of production and processing, a phenomenon replicated across many agricultural crops, the increased demand for by-products like starch and protein facilitates a widening gap between plants as food and plants as commodities which exacerbates food inequalities and accelerates ecological degradation. There is a growing danger that increasing the commodification and marketisation of the potato serves capital accumulation rather than ensuring nutritious, diverse, safe and ecological potatoes.

To end, the following passage from Steinbeck (2000[1939]:462) brings back how real and important the themes and issues discussed in this thesis are. *The Grapes of Wrath* speaks through the generations; the moral abstraction, destruction and cruelty that is performed to maintain power and control surplus food:

“The people come with nets to fish for potatoes in the river, and the guards hold them back; they come in rattling cars to get the dumped oranges, but the kerosene is sprayed. And they stand still and watch the potatoes float by, listen to the screaming pigs being killed in a ditch and covered with quicklime, watch the mountains of oranges slop down to a putrefying ooze; and in the eyes of the people there is the failure; and in the eyes of the hungry there is a growing wrath. In the souls of the people the grapes of wrath are filling and growing heavy, growing heavy for the vintage.”

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APPENDICES

Appendix 1 – Research Summary Sent to Potato Associations



PhD Research Summary

Trends of food production, distribution and consumption have shifted dramatically over the last three decades. Globalised supply chains, financialised markets, intensified production and technological changes have established year-round abundance of fresh produce as a common feature of supermarket aisles.

The social, environmental, political and economic consequences and impacts of these developments have gained significant interest in that time. Indeed, the production, distribution and consumption of food is recognised as one of the major global issues with nearly half of food produced not feeding humans, the richest quarter of the world population consuming three quarters of global energy and 12.5% of the global population considered to be chronically undernourished.

Despite much policy, research and industry action directed towards transitioning to sustainable food production and consumption, the issues of food security and diversity still require further research and intervention.

Using the UK potato supply chain as a case study, how the surpluses, by-products and excesses of production are being used and managed will be investigated. That is, how are contemporary potato producers, processors and suppliers reconfiguring or diversifying their production practices in light of increased risks, obligations and opportunities?

Through interviews with industry experts, archival research and documentary evidence, this research will map the hitherto unexplored routes of the potato across its never-ending life cycle. Providing an alternative view to the widespread belief in the wastefulness of contemporary food supply chains, it will focus on the unusual, ingenious and surprising methods that people have invented to reuse surpluses and by-products, maximising the value of a commodity across markets.

In a political, economic and environmental climate dictated by scarcity, this research turns the focus of attention on abundance. This comes as excess, surplus, abundance, waste and overproduction gains increasing salience in advanced economies suffering from economic stagnation, highlighted by policies across the European Union such as Horizon 2020 and discussions on the circular economy. With innovation and resource re-use seen as key to ensuring long-term environmental and food security, the case of the UK potato supply chain provides some answers and insights into the viability and future success of such proposals.

Researcher: Patrick Gould

Email: patrick.gould@postgrad.manchester.ac.uk

Tel: 0161 275 8990

Appendix 2 – Letter to McCain Foods (GB)

Sustainable Consumption Institute
178 Waterloo Place
Manchester
M13 9PG

McCain Foods (GB) Ltd
Havers Hill
Scarborough
North Yorkshire
YO11 3BS

2nd September 2015

Dear whom it may concern,

I am writing to enquire about the possibility of:

1. Visiting McCain production operations in the UK and
2. Interviewing employees at McCain who have responsibilities regarding supply chain management and sustainability.

I'm a PhD student at the University of Manchester interested in potatoes and waste management.

I am available to be contacted either through letter by the address above or at:

Email: patrick.gould@postgrad.manchester.ac.uk

Phone: 0161 276 3450 or 07445841244

Any help and further discussion about my enquiry would be greatly appreciated.

Yours sincerely,

Patrick Gould

Appendix 3 – Participant Information Sheet and Consent Form

University of Manchester

School of Social Sciences

Participant Information Sheet

What is the title of the research?

The Potato Wasters: A Sociological Study of the UK Potato Industry

Who will conduct the research?

Patrick Gould

What is the aim of the research?

The overall aim of this research is to develop social science understandings of waste and by-products in the agri-business supply chain using the case study of the UK potato industry. Current social science scholarship concerning food waste has taken place at the consumer end of supply chains; this research will focus more on the production and distribution aspects of the potato supply chain. In doing so, this research will aid to greater understandings of the relationships between groups and organisations involved in waste and by-products of potato production; helping to construct a more holistic approach to waste reduction and sustainability in the UK agri-food supply chain.

Why have I been chosen?

Your expertise, knowledge and experience in the potato industry.

What would I be asked to do if I took part?

If you decide to talk part, the main request would be for an interview. This interview will range between thirty minutes to three hours. The location of the interview will be decided by yourself along with the researcher - at your place of work or at a place that suits you. There may be more than one interview, and this will be arranged with the researcher.

What happens to the data collected?

The research will abide by the provisions of the Data Protection Act and the University of Manchester Data Protection Policy. Once the data is collected, it will be fairly and lawfully processed

for the research. This includes a limit on the amount of time the data is stored, ensuring the data is correctly secured, is accurate and processed in accordance with the participants rights.

How is confidentiality maintained?

The research will abide by the provisions of the Data Protection Act and the University of Manchester Data Protection Policy. Anonymity will be supplied on request of the participant, using pseudonyms or ID numbers. Any information gathered will be tightly secured and accessed only by the researcher.

What happens if I do not want to take part or if I change my mind?

If you decide at any time that you do not want your data to be used in the research, it can be withdrawn at any time and the researcher's copies destroyed at any time up to the completion of the PhD.

Will I be paid for participating in the research?

No.

What is the duration of the research?

The research will last from 2015 to 2017.

Where will the research be conducted?

The research will be conducted across different sites in the UK. Including farms, factories and offices.

Will the outcomes of the research be published?

The research will be published through the University of Manchester's website and will likely be published in academic journals and, hopefully, a book.

What benefit might this research be to me or other subjects of the research?

The research will benefit you for furthering public and private sector understandings of the role of food waste and in particular the importance of potatoes in food supply chains.

What if something goes wrong?

In the first instance, please contact the researcher, whose details are below.

If you do not receive a satisfactory answer, please contact his supervisor at the University of Manchester:

Alan Warde
Sustainable Consumption Institute
178 Waterloo Place
University of Manchester
Manchester
M13 9PL

Alan.warde@manchester.ac.uk

0161 275 8989

If there are any issues resulting from the research which you would prefer not to discuss with the researcher or his supervisor, please contact:

The Research Practice and Governance Co-ordinator:

Email: Research-complaints@manchester.ac.uk

Tel: +44 (0)161 275 758

Contact for further information

Patrick Gould
Sustainable Consumption Institute
University of Manchester
188 Waterloo Place
M13 9PL

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0161 275 8990

University of Manchester

School of Social Sciences

The Potato Wasters: A Sociological Study of the UK Potato Industry

CONSENT FORM

If you are happy to participate please read the consent form and initial it:

**Please
Initial
Box**

1. I confirm that I have read the attached information sheet on the above project and have had the opportunity to consider the information and ask questions and had these answered satisfactorily.

2. I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving a reason and without detriment to any treatment/service

3. I understand that the interviews will be audio/video-recorded

4. I agree to the use of quotations that are attributed

I agree to take part in the above project

_____	_____	_____
Name of participant	Date	Signature
_____	_____	_____
Name of person taking consent	Date	Signature
_____	_____	_____

Appendix 4 – Interview Schedule

1) Why do you think there are the levels of waste we see in the UK potato industry?

Cue: Technology / globalisation / production & consumption dynamic

Follow-up 1: When I say waste, what do you think I mean by that? Probe waste/loss distinction.

2) Could you describe or given an overview of the significant changes in the amount of waste and how it has been managed at your [company/farm] over the last [how long in business or since founding] years?

Cue: Three R's – Recycle / Recovery / Reuse

Zero-waste

From scarcity to abundance

Different forms of waste e.g. animal feed or more technological intense things like starch

Follow-up 2: Have these changes been difficult to implement? If so, what have the main obstacles and challenges been?

Cue: Cultural and social influences not just economic reasoning and feasibility

Collaboration and cooperation - relationships across the industry

3) What have been the main factors behind these changes?

Cue: Consumption

Production

Regulation – Directive 2008/98/EC, AHDB, DEFRA

Follow-up 3: Do you view your companies' role and aims to be aligned with the organisations and groups you mentioned?

Potential: You mentioned the challenges facing your organisation from increasing competition and the need to diversify, what role would you say institutions like the EU and DEFRA have played?

4) Thinking about the role of [government/retailers/other named organisation or institution] in changing the way waste is managed and used, why do you think these changes are occurring now?

Cue: Falling rate of profit / Rising competition / Retailer power

Technological innovation / Environmental attitudes

Follow-up 5: Environmental impacts, expressed in regulation, are often regarded as the main motivation behind changing the way waste is managed, do you agree?

Follow-up 6: If none of these, then what?

5) Do you think of potato more as a food or as a commodity?

Cue: Compare to wheat, grain or other staple foods.

Follow-up 7: Is it just a food or if you could make more money of out it being something else, would you?

6) What does the future hold for potato waste in the UK?

Cue: *Potato consumption trends*
Value added commodities: Starch / Energy
International competition
Commodity financialisation

Follow-up 7: There's a lot of talk recently about the potential for a circular economy across Europe through the likes of the Horizon 2020 programme, from your experiences and that of your company, how plausible and realistic are these aims? Do you feel they are important and how significant are they?

7) What else would you like to say about waste? This can be anything not related to potatoes, but your general thoughts on how as a society we think about and relate to waste?

Cue: *Personal feelings on waste - does it annoy/disgust/irritate/not bother you?*

Appendix 5 – Friedland et al's (1981) model 'Labor process differentiation in capitalist agriculture'

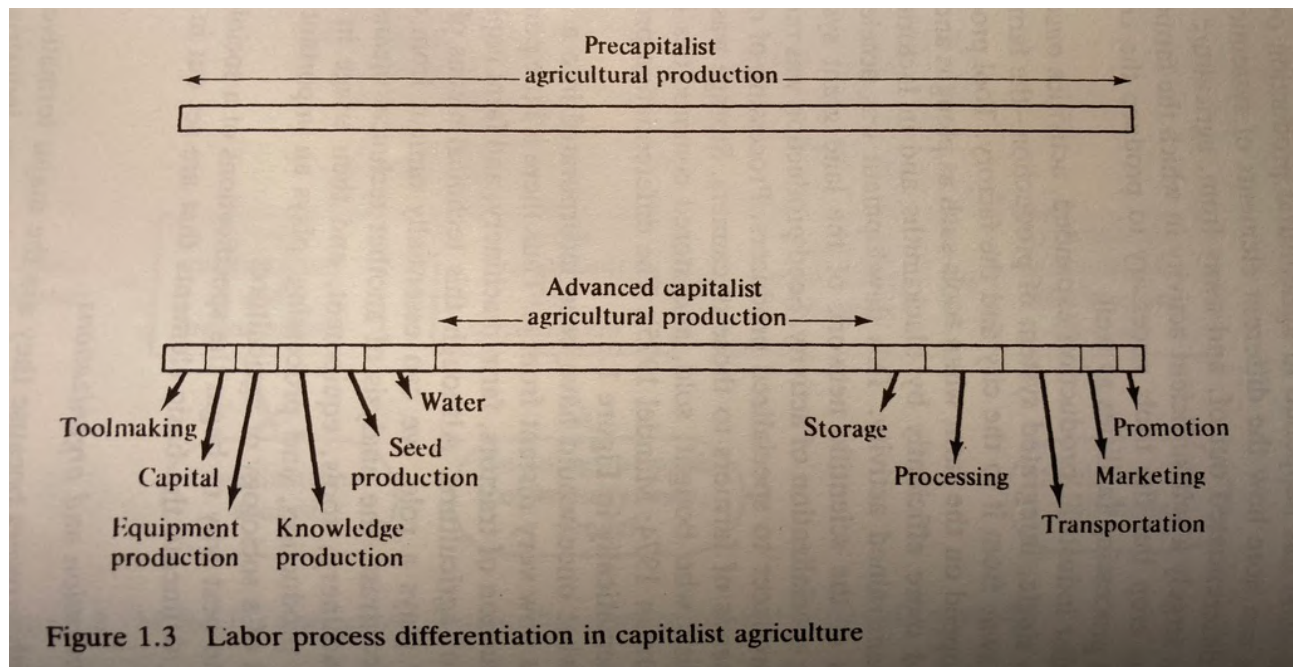


Figure 1.3 Labor process differentiation in capitalist agriculture