

Businesses' activities for consumer carbon emissions reduction: strategies, outcomes and contribution to sustainability transitions

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The candidate confirms that the work submitted is her own, except where work which has formed part of jointly authored publications has been included. The contribution of the candidate and the other authors to this work has been explicitly indicated below. The candidate confirms that appropriate credit has been given within the thesis where reference has been made to the work of others.

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I am lead author for the latter two papers and designed the research questions, the methodology, and collected and analysed the data. The papers were co-authored with my supervisors whose roles were in the recommendations of revisions and edits to manuscripts.

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Abstract

Emissions reductions in consumption remain a key requirement if the goals of the United Nations Paris Climate Agreement to reduce emissions to keep global temperature rise this century to below 2°C are to be met. This thesis analyses the roles and impacts that consumer-facing businesses can have on achieving consumption emissions reductions. It examines this through focus on large established businesses, which have designed and implemented voluntarily activities aimed to influence consumer behaviour.

The thesis contributes to the field of sustainable consumption research by using a coevolutionary approach and combining this with theories of business drivers, business model innovation, corporate responsibility and models of consumer behaviour change, thus bringing together disparate academic areas. It analyses the roles that large consumer-facing businesses in two industry sectors, retailing and detergent manufacturing, have played over time, to influence consumer behaviour to reduce product-related carbon emissions at home, and assesses their motivations for those roles, how effective they have been and how their roles have been influenced.

It finds that initiatives have not resulted in change in consumer practice at a scale that would deliver significant emissions reductions. In using a coevolutionary approach to examine sectors as a whole, there are number of explanations for this, including that both competition and cooperation between firms can shape individual businesses' responses. However, the over-riding conclusion is that consumption emissions from households are a result of sector-level, multi-directional influences along the chain of manufacturers, retailers, shoppers and consumers and arise from interdependent systems of provision, technologies and infrastructure.

Therefore, in spite of considerable efforts and resources deployed, business initiatives, individually and at sector level, could be more effective. However policy makers could improve effectiveness by taking a wider perspective of system-level and intra-sector influences in order to develop policy to achieve lower emissions at the scale needed.

Table of Contents

Businesses’ activities for consumer carbon emissions reduction: strategies, outcomes and contribution to sustainability transitions	i
Acknowledgements	iii
Abstract	iv
Table of Contents	v
List of Tables.....	viii
List of Figures	ix
List of Abbreviations	x
Rationale for thesis by alternative format	xi
1. Chapter 1 Introduction.....	1
1.1 Introduction.....	1
1.2 The context and rationale for this research	5
1.2.1 <i>The role of large consumer-facing businesses’ and transitions for a low carbon society</i>	<i>7</i>
1.2.2 <i>Consumer-facing businesses’ roles, capabilities, and motivations for, voluntary strategies and actions for emissions reduction in consumer use.....</i>	<i>16</i>
1.2.3 <i>Business strategies and mutual influences with user practices and consumer-facing technologies</i>	<i>28</i>
1.3 Research strategy and methodological approach	35
<i>Research strategy.....</i>	<i>35</i>
1.3.2 <i>Research philosophy</i>	<i>37</i>
1.3.3 <i>Methodological approach</i>	<i>38</i>
1.3.4 <i>Case study approach and time horizons</i>	<i>41</i>
1.3.5 <i>Data access techniques, collection and analysis.....</i>	<i>42</i>
1.3.7 <i>Research strategy summary</i>	<i>46</i>
1.3.8 <i>Research Ethics.....</i>	<i>47</i>
1.4 Contribution to advancement of knowledge	48
1.5 Structure and content of the rest of the thesis.....	48
1.6 References	50
2. Chapter 2 ‘Plan A’: Analysing business model innovation for sustainable consumption in mass-market clothes retailing.....	64
2.1 Abstract	64
2.2 Introduction.....	64
2.3 Retailers, Clothing and Innovation for Sustainable Consumption	66
2.1.1 <i>Marks and Spencer.....</i>	<i>68</i>
2.4 Business Models and Innovation	69
2.4.1 <i>The Business Case for Sustainability.....</i>	<i>70</i>
2.5 Methodology	74
2.6 Results	75
2.6.1 <i>Marks & Spencer Plan A Commitments Across The Period</i>	<i>75</i>
2.6.2 <i>Selected Plan A Commitments in Relation to Business Model Pillars, Competitive Advantages and Business Case Drivers.....</i>	<i>83</i>
2.6.3 <i>Selected Plan A Commitments in Relation to the Use Chain.....</i>	<i>84</i>
2.7 Discussion	85
2.7.1 <i>System Innovation</i>	<i>85</i>
2.7.2 <i>The Use of the Analytical Framework.....</i>	<i>86</i>
2.8 Conclusion.....	87

2.9 References	88
3. Chapter 3 Large UK retailers' initiatives to reduce consumers' emissions: a systematic assessment	93
3.1 Abstract	93
3.2 Introduction	94
3.2.1 Retailers and consumer behaviour at home	94
3.2.2. Retailers and corporate responsibility for consumption emissions	95
3.2.3. Research Objectives	97
3.3. Methods	97
3.3.1. Framework for Strategic Sustainable Development	97
3.3.2. Models of consumer behaviour change mechanisms	101
3.2.3. Using the two frameworks sequentially	103
3.2.4. Identification and analysis of retailers' initiatives	104
3.3 Analysis of the initiatives	104
3.3.1 Summary of the results	104
3.3.2 Commentary on the results	111
3.4. Discussion	114
3.4.1. Findings in comparison with other studies	114
3.4.2. Validity of findings: FSSD	115
3.4.3 Validity of findings: ISM	116
3.4.4 Validity of findings: the use of corporate material	117
3.4.5 Theoretical compatibility and validity	117
3.5 Conclusion	118
Acknowledgments	119
3.6 References	120
4. Chapter 4 'I prefer 30°?': Business strategies for influencing consumer laundry practices to reduce carbon emissions	129
4.1 Abstract	129
4.2 Introduction	130
4.3 Theoretical Basis	133
4.3.1 The coevolutionary framework used for consumer goods businesses' messages and users' practices	133
4.3.2 Business strategies, business case drivers and consumption emissions	138
4.3.3 Laundry user practices and consumption emissions (impact on ecosystems)	140
4.3.4 Technologies	141
4.3.5 Institutions	144
4.4. Methodology and setting	145
4.4.1 Data Selection	145
4.4.2 Data analysis	146
4.4.3 The empirical research setting	147
4.4.4 Identifying patterns and linkages	147
4.5 Results	149
4.5.1 The Supply system	150
4.5.2: The Demand System: How detergent manufacturers and retailers' perceive that laundry temperatures are influenced	155
4.5.3 Two mechanisms of coevolution between business strategies for consumer messages and consumer use practices in domestic laundering: 1996-2014	158
4.5.4 The Linkage Mechanisms	161
4.5.5 Coevolutionary influences and the role of other processes	164
4.6. Discussion	165
4.7 Conclusions	168
4.8 Acknowledgements and funding	169
4.9 References	170
5. Chapter 5 Discussion and Conclusions	176
5.1 Introduction	176

5.2 Synthesis of main findings of research.....	176
5.2.1 <i>Research Design and Methods</i>	177
5.2.2 <i>What activities have large consumer-facing businesses undertaken?</i>	180
5.2.3 <i>Overarching conclusions about businesses' motivations for the activities</i>	184
5.2.4 <i>Overarching conclusions about the extent to which these activities been effective, in both reducing emissions, and serving businesses' motivations</i>	189
5.2.5 <i>What does this indicate for climate change mitigation governance and policy?</i>	194
5.2.6 <i>What role have large consumer-facing businesses have played over time, through voluntary activities, to influence consumer behaviour to reduce product-related carbon emissions at home, and how has this role been influenced?</i>	197
5.3 Reflections on the research strategy and approach	202
5.3.1 <i>Reflections on the Clothing Use Chain</i>	202
5.3.2 <i>Case study approach and time horizons</i>	203
5.3.3 <i>Reflections on relationships of power between researcher and informants</i>	204
5.3.4 <i>Research strategy summary</i>	204
5.4 Contributions to the Literature.....	204
5.4.1 <i>The Clothing Use Chain</i>	205
5.4.2 <i>Novel use of FSSD, ISM and coevolutionary frameworks together</i>	205
5.4.3 <i>The methodological approach to engaging business entities with the research</i>	208
5.5 Conclusion.....	208
5.5.1 <i>Future research directions</i>	208
5.5.2 <i>Concluding thoughts</i>	209
5.6 References	211
Appendix A Supporting information to Chapter 1	216
A1 Cases in the literature that review businesses' initiatives designed to influence consumers to reduce consumption emissions in use of their products or services	216
A2.1 Example first contact letter	222
A2.2 Email sent to A.I.S.E to request access for a case study	223
A3i Email recruitment wording	224
A3ii (a) Participant Information Sheet (A.I.S.E working meeting attendees)	225
A3ii (b) Participant Information Sheet (A.I.S.E.)	227
A3ii (c) Participant Information Sheet (A.I.S.E study; non-A.I.S.E. stakeholders)	229
A3ii (d) Participant Information Sheet (individual business case study).....	231
Appendix B Supporting information to Chapter 2	233
Mapping seven selected initiatives from Marks and Spencer Plan A.....	233
Appendix C Supporting information to Chapter 3	236
Retailers initiatives 2007-2013.....	236
Appendix D Supporting information to Chapter 4	240
D1 Possible reductions in greenhouse gas emissions available from reduced laundry temperatures, selected figures.....	240
D2.1 Summary of respondents by type and country.....	241
D2.2 Interview guide for semi-structured interviews	243
D3 Business case drivers for consumer messages, as assigned by respondents	245
D4 Number of business respondents stating that the benefit is a consumer motivator	246
Appendix E Supporting information to Chapter 5	247
Climate change corporate reputation management: a selective timeline from the perspective of two leading UK retailers 2006-2008	247

List of Tables

Table 1-1 The research questions in relation to the papers in Chapters 2, 3 and 4, and methodological approaches.....	39
Table 2-1: Framework showing interrelations between business model and business case drivers for sustainability, simplified from Schaltegger et al. (2012)	73
Table 2-2: The eight Plan A commitments selected for analysis, their status across three years, 2007, 2010, 2012, and summary of their business driver and business model impact using Schaltegger et al.'s (2012) framework ...	77
Table 3-1: FSSD-derived model for this study, adapted from Bratt et al. (2011)	100
Table 3-2: ISM Framework for behaviour change initiatives	103
Table 3-3: Analysis of initiatives	106
Table 4-1: Conceptualising population level causal processes of VST (Murmann, 2013): Consumer messages as the units of replication	137
Table 4-2: Conceptualising population level causal processes of VST (Murmann, 2013): Laundry temperatures as the units of replication.....	138
Table 4-3: Codes used for analysis	149
Table 4-4: Causal Mechanisms and Their Effects on the Evolution of Consumer Messages and User Practices.....	163
Table 5-1: Retailers' and manufacturers' implementation activities for lower usage emissions in thesis.....	182

List of Figures

Figure 1-1: The Use Chain for clothing, derived from DEFRA (2010b) and Shove (2004a)	6
Figure 1-2: Elements of socio-technical systems (Geels, 2004, p900)	8
Figure 1-3: Coevolution processes developed by author, building on personal conversation with Frank Boons.....	13
Figure 1-4: Foxon’s (2011) coevolutionary framework, after Norgaard (1994)...	14
Figure 1-5: The coevolutionary framework for the thesis, following Hannon et al. (2013)	15
Figure 1-6: The Research Onion (Saunders et al., 2009, p108)	37
Figure 1-7: Graphic showing links between Case Studies 1, 2 and 3 in the three papers forming Chapters 2, 3 and 4	42
Figure 2-1: The Use Chain for clothing, developed by the author, informed by DEFRA (2010b) and Shove (2003).....	67
Figure 2-2: Business model innovation canvas, and business model pillars, adapted from Osterwalder and Pigneur’s (2010) and Schaltegger et al. (2012)	71
Figure 2-3: The Use Chain for clothing showing Plan A commitments that extend across systems	85
Figure 4-1: An integrated analytical framework illustrating the coevolutionary relationship between business strategies and the various dimensions of the wider socio-technical system	135
Figure 4-2: The Use Chain for clothing, derived from Shove (2004a), DEFRA (2010b) and Morgan (2015).....	142
Figure 4-3: Map of coevolutionary dynamics, showing two linkage mechanisms, developed by authors, following Murmann (2013)	159
Figure 4-4: Two Mechanisms of Coevolution.....	164
Figure 5-1: The Clothing Use Chain context and coevolutionary elements	179
Figure 5-2: Integration of Foxon’s (2011) coevolutionary framework with Darnton and Evan’s (2013) ISM model of three contexts in which behaviours are influenced	207

List of Abbreviations

CSR	Corporate social responsibility
FSSD	Framework for Strategic Sustainable Development
GHG	Greenhouse gases
ISM	Individual, Social, Material
IP30	I Prefer 30
MLP	Multilevel perspective for transitions
M&S	Marks and Spencer
NGO	Non governmental organisation
P&G	Procter and Gamble
UNFCCC	United Nations Framework Convention on Climate Change
VST	Variation selection transmission

Rationale for thesis by alternative format

Each of the papers shines a light on aspects of the roles and motivations of consumer-facing businesses in seeking to influence consumption emissions reduction for climate change mitigation: they build in sequence, with the first examining how strategy designed to encourage sustainable consumption was justified, over time, through one market-leading UK retailing business ('how they explained why they were acting'), the second evaluates the scope and coherence of eight leading UK retailers' consumption emissions actions over the same period ('how they explained how they were acting') and the third uses a coevolutionary framework to assess the influences and outcomes for the activities of interlinked consumer business sectors across Western Europe over a similar period ('how they were influenced, being influenced, and what were the outcomes'). Together, they build a picture of the nature of, and motivations for, large consumer-facing businesses' strategies for emissions reduction arising from home consumption of products they sell.

The thesis consists of an introductory chapter setting out the context and rationale for the research, placing it within the wider literature, outlining the overarching research strategy and its contribution to the fields of study, and detailing the data collection methods. The three chapters that have been published as papers follow as Chapter 2: 'Plan A': analysing business model innovation for sustainable consumption in mass-market clothes retailing', Chapter 3: 'Large UK retailers' initiatives to reduce consumers' emissions: a systematic assessment' and Chapter 4 'I Prefer 30°?': Business Strategies for Consumer Messages to reduce carbon emissions, an Empirical Coevolutionary Analysis'. Chapter 5 is a discussion, and conclusions, which bring together insights from the three papers, highlights lessons learned and the challenges found for businesses and for governance. This chapter also reflects on the research approach, limitations to the research conducted and possible future research direction.

1. Chapter 1 Introduction

1.1 Introduction

We have crossed the threshold level at which greenhouse gas emissions will present a danger to human societies (IPCC, 2014), through the climate change that they are causing. Productive capacity in the developed world is organised through businesses (Bansal, 2002); businesses are the main engines of socioeconomic change (Whiteman, 2011) and market-based capitalism is the predominant global economic system (Gladwin, 2012). None of these underlying systems are likely to change within the timescale needed to make the substantial adjustments to the rate of emissions that would be required to limit global warming to less than 2 degrees (IPCC, 2014), therefore changes will have to be made through these existing systems. We can expect to continue to live in what has been called a consumer society (Jackson, 2005), in which consumers control or influence 75% of emissions (Barrett et al., 2006) (for the UK). However, consumer goods in developed markets are universally designed by businesses, from manufacturers and through retailers. Consumers can be seen as people who shop, people who use and people who consume; each activity being configured by business designers (Shove et al., 2005). Hence consumer-facing businesses, such as manufacturers and consumer goods retailers, have considerable influence on the way each of these activities are performed and therefore the emissions they produce. This thesis will distinguish between consumers, based on these different activities, in order to enrich its analysis.

There are opportunities for businesses to make substantive contributions to environmental good in general and in consumption emissions reductions in particular. Hence, because businesses are a predominant driver of change, and because of the direct influence on consumption that they have, businesses' responses to the danger of climate change are of critical importance. This is congruent with one of the United Nations Sustainable Development Goals, whose achievement 'requires the partnership of governments, private sector, civil society and citizens alike to make sure we leave a better planet for future generations' (United Nations, 2017, webpage). Large consumer businesses have by no means ignored climate change, but the underlying contention for this

thesis is that their actions to influence their customers' domestic consumption emissions have not been sufficient to make a meaningful contribution to the size of the reductions required.

There is a view that the products bought for domestic use are becoming more energy efficient year by year, through improved technology, guided by regulation, and that therefore that the situation is improving. However, in the developed world, the number of products bought and owned, the frequency with which we use them, the ways we use them, and the numbers of individual households, are increasing, such that the volume of consumption more than offsets incremental efficiency improvements for each product (Blanco et al., 2014). Products for which use by consumer generates most emissions, compared to other parts of the supply chain were said by Munasinghe et al. (2009) to be washing detergents, shampoos, clothes, light bulbs, home cooked vegetables, TVs and kettles. Many consumer-facing businesses have taken actions to reduce emissions themselves and to support reduction in consumer usage emissions. Having led marketing, product development and sales departments within three large consumer goods businesses over a period of thirty years, I feel that the desire to be seen to play their part in reducing consumption emissions is a response to both customers and to threats of regulation. However there is a tension between this desire and the commercial imperative for ever-increasing sales and profits, such that businesses' actions have not led to sufficient consumptions emissions reductions. This thesis is motivated by a desire to explore this tension.

Therefore the research question is: what is the role that large consumer-facing businesses have played over time, through voluntary activities, to influence consumer behaviour to reduce product-related carbon emissions at home, and how has this role been influenced?

The sub-questions are:

- i. What activities have large consumer-facing businesses undertaken that have aimed to change consumer behaviour to reduce their emissions (other than that required of them by regulation)?
- ii. What were the businesses' motivations for these activities?

- iii. To what extent have these activities been effective, in both reducing emissions, and serving businesses' motivations?
- iv. What does this indicate for climate change mitigation governance and policy?

These questions are important because the evidence is that mainstream consumer practices in most developed countries have not changed to reduce residential emissions at meaningful scale; the increase in final demand has been greater than the emission reductions delivered by structural changes and efficiency improvements, leading to an overall increase in consumption-related emissions (Blanco et al., 2014). This is in spite of the widespread declarations by governments, institutions and businesses since the start of the 21st century that emission reductions by individual citizens will be necessary for greenhouse gas (GHG) emissions reduction (Moriarty and Honnery, 2010, OECD, 2011, Jackson, 2009, Metz et al., 2001), and altering the use patterns of domestic products to achieve substantial emissions reductions is an important element of this necessity (Dietz et al., 2009). The latest UK statistics published for final GHG emissions show total GHG emissions for 2014 at 35% less than 1990, a record low, mainly due to the decrease in use of coal for electricity generation. Within this total, 'The Energy White Paper' (Department for Trade and Industry, 2007) states that residential sector in total accounts for 30% of all emissions. Furthermore, 75% of the UK's carbon emissions arise from products and services that are bought and used by its citizens (this includes emissions embedded in the products from manufacture through to disposal) (DEFRA, 2011).

There are reasons to estimate that household emissions in use have increased. For example, the United Kingdom housing energy fact file, last published for 2013, shows a broad downward trend in carbon emissions from housing, probably related to more efficient boilers and energy efficiency measures. However greater use of appliances has worked in the opposite direction (GOV.UK, 2013), in spite of EU regulations on standby on appliances (European Commission, 2018b) and on discontinuation of incandescent light bulbs (European Commission, 2008). Other UK based research has also highlighted the greater use of appliances, the increase in single person households and that

the overall increase in domestic appliance use (Energy Saving Trust, 2011) , including the growth of home computer use and permanent availability of Wifi (Terry and Palmer, 2016). This is further evidenced by the UK statistics on energy use on lighting and appliances as percentages of overall non-transport energy consumption; these have increased from 13.1% in 2000 and 13.4% in 2010 to 16.6% in 2014 and 15.8% in 2015 (Department for Business Energy & Industrial Strategy, 2016). The overall increase in appliance use was forecast to lead to a shortfall in GHG emission savings required to meet the UK's 2020 targets (34% emissions reduction) by between 0.7 and 7 million tonnes (Energy Saving Trust, 2011). This is in the context of the challenge of meeting UK's 2050 target of 80% reduction, and the fourth (50% reduction by 2025) and fifth (57% by 2030) carbon budgets leading up to it (Committee on Climate Change, 2016), each compared to 1990 (U.K. Government, 2008).

This research is based on a conviction that consumer businesses could use their capabilities and power to drive changes in consumer practices, through innovation in products, in consumption process design and in their business models, each of which could result in substantial reductions in consumption carbon emissions. However consumer businesses' decision makers are themselves embedded in a system that is influenced by other systems, including for instance how consumer practices, financial markets, competitors, suppliers and customers respond to their activities and how, in turn, the businesses frame their responses.

The following sections will draw out specific justifications for this thesis. Section 1.2 will provide the context for the research by situating this thesis in the relevant wider academic debate and will set out the rationale for it. The research in this thesis draws from insights from three distinct fields of research: transitions towards lower carbon futures, corporate responsibility/business strategy for environment and consumer behaviour/sustainable consumption. This section will draw out specific justifications for this thesis arising from each research field and also set out why these areas of literature are appropriate for the research question and how they complement each other. Section 1.3 will provide the research strategy will be described and the methodological approach taken. The contribution of this thesis to the advancement in knowledge will be highlighted in

Section 1.4 before Section 1.5 outlines the remaining structure and content of Chapters 2, 3, 4 and 5.

1.2 The context and rationale for this research

Taking a consumption perspective for emissions is important because residential emissions remain stubbornly high, and there is substantial climate mitigation potential from changing consumption choices (Girod et al., 2014). In the most detailed monitoring of domestic electricity use ever carried out in the UK (Owen, 2012), washing machines and tumble dryers were amongst the top sixteen appliances consuming the most energy in UK households (Haines et al., 2010). Lifecycle assessment studies indicate that, for clothing, detergents and washing machines, the use phase is the most energy demanding (Saouter and van Hoof, 2002, Pakula and Stamminger, 2010, Madsen et al., 2007). Not only this, but Laitala et al. (2011) have demonstrated that changes in consumer behaviour, using currently available products, can deliver both environmental and consumer benefits, for instance, reduced costs, better cleaning results and less damage to clothes. Therefore the empirical basis chosen for this research is large consumer goods businesses in Western Europe that manufacture or sell clothing and laundering products, and whose business models are based on frequent and repeat consumer purchasing. It seeks to identify what they have done to achieve these benefits. The processes are represented in a Use Chain for clothing, Figure 1-1, which demonstrates the breadth and scope of types of businesses involved in these markets. It also identifies the distinction between shoppers at the purchase stage, consumers at the consumption stage (use of detergents) and consumers at the usage stage (clothing being worn and recycled or disposed of). The derivation of the Use Chain is more fully explained in Chapter 2.

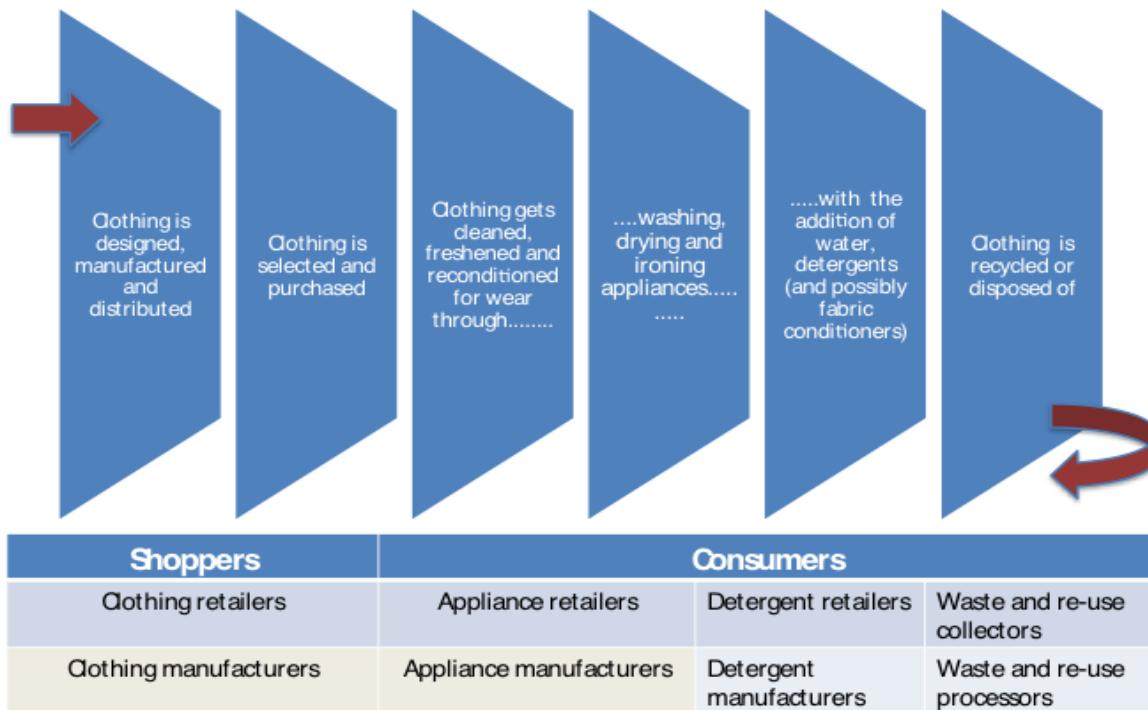


Figure 1-1: The Use Chain for clothing, derived from DEFRA (2010b) and Shove (2004a)

The theoretical context now follows. Firstly, in 1.2.1, I assess the literature for approaches that have set out how transitions to a low carbon society can be achieved, with a focus on the role of large businesses. This examines how links and influences between them as businesses and with other systems have been conceptualised. This argues for the choice of a coevolutionary framework for the thesis as a whole and as used in the third paper, which forms Chapter 4. Then, in 1.2.2, I examine areas of literature that shed light on why individual businesses of this type should, or would, and could, develop strategies for emissions reduction in consumer use. This justifies the choice made of a business case driver framework, used in the papers in Chapters 2 and 4. Thirdly, in 1.2.3, I examine the literature for how outcomes of these businesses' strategies can be assessed in relation to systems of user practices and consumer-facing technologies, leading to the choices made for the theories used in the papers set out in Chapter 3 and 4. Throughout these sections I show how these areas of literature are appropriate together.

1.2.1 The role of large consumer-facing businesses' and transitions for a low carbon society

Here I will explore the tensions apparent in the transitions literature about the role of large consumer-facing businesses. This leads to the selection of a particular coevolutionary framework for this thesis, because it can overcome these challenges.

1.2.1.1 Socio-technical transitions

Socio-technical transitions are defined as fundamental, long-term transformations towards dramatically lower carbon modes of production and consumption (Markard et al., 2012) and are thought of as long-term, far reaching changes that result in new products, new services, new business models and new consumption norms (Markard et al., 2012). They explicitly acknowledge the interplay within systems of sociological practice, institutions and of the technologies by which societies needs are satisfied (Smith et al., 2005) and this understanding is thought to assist in unlocking unsustainable consumption patterns (Schot et al., 2016). Therefore transitions approaches provide a relevant theoretical basis for assessing the role of voluntary activities from existing large consumer-facing businesses, because they recognise the breadth of the multiple system changes that will be necessary to meet very substantial emissions reductions, through recognition of interrelated influences between actors, practices and systems, shown in Figure 1-2.

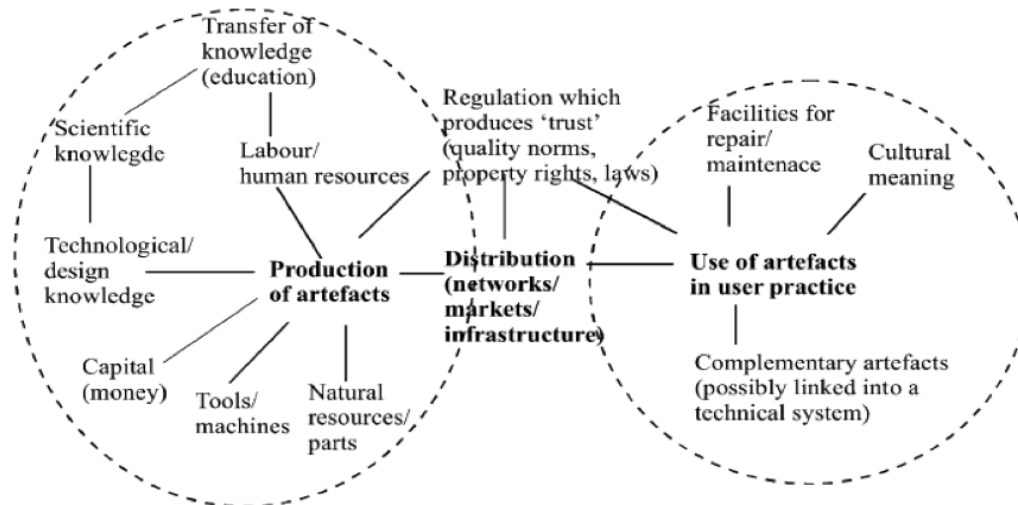


Figure 1-2: Elements of socio-technical systems (Geels, 2004, p900)

The strength of transitions approaches is that they recognise that businesses are themselves embedded within social and economic systems in which existing technologies have benefitted from scale economies and institutional adaptations and therefore limit individual businesses' scope to introduce innovation successfully (Rip and Kemp, 1998, Smith et al., 2005) and in particular provides an explanation for why innovative technologies for low carbon are not diffusing into mainstream use (Smith et al., 2005).

Sustainability issues at scale cannot be addressed by single organisations, but require coevolutionary changes across systems of technology, economy, culture and organisational forms (Loorbach et al., 2010). Of particular relevance to this thesis, is to analyse the role of businesses, specifically the way in which businesses frame consumption through the manufacture, distribution and design for use of products (or artefacts, as in Figure 1-2). These are recognised theoretically as central concepts in the transitions field, shown here as a supply chain from production, through distribution, to use.

Transitions impact socio-cultural, technological, economic, ecological, and institutional systems on different levels (Rotmans et al., 2000) and a key concept in transitions is the interaction between three levels of analysis, called landscape, regime and niche; landscape is the exogenous macro level that is

relatively unchanging other than in the long term, whereas the socio-technical regime is a shared, stable and aligned level of status quo organisations, values and routines (Geels, 2002). Niches have been conceptualized as protected spaces, in which radical innovations can emerge, develop and learning processes take place, protected from the selection pressure of a prevailing regime (Geels, 2004, Kemp et al., 1998, Schot et al., 2016). Long-term changes at landscape scale are seen to lead to destabilisation of the incumbent regime actors, thus enabling niche innovations to compete effectively and become established.

There is a large body of literature that uses the language of transitions to evaluate how a more sustainable society can be promoted, planned and governed. Transitions approaches have one of two purposes. Firstly, for policy makers and governments, transition management is an approach in which visions are developed for a more sustainable future, around which actors plan steps toward them (Loorbach and Rotmans, 2006). Secondly, transitions approaches have been used for analyses of the evolution of past transitions (Geels, 2002) to give insights into how technological innovations have emerged, and barriers to them overcome, using interlinked levels of analysis. The strengths of what is called the multilevel perspective for transitions (MLP) (Geels, 2002) are that developments at one level can be seen in the context of the other levels (Smith et al., 2005), thus enabling the assessment of the activities that large established regime businesses have undertaken to be examined in context of the scale of their influence. Many transitions studies focus on regime level contexts (Markard et al., 2012). Earlier researchers in this field took it as read that established incumbent manufacturers, focused on one technological regime, are blind to opportunities for regime-disruptive innovation (Dosi, 1982, Kemp, 1994). However, more recently, researchers have found incumbent businesses pursuing contrasting technology strategies in parallel tracks (Berggren et al., 2015, Loorbach et al., 2010) and incumbent businesses consciously are able to keep regime and niche level activities technologically and commercially separate. Indeed, Loorbach et al. (2010) argue that transition management offers a practical and strategic framework for regime businesses to engage with system change in society.

One of the characteristics of the transitions management approach is that it assumes that, at least at first, government-led bodies seek to engage other actors to collaborate towards a vision of a more sustainable future (Rotmans et al., 2001, Berkhout et al., 2004). However, this is problematic in a current political environment of neoliberalisation in which the role of the government and the regulatory intervention in the market is being minimised and replaced by self-regulation (Castree, 2010), where the state takes no part in creating conditions for transitions to occur. This is even more so for industries dominated by large international companies. Single national or international government bodies can no longer easily govern these entities. This is a recognised challenge of globalisation for environmental governance (Spaargaren and Mol, 2008, Lemos and Agrawal, 2006). Indeed, Clapp (2003) finds that multinational companies in agricultural biotechnology have influenced global environmental governance to legitimise and create markets for higher profit products. Furthermore, because of the growing power and authority of 'big brand' companies as global environmental governors (Dauvergne and Lister, 2012), it is pertinent to question the political and democratic legitimacy of these companies if they are seen to be steering transitions (Shove and Walker, 2007). As regime players, 'big brand' companies' choices for transition goals will be bounded by their own framing and experiences and will neglect some options (Smith et al., 2005).

As for the evolutionary, MLP approach, whilst it is of value because it draws attention to the linkages between technological innovation, social engagement and economic structures, its consideration of the nature of power and the role of actors is limited. Smith et al. (2005) suggest ways that power and agency could be incorporated more centrally into MLP analysis by better understanding the capabilities, motivations and expectations of regime actors and networks. Actors have choices, either as business strategists, consumers and shoppers. Geels (2011), in response to this criticism, acknowledges that power elements are less well developed, and that the approach could benefit from stronger incorporation of insights from strategic business management and the dynamics of consumer behaviour.

McMeekin and Southerton (2012) argue that a user practice approach is a necessary complement to the MLP, because it provides additional insights into

final consumption processes, including the escalation of consumption, which are missing because of the emphasis on technology in MLP conceptualisations. This is particularly important for this research question, which is about the way millions of consumers live:

‘for all the talk of socio-technical co-evolution, there is almost no reference to the ways of living or to the patterns of demand implied in what remain largely technological templates for the future’

Shove and Walker (2007, p768)

Since consumers are actors who make choices from options available to them, there is a co-dependency between businesses and users (ibid.). This aspect of coevolution between two systems is important for these research questions and will be covered later in section 1.2.3.

Another particular feature of the systems being studied in this thesis is the role of retailers and other mediators, encompassed in the term ‘Distribution’ in Figure 1-2. These have been described also using the term ‘intermediaries’, are conventionally seen in innovation studies as actors who broker, bridge, exchange information, or organise ‘superstructure’ (Howells, 2006) or as standard-setting third parties who intervene in the decisions of others whether or not to adopt a new innovation (Mantel and Rosegger, 1987). Rogers (1995) identified intermediaries as ‘change agents’ who had influence on the adoption of innovative products, and also on the speed of their diffusion. In transitions, the roles of intermediaries in the context of the Clothing Use Chain can also include ‘gatekeepers’, such as retailers and industry associations, both comprising actors who are in positions to select not only products and services for markets (Belz, 2004) but also select other participatory actors for transition activities (Loorbach, 2010), and Schot (2003) includes also marketing agencies, consumer advocacy and advisory groups, and cultural commentators. Harvey et al.(2002) identified how much the supermarket system has influenced the nature of food available for consumption, and Smith (2006) notes the influence in the other direction, in that public interest had strengthened the cause of organic food, which supermarkets had to follow. McMeekin and Southerton (2012), identify that user practice approaches can more fully explore the interdependencies between producers and consumers via retailers, who as intermediaries, have the potential

power to promote or suppress both innovations and the status quo . This is shown in the 'shopping' phase of the Use Chain. However the influence that shoppers have to influence retailers' strategic choices, and through them, manufacturers', is underrepresented in this literature and is important for the research question.

In summary, therefore, whilst transitions literature, and in particular the MLP approach, provides a useful system framework and terminology, it lacks appropriate concepts for empirical analysis of the influence and power of large consumer businesses on each other, on and from intermediaries, and on and from consumers' behaviour.

1.2.1.2 The Coevolutionary Framework

Many researchers in the transitions field have declared coevolution as its proper ontological perspective (Rotmans et al., 2000, Shove and Walker, 2007). Loorbach et al. (2010) argued for co-evolutionary mechanisms to be researched for firms and larger systems, since single businesses cannot tackle complex system sustainability issues. The missing coevolutionary links of influence in criticisms of transitions and the MLP are appropriately filled in Foxon's (2011) coevolutionary framework. It is derived from the theoretical roots of socio-technical transitions, and was developed to allow empirical analysis, at different levels, of the challenges for innovation and its adoption for a lower carbon future.

Systems are considered co-evolving if they influence each other through processes of variation, inheritance (transmission), and selection (Kallis and Norgaard, 2010, Murmann, 2012). Figure 1-3 shows a conceptual map of the processes of two evolving systems and with whom/ what they can be linked. In each system, there is variation and, over time, some elements are selected. Those elements that are selected are multiplied in the transmission stage, so that the population as a whole consists of elements that have been selected. Coevolution occurs when variation, or selection, or transmission in one system is influenced by variation, selection or transmission in the other.

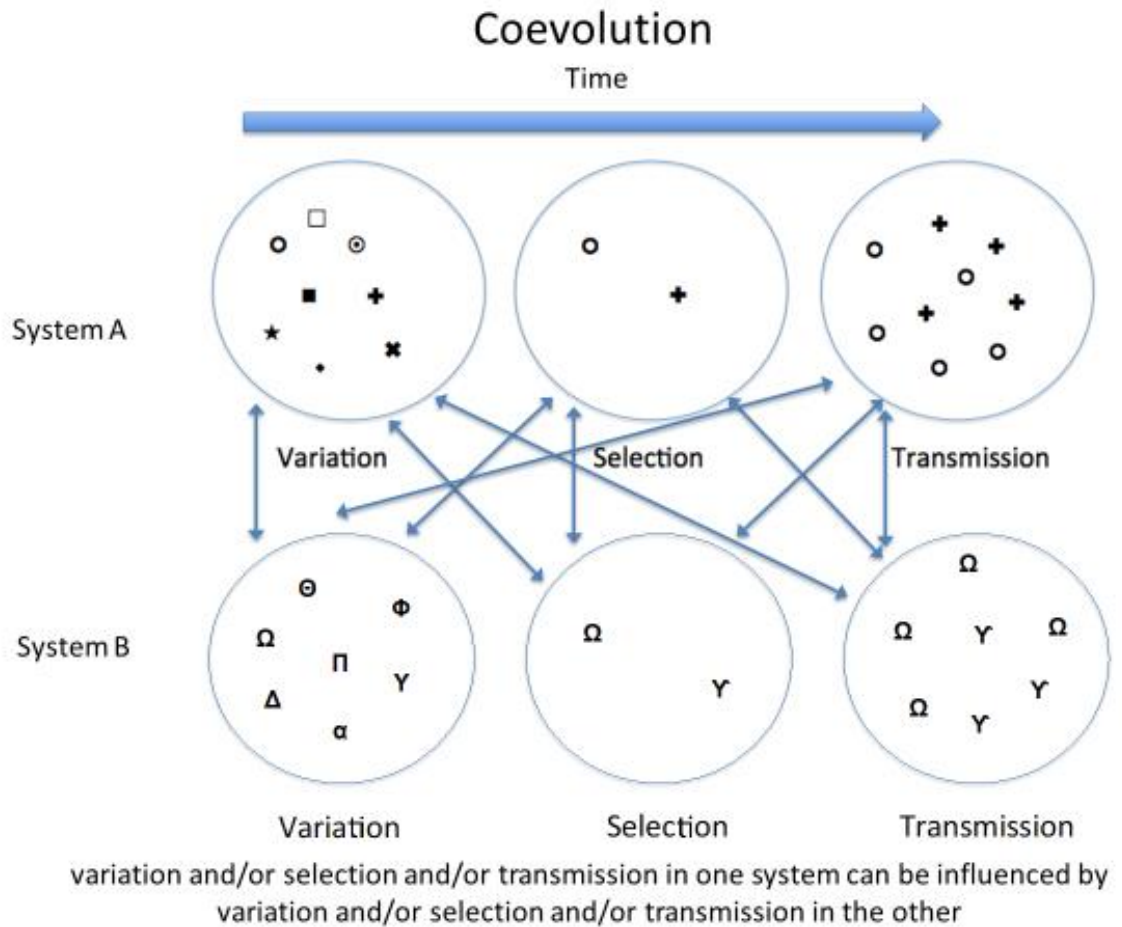


Figure 1-3: Coevolution processes developed by author, building on personal conversation with Frank Boons

Coevolution has been used previously to explain how systemic barriers have prevented the adoption of carbon-saving technologies in systems such as energy fuel, where social and institutional path-dependency barriers arise (Unruh, 2000), the UK energy supply system, where business and institutional selection pressures arise (Hannon et al., 2013), the adoption of electrical vehicles, where institutional relationships between consumers and manufacturers prevent selection of new technologies (van Bree et al., 2010) and sustainability standards, which have varied, been selected and transmitted differently in different national contexts (Manning et al., 2012).

Foxon's (2011) coevolutionary framework comprises five systems: ecosystems, technologies, business strategies, institutions and user practices, see Figure 1-4.

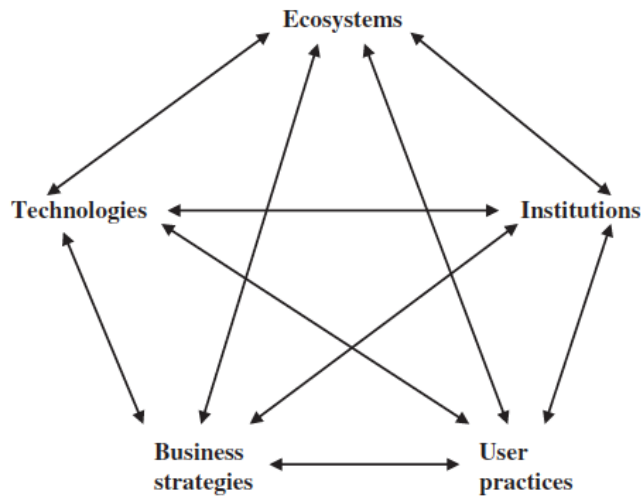


Figure 1-4: Foxon's (2011, p2262) coevolutionary framework, after Norgaard (1994)

The coevolutionary framework is relevant to answer the research questions because it enables explicit consideration of the mutual influences and linkages between large businesses and their customers, the technologies they choose to adopt, and institutions, representing the norms, customs and expectations of their markets and roles in society. These influences need to be taken into account for changes to be adopted at meaningful scale, to achieve a low carbon society. This thesis puts businesses and these mutual influences, at centre stage, following Hannon et al. (2013) , shown in Figure 1-5, and is appropriate for analysis of consumer goods provision dominated by large international businesses.

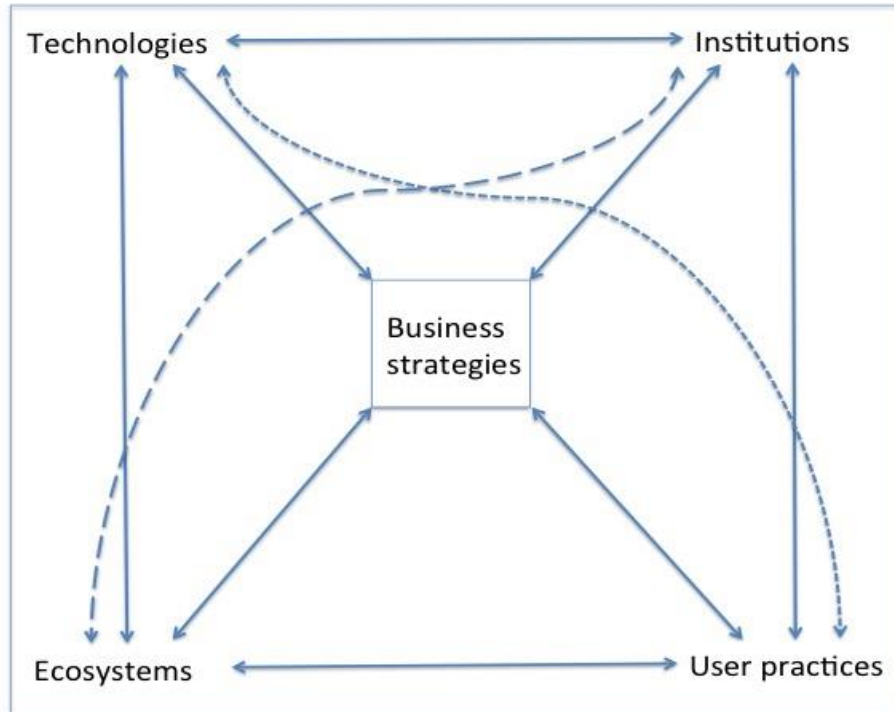


Figure 1-5: The coevolutionary framework for the thesis, following Hannon et al. (2013)

A further strength of the coevolutionary framework lies in the way businesses' actors' motivations and actions for their strategies can be explored in relation to both structure and their power. It answers Smith et al.'s (2005) call for actors (such as decision makers in large businesses and individual consumers) to be perceived as having agency, rather than merely being trapped in a structure.

In the context of this thesis, the interest is in voluntary initiatives, for more emissions efficient outcomes, from regime consumer businesses that provide products to consumers. It seeks to explore how these initiatives are subject to variation, selection and transmissions processes and mechanisms from other systems, each of which can act as triggers or barriers to innovations. An initiative therefore can either become a variation that is used and retained, and built on, for the future, or selected out, leading to a reduction in variety. Building on this, the next section examines businesses' strategies for emissions reductions.

1.2.2 Consumer-facing businesses' roles, capabilities, and motivations for, voluntary strategies and actions for emissions reduction in consumer use

Having made the case to use a coevolutionary framework to address the research question, the next two sections together form a critical review of one of the five sets of systems, businesses' strategies, in relation to the other four. This builds on Hannon et al. (2013), chosen because it is the activities of businesses that are at the centre of the research question, as shown in Figure 1-5. The empirical setting is greenhouse gas emissions reduction in consumer use. This section reviews, in turn, the literature for business strategies in connection with two of the other sets of systems, ecosystems and institutions, and leads to an analysis of the literature relating to possible drivers of businesses' strategies for consumption emissions reduction. It critically examines why individual businesses should or would and could develop strategies for action towards emissions reduction in use, that is, their role in society, their motivations and their capabilities to do so. It provides a framing for analysis of businesses' voluntary strategies and activities and expands on the choice made of a business case driver framework in Chapters 2 and 4. The following section, 1.2.3, provides a review of the literature for assessing business strategies in connection with the remaining two sets of systems, namely user practices and technologies. It expands on the choices made for the papers in Chapters 3 and 4 for ways in which user practices are theorised.

1.2.2.1 Businesses' strategies and ecosystems

Firstly, in reviewing business strategies with respect to ecosystems, it is notable that, since 1992, many large businesses have declared initiatives intended to reduce consumer emissions, under the broad issue of sustainability (WBCSD, 2013). Over the course of a number of high profile large-scale dangerous events (in Seveso, Bhopal, Antarctic Ozone hole, Chernobyl), from the late 1980s, businesses saw the need for a more proactive stance toward environmental issues, because economic performance was beginning to be affected (Banerjee, 2012) and so it became a strategic management issue. In the 1990s, scientific analysis showed that carbon dioxide and other greenhouse gas emissions act at a global scale to cause climate change. This forced businesses to consider their role further, since as it became clear that climate change exposes whole

societies, economic sectors and ecosystems to risk, threatening also the sustainability of economic performance (IPCC, 2014, Stern, 2007). Climate change became the principal environmental issue (Bansal and Hoffman, 2012) and large businesses increasingly took actions both to reduce GHG emissions and to reduce the threat of regulation because of emissions (Kolk et al., 2008). Nonetheless, even the best climate policies of large European companies avoid committing to absolute reductions in GHG emissions (Sullivan, 2010).

This leads to a need to assess how GHG emissions from residential consumption have been measured, categorised and analysed in the wider context of all emissions associated with products. In developed countries, the major categories of residential consumption from which emissions arise are space heating and cooling, water heating and the use of appliances, including lighting (Swan and Ugursal, 2009). Residential consumption emissions are complex to measure and are less well understood than other sectors because they arise from fragmented actions of millions of individual consumers, and consolidated data from detailed household use is not available (Swan and Ugursal, 2009). There are two contrasting approaches to measurement; top-down and bottom-up modeling (ibid.). In European government assessments, top-down assessments of consumption emissions in the European Union and national statistics are collected on the basis that electricity supplies to the home, and therefore the emissions associated with them, are attributed to the electricity supply industry. This is a simple approach and relatively easy to make available, but is not helpful for assessing the contribution made by various consumer practices to residential emissions, particularly since home space or water heating by gas and other non-electricity heating fuels are, in contrast, defined as domestic emissions (GOV.UK, 2016). Academic assessments of emissions which are designed to assess embodied emissions (emissions that include global emissions released elsewhere to meet final demand from consumption in the country), use input-output models and include emissions arising from the energy supply for consumption, but again these are not disaggregated into individual end-uses (Baiocchi and Minx, 2010, Barrett et al., 2011, Barrett and Scott, 2012), because this is not the focus of these studies. Chitnis et al. (2012) use historic data to estimate GHG intensities, by household expenditure sector, in a further refinement. However, the lack of detail and use of historic data to

derive GHG intensities makes these approaches less useful for measuring the scale of opportunities, and innovations, for changes in intensities and emissions reductions arising from different types of products used in homes.

On the other hand, bottom-up statistical models use data from surveys of a number of representative homes to estimate the make-up of total emissions. Therefore they can account for consumer behaviour and use of heating, cooling and individual appliances, but require a high level of detail, are difficult and expensive to organise and so have not been collected systematically over time at meaningful scale (Swan and Ugursal, 2009). For instance, the study of electricity consumption in 250 UK owner-occupied households over a period of up to one year over 2010/11, funded by Defra and DECC, was said to be the first of its kind (Owen, 2012). It was followed up by further analysis of the data (Palmer and Terry, 2014). However this appears to have been a single study, not repeated in its format. In summary, then, systematic data to support the relative importance and growth of domestic usage emissions is not available.

Turning to the business context for greenhouse gas emissions measurements, the ecological footprint metaphor (Wackernagel et al., 1997) has been used by many, notably through the Greenhouse Gas Protocol (GHG Protocol), a partnership between the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). Emissions measurement and management has become a major way in which businesses perceive their role with respect to climate change; the GHG Protocol is the most widely used international accounting tool for business leaders to understand, quantify, and manage greenhouse gas emissions (WRI/WBCSD, 2017). This protocol is also used by CDP (2016), an independent not-for-profit organisation that holds the world's largest database of primary corporate climate change information. It requires businesses to estimate direct emissions (called Scope 1) and emissions from direct purchases of energy (called Scope 2), whereas reporting of indirect emissions arising upstream and downstream of the supply chain is optional (called Scope 3). Mandatory regulations in Europe, Japan, Australia, and many US states have forced firms to at least report, if not control, Scope 1 emissions. In the EU, where a cap-and-trade program has been implemented through the EU Emissions Trading Scheme (ETS), most firms must

control but do not have publicly to disclose direct emissions (Matisoff et al., 2013). Publicly quoted UK businesses have been legally required to integrate reporting of Scope 1 and 2 GHGs with their financial reporting since October 2013 (DEFRA, 2013).

However, Scope 3 emissions can often be substantially greater than Scope 1 or 2, on average being more than 75% of an industry's carbon footprint, although Scope 3 emissions vary greatly by industry, boundaries (to avoid double counting) are difficult to specify, and protocols are much less well developed for estimating them (Huang et al., 2009). Furthermore, the transparency and quality of Scope 3 emissions reporting has not improved over time (Matisoff et al., 2013). Emissions from products in use are just one of the commonly listed sources of Scope 3 emissions. Very few companies disclose quantitative figures associated with the use of their products or services (Kaenzig et al., 2011, Kolk, 2005). For instance, in 2010, only 7% of companies reported on use emissions, this compares to the most frequently reported source of emissions in Scope 3, business travel, at 44% (Matisoff et al., 2013). Yet, for some domestic products the use phase has been identified as one of the largest sources of carbon emissions (WBCSD, 2012, The Carbon Trust, 2011), for instance, for laundry detergents in developed markets (Unger et al., 2011) and clothing (Business for Social Responsibility, 2009, WRAP, 2012). The focus on Scope 1 and 2 emissions, therefore, misses the impact that businesses have on downstream consumer use of their products and hence risks giving an unbalanced view of progress (Whiteman et al., 2012). It seems that emissions management and measurement has been used to demonstrate individual firms and sectors as having made progress and potentially to ward off regulation (Kolk et al., 2008). Furthermore, it remains unclear how the whole body of emissions measurement, accounting and targeting has contributed to reliable and comparable information about businesses' true mitigation impact on GHGs and climate change (Pinkse and Kolk, 2012, Kolk et al., 2008, Busch, 2010).

Therefore, emissions management by businesses has become an example of what Dyllick and Muff (2016, p2) express as 'the big disconnect', that is a body of demonstrations of micro-level progress, arising from many single businesses choosing to take on roles to reduce emissions, but with poor understanding of

the actual emissions reductions achieved (Whiteman et al., 2012). The substantive impact of the whole system of businesses' strategies on the macro-level ecosystem is neglected.

1.2.2.2 Businesses' strategies and institutions

The second part of this section reviews the relationship between systems of businesses strategies and systems of institutions. Institutions are systems of rules (North, 1990) , including social norms, legislation, policies, and customs, and business decision makers are actors who are embedded in these institutional contexts (Markard and Truffer, 2008). Large businesses' managers in particular are confronted with the dilemmas between running the business for the interests of its owners, its many types of stakeholders, or for society in general, since, large businesses' activities are more visible in society and their actions have greater impact and consequences (Crane et al., 2008). Since, the focus here is on businesses' voluntary emissions management strategies, it is useful to examine these as an aspect of corporate responsibility. Emissions management is formally included in the best known global voluntary corporate responsibility reporting standards frameworks (Chen and Bouvain, 2009) and in most large firms' corporate reporting (Bondy and Matten, 2011), alongside other social and environmental dimensions (Kolk, 2010), therefore has itself become an institution. Therefore it is appropriate to review, how emissions management fits into the overall field of corporate social responsibility, in terms of the role and motivations for it.

There have been many varied approaches to categorising theories of Corporate Social Responsibility (CSR) (Garriga and Melé, 2004, Crane et al., 2008) . For Garriga and Melé (2004) two of these categories are named instrumental theories, and political theories, both of which have relevance to this research in the light of its coevolutionary approach.

Firstly, instrumental theories perceive CSR as a means to the end of profits, in which enlightened self-interest leads to economic benefits to the firm, as exhibited by the European Union:

'Corporate social responsibility (CSR) refers to companies taking

responsibility for their impact on society.....CSR is important for the sustainability, competitiveness, and innovation of EU enterprises and the EU economy. It brings benefits for risk management, cost savings, access to capital, customer relationships, and human resource management.’ (European Commission, 2017b)

This is telling, because it is framed in terms of social responsibility, but the importance of it is justified through businesses’ instrumental benefits. Many examples of approaches where ‘win-win’s’ are described in order to promote CSR to businesses are found; they seek to show that better environmental reporting leads to better environmental performance and then to better financial performance (Kolk et al., 2008, Matsumura et al., 2013, Elkington, 1999).

Many researchers have found a bias to instrumentality as the predominant driver for businesses’ CSR, with secondary consideration for the environment or society (Walsh et al., 2003, Hahn et al., 2010, Hahn and Figge, 2011, Hahn et al., 2015, Tregidga et al., 2013, Dyllick and Muff, 2016) and that this seems not to have changed since the 1990s, across many studies into organizations and environment over this period (Kallio and Nordberg, 2006). All of the above, i.e. the predominance of the profit motive, single-business focus and the lack of attention to wider systemic issues, including emissions, suggest that, in spite of their widespread use, instrumental approaches to CSR have limitations in their perspectives when used as a basis for coevolutionary analysis.

The second type of theories described by Garriga and Melé (2004) are categorised as political, and focus on businesses’ responsibility to use their power in society. Carroll (1979), who is generally accepted to have introduced this model of CSR (Garriga and Melé, 2004), sums up these theories:

‘The social responsibility of business encompasses the economic, legal, ethical, and discretionary expectations that society has of organizations at a given point in time’ (Carroll, 1979, p500).

A firm can be seen as a citizen with an inescapable involvement in society (Matten and Crane, 2005). The motivation here, for an individual firm, is that it will eventually lose its position in society if its power is not used responsibly.

From the perspective of society, at a system level, businesses as a whole will, in theory, lose their social legitimacy if they do not meet these expectations (Patten, 1992, Deegan et al., 2002). From the other direction of influence, businesses represent the productive resources of an economy, and therefore without their support, any type of sustainability cannot be achieved (Bansal, 2002). The mutual influences implied are consistent, then, with a coevolutionary analysis and a coevolutionary framework (Foxon, 2011), since the influences between and across businesses, institutions and user practices are related to the power they exercise to introduce variation, select and replicate it for the future. The political power that global corporations have to influence institutions and discourse has been said to have been under-theorised (Banerjee, 2010), especially with respect to the global increase in self-regulation instead of government regulation (Mäkinen and Kourula, 2012, Humphreys, 2014, Albareda et al., 2007, Lenssen et al., 2008) and evidence of the lack of disciplinary oversight of self-regulation (King et al., 2013). As Fuchs et al. (2016, p306) conclude:

‘Power is essential in understanding what drives overconsumption and creates barriers against attempts to make it sustainable, and in identifying where potentially effective intervention points may exist. Sustainable consumption and absolute reductions research and action need to consider who sets the agenda, defines the rules and the narratives, selects the instruments of governance and their targets, and thus influences peoples’ behavior, options, and their impacts.’

Indeed, large MNE businesses’ strategies are seen to have shaped and influenced institutions, such that they ‘tend to favor more carrots than sticks because of corporate power and influence over institutional policy making’ (Banerjee, 2010, p267).

Businesses benefit then also from social approval and from the mutual influences between social and economic processes (Bansal, 2005). Business actors themselves are

‘...strongly influenced by nonmonetary and noncompetitive factors, including normative pressures to “go where the market is going,” shifting regulatory requirements, the market power and foibles of important customers’

(Biggart and Lutzenhiser, 2007, p1079)

These influences, and partnerships and networks between and across business and institutional entities, demonstrate why there are coevolutionary elements at play (Pinkse and Kolk, 2012).

A coevolutionary framework, proposed in the preceding section, draws upon influences between systems and can help to analyse why it has been challenging in practice for mainstream, regime-level actors to effect eco-efficiency approaches for increasing resource effectiveness. However, as shown here, many researchers who have looked at why companies would undertake voluntary CSR assert that it is done on the basis of the instrumental benefits. Therefore, when seeking to understand the business actors' perspectives of their motivations, an instrumental lens has been applied, in order to be congruent with their frames of reference. This is explained in more detail in the paper that forms Chapter 4. However, for the thesis as a whole, it is important to step beyond the dominant business logic. Instrumentality does not take into account either the broader power that the construction of the regime gives them in the maintenance of the status quo (Avelino and Rotmans, 2009) or that respondents may be blind to the ways in which their framing of the subject legitimises what falls within businesses' remit and what does not (Sovacool and Brown, 2015). CSR literature itself has its focus on the intentions and actions of individual businesses. Seen in the light of the coevolutionary framework, there is a tension between CSR approaches based on individual businesses' efforts and the effect that businesses as a whole have on the entire landscape of consumption. One aspect of this is, for example, the role of multi-stakeholder partnerships for climate change governance, which is noted by Whiteman et al. (2012) as deserving of future research, explored in Chapter 4.

1.2.2.3 Businesses' Strategies and Business Case Drivers for Consumer Emissions Reductions

The third part of this section now assesses the literature for ways in which firms' own perspectives on the business rationale for decisions about consumption reduction strategies have been framed. As shown, businesses' own perspectives often take an instrumental approach. Taking sustainability as a whole, researchers of corporate sustainability have developed insights into the various

financial, institutional, and ethical drivers (Bansal and Hoffman, 2012). Many are justified on the basis of what are called business cases (Salzmann et al., 2005) and these types of justification have predominated in businesses (Hockerts, 2015). Schaltegger et al. (2012) go further, from an extensive review of the literature on business cases for sustainability, in proposing a typology, which defines six core business case drivers as follows: cost reduction, risk/risk reduction, reputation/brand value, sales/profit margin, attractiveness as employer and innovative capabilities. The papers that form Chapters 2 and 4 of this thesis use Schaltegger et al.'s (2012) typology because it explicitly enables assessment of the interrelationships between these and business model innovation (explained in Chapter 2).

Drawing on each of Schaltegger et al.'s (2012) six drivers, in turn, for businesses' reducing consumer use emissions, firstly, no references have been found in the literature to businesses' cost reduction as a business case driver; this is intuitively logical because it would be the consumer who makes any savings in use, rather than the business. With regard to risk and reputation, these two drivers are often strongly linked. Godfrey et al. (2009) find that firms that take part in CSR activities aimed at society at large gain an insurance benefit through enhancing their reputation, which protects them from future threats, and, similarly, formal disclosure of emissions through CDP can enhance reputation (Whiteman et al., 2012, Kolk et al., 2008). Some corporate environmental practices, however, are not linked to any substantive material performance, and are designed only to have a symbolic effect on the firm's reputation (Bowen, 2014). Furthermore, firms (and groups of firms in association) may use CSR to manage the risk arising from institutional pressures, for instance threats of regulation (Reid and Toffel, 2009). For consumer goods businesses, such as those in the Clothing Use Chain, brand reputation with consumers is of particular importance (Riezebos et al., 2003, Theißen et al., 2014) and it has been found that, in particular, multinational companies face additional reputational risks, in part because of cultural consumption differences across country markets (Bondy and Starkey, 2014).

Turning to positive effects on sales or profits, Kolk and Pinkse (2008) find that firm-specific competitive advantages related to climate change might be

developed in oil, gas and automotive industries, or by firms specializing in goods and services required for the mitigation of climate change. However they find no compelling reasons for other types of businesses to develop new firm specific advantages related to climate change, other than a general opportunity for enhancing legitimacy and reputation.

For the driver of employer attractiveness, whilst there is extensive literature about the importance of CSR in general in engaging, motivating and retaining employees (Aguinis and Glavas, 2012), consumption emissions are not a particular focus. However, recent papers have speculated on the possible risk to employee attractiveness when consumption emissions standards are undermined, again for automobiles (Klinger, 2016, Kirch, 2016). Therefore this suggests that the employer attractiveness driver for consumption emissions also links most strongly back to managing risk.

Finally in the analysis of drivers and how they might relate to consumption emissions reduction strategies, are innovative capabilities. Hockerts (2015) finds that firms having higher perceived sustainability performance drew on more complex mental models to link sustainability and corporate competitiveness and this could be interpreted as having enhanced firms' innovative capability. However, this driver can have wide-ranging features; including building innovation into the business's strategy in both product and service technological design, into its commercial strategies, and also in business model innovation. For consumer goods manufacturers and retailers, Bocken and Allwood (2012) find very few literature references dealing with innovations for emissions reductions associated with final consumers, even at the firm level. They state that it is the complexity of interrelated environmental issues that presents significant challenges in innovation for consumer goods, and call for more research to take this into account. This gap is explored in the paper that forms Chapter 2 of this thesis. For this thesis, one relevant example given of a rare 'win-win-win' innovation is said to be the introduction of more concentrated laundry detergents (Bocken and Allwood, 2012). These enable washing to be undertaken by consumers at lower temperatures, below 40°C (A.I.S.E., 2013a). Bocken and Allwood (2012) point out that this also saves cost in the supply chain

for manufacturers and retailers. This opportunity is analysed in Chapter 4 of this thesis.

Innovation in product and service design, a key intervention area for sustainable consumption (Tukker et al., 2010), needs to be done in the context of wider sociotechnical systems, according to Shove (2012), requiring due consideration of evolutionary processes of emergence, stabilisation (of new practices) and disappearance (of previous practice). These are necessary when habits (Rubik et al., 2009) or lock-in (Smith et al., 2005) are to be overcome. Therefore product and service innovation needs to be complemented by guiding initiatives, such as regulations, information giving, labelling, economic and other incentives for consumers and for the businesses that are innovating. This is why it is difficult to observe in isolation from the other coevolutionary systems.

Bocken and Allwood (ibid.) identify other strategies for innovation that existing consumer businesses can use, for instance, use of marketing techniques for encouraging consumers to perceive the additional benefits of eco-friendly products and choice architecture to support low carbon behaviour and purchases, for instance, editing out higher carbon emitting alternative products from those on sale. Consumer goods companies have considerable expertise in these techniques, both to create demand for more sustainable products (Kong et al., 2002) and to persuade consumers to change their behaviour by advertising, and other communication strategies (Ginsberg and Bloom, 2004, Devinney et al., 2006). Also, choice editing is common for retailers as a mainstream business strategy, in order to steer customers toward products that are more profitable (Murray et al., 2010), for instance, putting the most profitable products at eye level and the least profitable on the bottom shelves. A number of businesses, from time to time, have stated that they have already influenced the practice of consumers, in order to reduce emissions in certain domestic sectors. For instance Unilever have encouraged consumers to take shorter showers (Bocken and Allwood, 2012), and two detergent manufacturers, Unilever and Procter and Gamble, and several clothing retailers, for example Marks and Spencer, have run campaigns to advise consumers of the benefits of using washing detergents at low temperatures, and prioritised products for sale accordingly (Unilever, 2012, Business in the Community, 2008, Marks and Spencer, 2013d, Mylan,

2017). The theoretical perspectives for these strategies are further discussed and are the subject of research set out in the papers in Chapters 3 and 4.

The final broad area, in which businesses can innovate for sustainability, is in their own business models. Business model innovation theories are covered in Chapter 2. Schaltegger et al. (2016) find that innovation in business models for sustainability can go beyond the instrumental profit motives, in providing a means to secure ecological and social value as well as economic value but the challenge remains how to turn social and environmental value into economic profit and competitive advantage (Dyllick and Hockerts, 2002, Schaltegger et al., 2012). Indeed, Bocken et al.'s (2014) extensive literature review, of possible business models for sustainability, identified that innovation in business models can be a way of designing consumption emissions reduction strategies, congruent with instrumental business benefits, however in practice there is little empirical evidence of it having been implemented. It seems directly opposed to the sales and profit growth drivers of businesses; 'it is difficult to imagine corporate messages aimed at selling less' (Bocken and Allwood, 2012, p127). Schaltegger et al.'s (2012) business model framework is described in more detail in Chapter 2, and used as an analytical tool, in the papers that form Chapters 2 and 4 of this thesis.

In summary, there are three key findings for consumer goods businesses and consumption emissions based on Schaltegger et al.'s (2012) six core drivers, from the literature. Firstly, managing risk to corporate and brand reputation is frequently identified, but in relation to other drivers, rather than being an isolated driver. Secondly, innovation for sustainable consumption has been extensively proposed through business model innovation frameworks and through other business capabilities, but empirical research demonstrating successful innovation for consumption emissions reductions is lacking. Finally, from the paucity of literature, the other drivers seem to be less salient for this group of businesses and consumption emissions.

1.2.3 Business strategies and mutual influences with user practices and consumer-facing technologies

As shown in the earlier section 1.2.1, the coevolutionary framework is particularly useful because aspects of both agency and structure can be assessed within it. In view of the research questions, this section critically examines the literature for insights into actors and structures within, and possible coevolutionary relationships between, three systems: businesses' strategies, user practices and technologies. Using this lens, it examines the literature relating to businesses' activities that have sought to promote changes in user practices to achieve consumer emission reductions in homes. This will include a review of how researchers and businesses have assessed the results of these activities for lower carbon consumption. The area of interest is how these assessments have been made, and what are the measurements and mechanisms are given for the results that have been achieved. In the light of possible coevolutionary influences, it also seeks theoretical insights about how user practices themselves influence businesses' strategies.

The need to reduce GHG emissions in homes is a subset of the need for more sustainable consumption. In that context, it is important to position GHG emissions reductions within the whole consumption system, because emission reductions in use could be made at the expense of other environmental harms. There have been approaches from a wide range of disciplines seeking to reconciling challenges and inconsistencies for sustainable consumption, see, for example Jackson (2006). At face value, the term 'user practices' used in the coevolutionary framework can imply that structural forces are predominant, whereas the term 'consumer behaviour' can imply that individual choices are predominant. Indeed, one of the prevailing themes is the contrast between perceiving individual actors' consumption choices as the issue and perceiving social and physical structures, which shape consumption behaviour, as the issue (Shove and Walker, 2010, Southerton, 2013, McMeekin and Southerton, 2012). Darnton and Evans (2013) proposed a framework for the Scottish Government, setting out three broad academic approaches that are made to assess how consumption can be influenced for environmental benefit. It is summarised by the acronym 'ISM' (Individual, Social, Material). This framework is briefly

introduced and used in the paper that forms Chapter 3, and the rationale for its use in this thesis for analysing businesses' strategies is expanded here, in what follows.

Firstly, from economics comes the 'Individual' context, in which actors make individual decisions based on rational choice based on information provision, cost-benefit analysis, planned behaviour and fixed preferences; for instance, the OECD (2011) stress the importance of policies that provide economic incentives for consumer behaviour change. However, mechanisms from this context have been frequently demonstrated as ineffective in changing behaviour (Bocken and Allwood, 2012, McKenzie- Mohr, 2000, Jackson, 2005), especially for repeated routine activities (Verplanken, 2011) and also in circumstances in which energy costs for habitual domestic actions are secondary to other factors in use (Sorrell, 2015). Laundering in the Clothing Use Chain is such a case. Individuals' 'bounded rationality' (Simon, 1955) and subsequent exploration of heuristics and judgement biases (Kahneman, 2003) have led to the development of behavioural economics approaches, which recognise the cognitive short cuts that individuals take in everyday decision making. Hence behaviour change initiatives have been recommended that seek to present choices to individuals in ways in which the desired option is encouraged. Behaviour can thus be 'nudged' (Thaler and Sunstein, 2008) by retailers and manufacturers of consumer goods, because they have the power to direct people to what they perceive as more appropriate choices.

Secondly, from social psychology comes the 'Social' context in which people make individual choices as actors, based on social norms or cultural conventions, including their identity as part of a group (or to oppose one), identified by their values, beliefs and attitudes. There are many contributions from a psychological perspective, which are of value in considering climate change behaviour, set out for instance in Swim et al. (2009) and its challenges:

'How to connect the very global and abstract issue of climate change to our very local and human moral intuitions may play a critical role in rallying first our hearts, and then our hands, to action' (Markowitz and Shariff, 2012, p246)

Markowitz and Shariff (2012) also point out that very negative normative

descriptions about climate change impacts can backfire and lead to lower levels of concern and engagement with desired behaviour change.

On the other hand, one of the most cited examples in relation to effectiveness in changing behaviour for less frequent laundering, is the use of positive descriptive messaging in hotel rooms to state that other guests reuse their towels (Goldstein et al., 2008). In the particular area of energy conservation behaviour, Smith et al. (2012) note the evidence that people identifying themselves in a group are more likely to be motivated to act, if they are told that other members of the group are doing so. However, individuals do not always act in ways that would be consistent with their attitudes or what they claim to care about (Kollmuss and Agyeman, 2002, Barr, 2006) in part because of social and institutional barriers (Blake, 1999). Stern's (2000) extensive literature review summarises the field and explains the importance of context:

'Attitudinal causes have the greatest predictive value for behaviors that are not strongly constrained by context or personal capabilities. For behaviors that are expensive or difficult, contextual factors and personal capabilities are likely to account for more of the variance' (ibid., p422).

In the shopping context, Young et al. (2010) find good environmental intentions are not followed through into actions through barriers of effort and time, such as overload of information, lack of knowledge and competing priorities for attention.

Social psychology approaches seek to create drivers to new behaviours or remove barriers to them, through engagement, awareness or involvement (Lorenzoni et al., 2007). Mechanisms that can be based on this context include social marketing (Collins et al., 2010) defined as 'the power of marketing to social good, thereby compensating for its deficiencies with better outcomes' (Hastings and Saren, 2003, p308). The seminal work of Andreasen (2006) notes that the private sector has a long tradition of bringing about substantial behaviour change through social marketing and working with networks, relationships, and group opinion leaders, often seen as more effective than traditional marketing (Berthon et al., 2012). Reasons for this can be identified in the notion of opinion leadership in Rogers' (1995) theory of diffusion of innovation. McKenzie-Mohr (2000) finds that social marketing has been effective at changing behaviour

particularly when addressing social norms and social influences, and in the household energy conservation context Schultz et al. (2007) show how social approval messages can improve persuasiveness.

Thirdly, from sociology comes the theory of practice, such that individuals are seen to have patterns of practices, interconnected sets of norms and conventions (Chatterton, 2011), arising from the constraints of the products and infrastructure that are available to them. It is these that determine how they go about doing things, especially for repeated and routine activities. Practice based approaches express the need to change the material context (rather than either to promote awareness, or to change minds) in order to change behaviour. Actions can be taken through infrastructure, technologies, rules and regulations. McMeekin and Southerton (2012) argue that theories about individuals' choices for environmental ends are wanting, because mainstream domestic consumption has become an outcome of the practices of everyday life, structured by the technologies and infrastructures that consumers have at hand. These structures are frequently shaped and multiplied by businesses for their commercial interests (Shove, 2004a, Conca et al., 2001, McMeekin and Southerton, 2012), including businesses' adoption of technological innovation. Therefore businesses have come to therefore dominate the specification of user practice (Shove, 2004a). Nonetheless, in assessing to what extent individuals can influence businesses' strategy in this context, Nye et al. (2010) raise the prospect of several opportunities for domestic consumers to redefine conventional understandings and uses of energy, arising, for example, from community energy generation and from the use of smart meters, both of which mean consumers could influence product and service providers in future technological developments. Also for everyday domestic activities, Shove et al. (2007) identify how trajectories of consumers' practices and material artefacts have coevolved, and they raise the prospect that routines that have arisen and persisted can be replaced through understanding these mechanisms.

For clothing in particular, Wrigley et al. (2012) find that maintenance and disposal of clothes were influenced mainly by existing habits and routines, which usually take precedence over awareness of sustainable practice. Some researchers reject the simplistic notion of 'habits' (Southerton, 2013), although

the strength of habits and routines in recurrent domestic tasks is often referred to elsewhere as the characteristic of this context (Wigley et al., 2012, Verplanken, 2011). One of those tasks is laundering; described as a 'system of systems' (Shove, 2004a, p118), the systems being appliances, clothing, detergents, and reasons for washing, but this theme is not further developed, for instance, to consider and distinguish between types of businesses doing the influencing: appliance manufacturers, detergent manufacturers, grocery and clothing retailers. Although these researchers reflect on the role of businesses, in a coevolutionary framing, this approach has gaps because it fails to conceptualise the role of business motivations and strategies, for types and roles of different businesses, nor do they conceptualise the influence consumers as actors have back into these businesses. Hence practice theory can be explanatory, but there is a lack of concrete examples for which it has been used to steer behaviour change to achieve measureable results.

Darnton and Evans' (2013) ISM framework neatly summarises the three approaches described and therefore has been used here. Mourik et al. (2015), who evaluate demand side management for similar purposes, give a similarly expressed alternative to analysing perspectives from three disciplines. Other frameworks for analysing and categorizing behaviour change initiatives are usefully reviewed by Stephenson et al. (2010) and by Morris et al. (2012). None of these represent a complete picture of ways of influencing behaviour, nor is there one source of reliably successful mechanics (Stephenson et al., 2010) even with a single focus on residential energy use (Wilson and Dowlatabadi, 2007). Nor are they mutually exclusive; Chatterton (2011) argues that behavioural approaches often use a mix of disciplines and disciplines overlap sometimes on certain aspects, for instance behavioural economics, which combines concepts of individual and psychological theories. These categorisations are inevitably simplistic ways of perceiving human behaviour and sweep over the academic tensions inherent in integrating the three, argued as incommensurable, for instance by Shove (2010). Nonetheless, using concrete examples, Southerton et al. (2011) demonstrate, in their review of thirty case studies using the ISM framework, that the three contexts might be usefully combined by policy makers to get better behaviour change results. The ISM framework has the benefit of being a practical tool (Darnton and Evans, 2013),

for analysing approaches that might be effective to change consumer behaviour, and it is also one that businesses might use, even though it was developed for a government body. In this thesis, the ISM framework is used to analyse and assess the mechanisms in the initiatives that businesses have chosen to influence shopper or consumer behaviour, building on Southerton et al. (2011), and because it includes a particularly clear description of the mechanics arising from the three disciplinary traditions, which makes them easy to identify in practical cases. The approach of this thesis is that consumer-facing businesses could indeed use these approaches, especially given their deep knowledge of consumers and existing core capabilities in consumer behaviour change (Bocken and Allwood, 2012, Vakratsas and Ambler, 1999).

This section concludes with consideration of what is known about assessment of the effectiveness of businesses' strategies in reducing consumption emissions. In an extensive review of ways of evaluating the effectiveness of behaviour change initiatives to reduce consumer energy demand (for policy makers), Mourik et al. (2015, p8) state that such an initiative would be:

'effective when it has reached its goals and/or has had a positive effect on reducing total energy consumption and when it has led to lasting behavioural change and energy savings in the target group' .

Although GHG emissions have become a big issue for businesses' strategies, as discussed earlier, frameworks to assess the effectiveness of the management of such strategies in businesses have been developed with consideration to the whole system, rather than GHGs alone. This can lead to problem displacement, in which sustainability activities in one area cause greater environmental issues elsewhere, and is a common characteristic of intractable issues, such as those associated with climate change (Baumgartner and Korhonen, 2010). The Framework for Strategic Sustainable Development (FSSD) is a whole-system conceptual model and planning method (Robèrt, 1994, Holmberg, 1995, Holmberg and Robèrt, 2000, Missimer, 2015). An alternative with a similar aim (Baumgartner and Korhonen, 2010) is the Sustainability Balanced Scorecard (SBSC) (Figge et al., 2002) which has been successfully introduced to businesses because it stems from a frequently used general business management tool, the Balanced Scorecard (Kaplan and Norton, 2001). Debates

have been had as to the degree to which a SBSC can be an independent tool for transformational change for sustainability, see for example, Hahn and Figge (2016), Hansen and Schaltegger (2016, 2017). However, for a particular issue, such as emissions reductions in consumption, the SBSC is not appropriate for this research, because it seeks to monitor and assess the impact from the entire 'Scorecard' for the firm, whilst the FSSD, although originally demanded a full sustainability perspective for a firm, can be used for activities relating to consumption of the firm's products or services, such as the specific focus here on consumption emissions. The FSSD, its usefulness, validity and limitations are described in detail in the paper forming Chapter 3 of this thesis.

Using the ISM and FSSD frameworks as guides, the academic literature has been reviewed for identified cases of voluntary business initiatives to reduce consumption emissions in use, identified through four sets of topic searches, see Appendix C. Researchers have found that the evidence base is poor (Southerton et al., 2011) and examples of interventions having had reliably substantiated successful outcomes are remarkably few (Bocken and Allwood, 2012). Most are cited, even in academic literature, without substantiation and with few, if any, of the criteria that would be consistent with the disciplined and complete approach of the FSSD, whilst it is recognised that businesses have not necessarily sought to adopt this type of rigour. In addition, commercial confidentiality has been frequently identified as a factor in limiting what is published on businesses' sustainability initiatives (McEvoy et al., 1998, Doane and MacGillivray, 2001, Vasileiou and Morris, 2006).

In conclusion, a more recent paper by Bocken (2017) recognises that the figures used are derived from unsubstantiated secondary data and need to be verified with more evidence for absolute outcomes to be assessed and highlights the challenges in assessing the detailed impact and outcomes of businesses' activities:

'While in some cases, significant effort has been put into transforming consumption patterns; the effects are not always clear or significant. Initiatives related to clothing consumption (M&S) and laundry behaviour (Unilever) has led to

environmental improvements of around 2-5 per cent, respectively' (ibid., p 93).

A wider conclusion made, for instance, by both Munasinghe et al. (2009), and by the Sustainable Consumption Roundtable (2006) in their strikingly titled 'I will if you will' report, is that each set of actors seem to be asking someone else to do things first rather than taking the initiative. For instance, it is said that consumers could demand low carbon products and services, thus encouraging businesses to innovate. Similarly retailers could initiate material action by demanding low carbon products from their suppliers, and edit choice to these only. In general, they have not done so, with the possible exception of legally mandated low rating appliances. This observation, relating to mutual selection pressures across systems, resonates with the processes of variation, selection and transmission inherent in the coevolutionary framework, and further substantiates the choice of that framework.

1.3 Research strategy and methodological approach

Research strategy

It is important to define the overarching research strategy because it demonstrates the coherence between the research philosophy, approach, detailed strategies, methods and procedures. The choices that could have been made are shown in the research 'onion' of Figure 1-6 (Saunders et al., 2009). The following section describes the strategic choices that were made to address the research question: 'What is the role that large consumer-facing businesses have played over time, through voluntary activities, to influence consumer behaviour to reduce product-related carbon emissions at home, and how has this role been influenced?

The sub-questions are:

- i. What activities have large consumer-facing businesses undertaken that have aimed to change consumer behaviour to reduce their emissions (other than that required of them by regulation)?
- ii. What were the businesses' motivations for these activities?
- iii. To what extent have these activities been effective, in both reducing emissions, and serving businesses' motivations?

iv. What does this indicate for climate change mitigation governance and policy?

These choices were made in relation to the alternatives that could have been adopted.

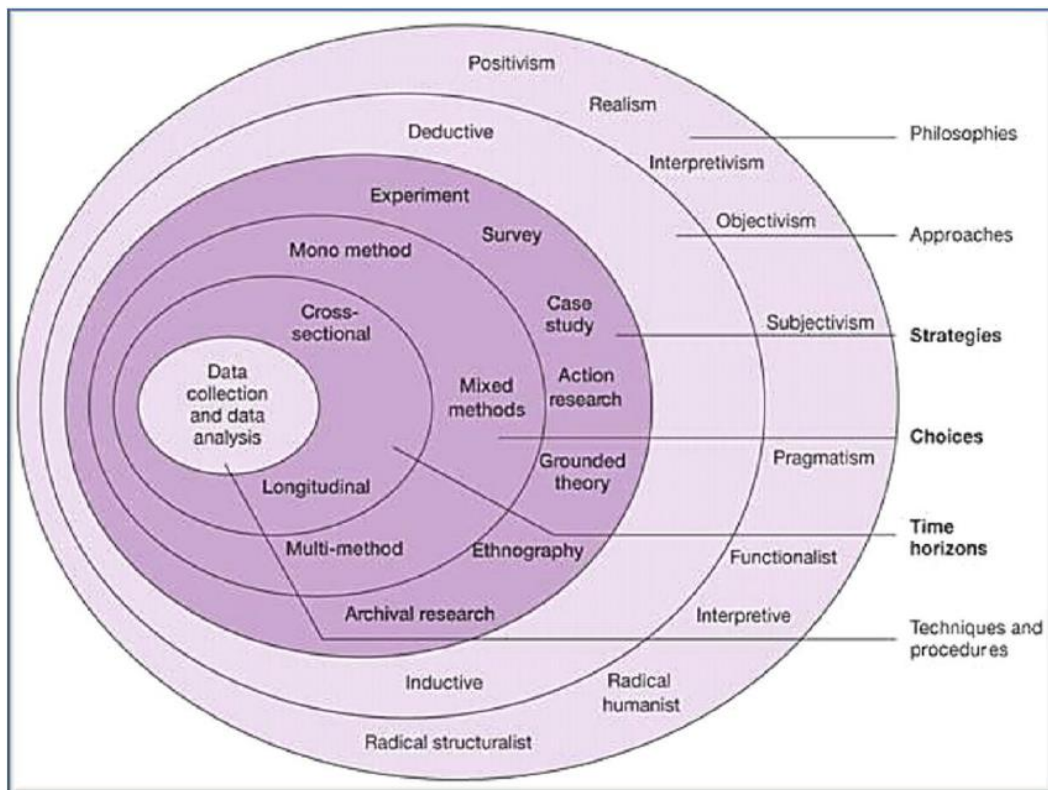


Figure 1-6: The Research Onion (Saunders et al., 2009, p108)

1.3.2 Research philosophy

The research questions concern the role and influences within and across consumer-facing businesses with other systems, each comprising human actors, including their perceptions of their motivations and effectiveness. A realist philosophy would perceive the most important driver for decisions on methodological approach as always be to discover the real mechanisms and structures underlying perceived events. However, whilst there is a reality that is totally independent of representations of that reality, this can be accessed only through actors' representations of it (Bhaskar, 2010), including those of the researcher. Critical realism, as a philosophy, acknowledges that all observations are value-laden (Saunders et al., 2009). Therefore, only a part of a bigger picture can be understood and this in the context of the social structures that shape and constrain the actors involved. This includes consideration of the different contexts at different levels of analysis; individuals, businesses and groups (for instance, industries as a whole), which are important for the cases described in

the individual papers forming Chapters 2, 3 and 4. All data are accessed through actors, each interpreting reality for themselves, and having their own values, which colour both their observations, the information they offer, and the construction of the data available to the researcher. Hence the construction of knowledge of what has taken place cannot be understood independently of the actors involved (Dobson, 2002). Therefore this research has adopted a critical realist philosophy.

1.3.3 Methodological approach

The methodological approach to the research is inductive, in that it seeks to understand the type and nature of the underlying factors behind exhibited activities (Gray, 2013). Data was collected and then analysed to see if patterns emerged that suggested influences and relationships, within each of three stand-alone case studies. Together they provide a degree of reliability to the overall thesis' conclusions. Pre-existing frameworks were used to guide the data collection and analysis. These theoretical frameworks, and how they are adapted for use, have been described in Section 1.2 and their use explained in more detail within the papers that form Chapters 2, 3 and 4. Table 1-1 shows the relationship between the research questions and the papers' distinctive methodological approaches.

Table 1-1 The research questions in relation to the papers in Chapters 2, 3 and 4, and methodological approaches

Research questions	Chapter 2	Chapter 3	Chapter 4
What is the role that large consumer-facing businesses have played over time, through voluntary activities, to influence consumer behaviour to reduce product-related carbon emissions at home, and how has this role been influenced?	Develops a Clothing Use Chain in order to identify types of businesses, and the relationships between them, which could influence consumer behaviour in clothing purchase and use	Identifies eight large UK retailers as possible influencers of consumer behaviour in relation to product-related carbon emissions at home	Identifies multinational detergent manufacturers and their pan-European business association, as well as retailers, as entities that could influence consumer behaviour in the Clothing Use Chain. Maps out influences on, and interdependencies between these firms' business strategies, using a coevolutionary framework.
i. What activities have large consumer-facing businesses undertaken that have aimed to change consumer behaviour to reduce their emissions (other than that required of them by regulation)?	Through content analysis of Corporate Reports and other publicly available data, identifies a number of voluntary activities in the Clothing Use Chain that were undertaken by one market-leading UK retail business, Marks & Spencer, from 2007 to 2013.	Through content analysis of their corporate publications, identifies a number of voluntary activities undertaken by each of the eight UK retail businesses from 2007 to 2013 and examines the behavioural change contexts in which these retailers sought to effect consumer behaviour change.	Through both content analysis and thematic analysis of public and private data, including 25 semi-structured interviews, examines the ways in which retailers, manufacturers and their European association sought to change consumer behaviour, through activities undertaken from 2005 to 2015.
ii. What were the businesses' motivations for these activities?	Analysis provides explanations for this business's motivations, from analysis of business case drivers for sustainability		Analysis provides explanations for businesses' motivations, from analysis of business case drivers for sustainability

<p>iii. To what extent have these activities been effective, in both reducing emissions, and serving businesses' motivations?</p>	<p>Analyses effectiveness in emissions reduction and in serving the business's motivations, in terms of what, if any, objectives were set out and in terms of business case drivers</p>	<p>Analyses the published results given, using a planning method for strategic sustainable development to assess what, if any, objectives were set out and examines the scope, coherence and effectiveness of the activities over time</p>	<p>Analyses the results of the activities to determine their effectiveness in emissions reduction and in serving the firms' motivations, in terms of business case drivers</p>
<p>iv. What does this indicate for climate change mitigation governance and policy?</p>	<p>This combination of approaches enables conclusions to be drawn that the initiatives from this single firm have not yielded systemic consumer emissions reductions or new business models. They appear to have been 'pilot projects', some of which have generated some business case benefits. Policymakers might consider building approaches in which whole sectors might be encouraged to support new business models for consumption emissions reduction.</p>	<p>The frameworks used across UK retailing firms indicate: a. Policy makers might consider the opportunity to recognise and emphasise different contexts for consumer behaviour change that businesses could employ b. Policy makers might consider evaluating businesses' initiatives for sustainable consumption using a systematic strategic framework to assess coherence, relevance and likelihood of success in achieving desired outcomes. However, and in contrast, there is also scope for clearly defined pilot projects, through which learning can take place.</p>	<p>a. Business case driver analysis shows that 'win-win' benefits can drive business actions, but policy makers might recognise that consumption emissions reductions for their own sake is unlikely to drive businesses' actions. b. Coevolutionary analysis enables the influences between and across manufacturers and retailers to be highlighted and emphasises the whole system approach necessary to drive material change in the outcomes of business strategies in connection with consumption</p>

1.3.4 Case study approach and time horizons

The research sought to understand how consumer-facing businesses have set out, perceived and rationalised the issues and the actions they have chosen to take over a twenty-year period. A case study approach was adopted because the research question is explanatory, focusing on contemporary events, with no control over the events, seeking to identify influences and links over time (Yin, 2009). Firstly, a Clothing Use Chain (Figure 1-1) was developed, from the literature, to give an overall context for in-depth, rich, accounts of three particular sets of activities across industries within it (Yin, 2009). Each of the three stand-alone, qualitative, case studies gives a different set of perspectives on the consumer businesses and their strategies within the Clothing Use chain. The first focused on one large UK clothing retail business, and their strategies over a seven-year period, 2007 to 2013. This first case (and the paper that forms Chapter 2) was selected because the database demonstrated that this firm had received many national and international public awards and recognition for the farsightedness and clarity of their Sustainability strategy. The second case (and the paper that forms Chapter 3) analysed eight of the largest UK retailers and compared and contrasted their strategies over the same seven-year period, as evidenced by their public reports and other communications. This was selected as a case because retailers have a pivotal role in consumption systems, as identified in the Use Chain. The third paper (and the paper that forms Chapter 4) analysed the activities of the entire laundry detergents industry in Western Europe, including through those of its industry association, across twenty years to the end of 2015. This was selected because of the widespread acknowledgement of the progress this industry had made within the Use Chain, and this had a backdrop of support of a European Commission Recommendation (1998) for its sustainable consumption position.

The empirical links between the case studies, and their relative scale, are shown in Figure 1-7.

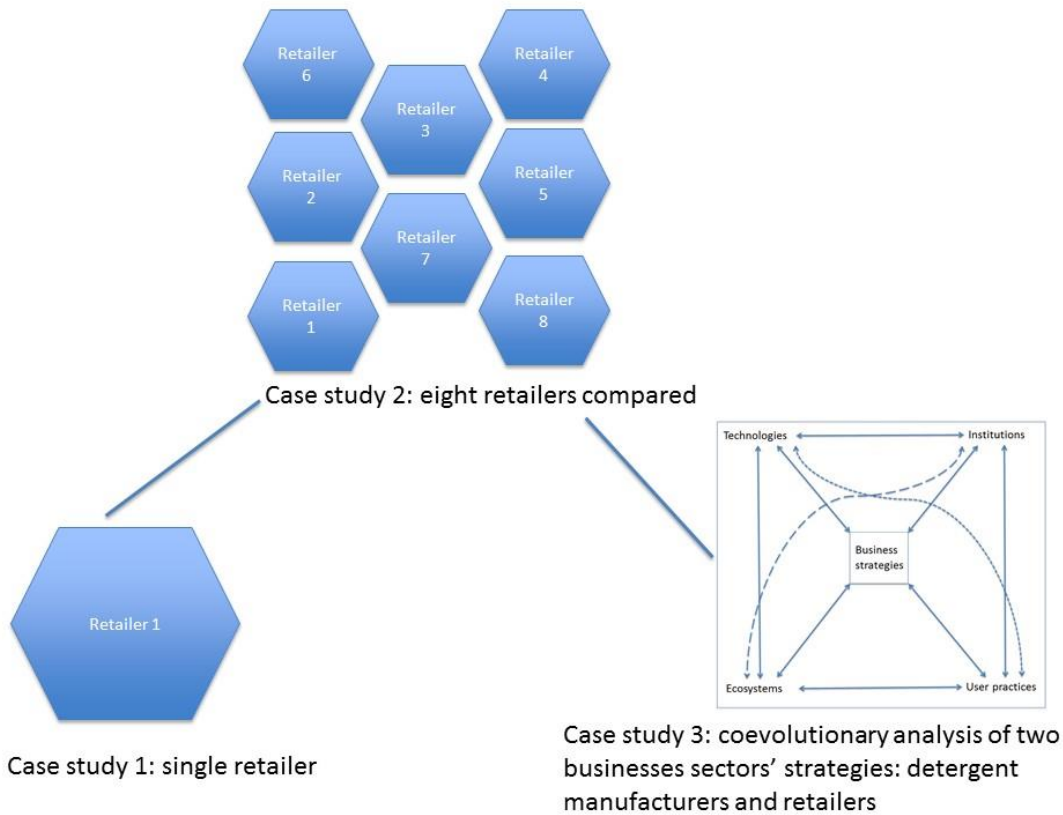


Figure 1-7: Graphic showing links between Case Studies 1, 2 and 3 in the three papers forming Chapters 2, 3 and 4

Each case study derived its evidence from multiple sources: documents, interviews, news items, and observations at meetings and events, both directly experienced, and from participants, thus giving data triangulation (Yin, 2009). Multiple sources were especially valuable to overcome the difficulty of accessing commercial data not readily available from businesses. This Introduction (and the Concluding section) covers cross-case issues and conclusions.

1.3.5 Data access techniques, collection and analysis

There were considerable barriers and challenges in accessing data for the research. The large commercial firms at the heart of the Use Chain are sensitive to possible reputation damage through information released to outsiders and careful about access that would compromise commercial confidentiality, or aid their competitors should it become public. Nonetheless, as large publicly owned enterprises, they do publish corporate data systematically. In order to develop possible case studies, I analysed data from Mintel (2011a, 2011b, 2012a) to identify the size and nature of the companies and share of the markets in the

Use Chain that they represented. For each of the firms a digital folder was created in order to form a database; these were the largest eight retailers by sales market share in the UK and the largest three detergent manufacturers by sales in Europe, and a database was also created for A.I.S.E., the European association for detergent manufacturers, for the British Retail Consortium (the trade association for UK retailers) and for WRAP, a charity that works with government, businesses and communities to deliver practical solutions to improve resource efficiency. Descriptions of the activities themselves were in the public domain (since they were directed to mass market consumers) and therefore available for scrutiny to the researcher. This was complemented by research data gathered from interviews, from individuals working for companies and their associations, and other knowledgeable third parties with experience working on these activities with the companies in this field, as set out in Appendix D2.1.

The first and second papers were based largely on analysis of publicly available data for eight UK-based retailers. The third paper in Chapter 4 built on the previous two papers, examining the role of retailers and mutual influences between their roles and those of manufacturers. These roles became important in building up the map in Chapter 4 (Figure 4-3), showing what had taken place over a twenty-year period to 2014, in which mutual influences became apparent.

Additional data was sourced for the third paper by gaining agreement with the European association for detergent manufacturers, A.I.S.E., to have access to their proprietary data and prospective interviewees, in exchange for the researcher writing up a report of conclusions for their latest pan-European campaign, which was subsequently made available publicly (A.I.S.E., 2015a).

My background in having been employed by consumer-facing businesses (two consumer goods manufacturing companies, and one large retailer) was helpful in two particular respects. Firstly, I was able to identify and navigate Corporate Responsibility and other public reports and data sources from each of the firms. Most Corporate Responsibility reports are available by searching within corporate websites, but some reports arising from early years of the study were requested from the companies' public relations or corporate records

departments. Data were also identified and accessed from company presentations made available on YouTube, conference videos, attending meetings of business associations, and public information from lobbying groups and sustainability charities, some of which were known to me from previous employment. Secondly, I was able to find named individuals in relevant roles in the companies, or those having been employed by them in the past (directly or as consultants) and in A.I.S.E.. Named individuals (identified through job titles) were found through Internet searches, including through a personal network via the business-networking site LinkedIn, and through contacts who had connections with clothing, retailing and detergents' firms, made at the University of Leeds, not only in the School of Earth and Environment, but also in Leeds University Business School and School of Design. Having identified individuals of interest, I was thus able to introduce the research by phone, by direct email, or by direct contact at networking events, such as Leeds University and WRAP events. My professional background in consumer goods marketing and product development allowed me to acknowledge common ground with prospective interviewees, which I feel was of value in securing their support and access to data. This helped to persuade individuals to take part and they were more forthcoming with explanations in the interview process because they realised that I had both a personal practical understanding of the type of businesses they work in and of the realities of their status and degree of influence within the business. The approach resulted in 43 contacts, 25 of which agreed to respond to a semi-structured questionnaire; this includes two individual respondents who were interviewed via A.I.S.E. who had previously been unavailable for interview via an earlier, direct approach.

Once individuals contacted had agreed to take part in the research, I explained the requirements. They were asked for advice on sources of relevant data, written or video materials, or other individuals, known to them, who might be available for the research. Also, invitations were secured to meeting and events of A.I.S.E. and WRAP. Through this iterative process, more contacts were made available. For participants who agreed, I undertook a semi-structured interview process, either face-to-face, by telephone, or by email (two respondents). The semi-structured interview process allowed for more depth of questioning where interviewees had particular experiences, without having to ask questions that

were less relevant to interviewees' experience. This was particularly helpful for many of the interviewees in commercial roles, including employees of large companies, who were very conscious of the value of their time. With participants' permission, the interviews were recorded for later transcription. When interviewees offered relevant documentary data, both publicly and privately available, they were added to the data set for analysis.

The interviews were transcribed using voice-to-text software for the bulk of the work, but this had to be carefully reviewed for accuracy. The transcriptions and documentary data were then coded against the frameworks, using NVivo software. The coding regimes are described in the paper that forms Chapter 4. Thus, patterns were built inductively from the evidence.

The quality of a research design can be tested through four elements of validity: construct validity, internal validity, external validity and reliability (Yin, 2009). In this thesis, construct validity was established through using multiple sources of evidence. For establishing a chain of evidence in Chapter 4, a senior A.I.S.E. manager commented on a number of earlier drafts, which improved both accuracy and validity, although the final published version does not necessarily reflect A.I.S.E.'s perspectives. Internal validity was assessed by pattern matching across the three papers in the analysis and within the papers forming Chapters 3 (across eight retailers) and Chapter 4 (across a set of businesses' initiatives). External validity was established by using pre-established theoretical frameworks, notably a coevolutionary framework for transitions to a low carbon economy (Foxon, 2011), a business case drivers for sustainability framework (Schaltegger et al., 2012), a business model innovation framework (Osterwalder and Pigneur, 2010), a business planning framework for strategic sustainable development (Holmberg and Robèrt, 2000) and a framework for consumer behaviour change (Southerton et al., 2011), and by using replication logic in Chapter 3 in the analysis of eight retailers. Reliability was improved through use of the common database for collection and categorisation, and through coding and use of Nvivo software.

1.3.6 Relationships of power between researcher and informants

As Mullings (1999, p337) states:

'because of the dynamic way in which identities and their attendant power relations are created and transformed during business interviews, uncertainty will necessarily remain a residual in the evaluation and interpretation of information received. It argues that recognizing and naming these uncertainties is an important step towards not only establishing rigor in the research process, but also to displacing the indomitable authority of the author.'

Herod (1999) describes an ethical paradox when interviewing people in positions of power: on one hand the researcher needs to create a trusting relationship, but, on the other, this changes the nature of the interrelationship over even short time periods and influences how knowledge is interpreted and represented.

It was time consuming and difficult to gain agreement to be interviewed from employees of the larger firms. Of the 41 contacts made, there were six direct rejections of the request to be interviewed, citing commercial confidentiality, and a further ten phone call and email requests (to known and named individuals) were unanswered, sometimes despite several requests. In effect, respondents were in a position of power with respect to the researcher both in recruitment and in the interview, because their input was precious. There is a further unknown as to what degree their answers were valid, personal opinion, versus a conscious, or subconscious, 'company line'.

This also raises questions of power within businesses, as well as relative power between the businesses and employees of their association, A.I.S.E., and how much these influence degrees of individual action and of individual's perceptions. This represents a challenge and an uncertainty, because the power relationships between respondents within the hierarchy of their organisations are an unknown in the evaluation and interpretation of their input.

1.3.7 Research strategy summary

Taken together, the research philosophy, methodological and case study approach, data access techniques and the position of the researcher in the context of informants, form a coherent overarching research strategy for the thesis. In relation to the research questions about the roles, activities, motivations and effectiveness of activities, the absolute reality cannot be discerned, because it is interpreted through humans' mental processes.

Therefore this justifies the critical realist approach, using inductive reasoning, moving from specific instances into generalised conclusions, in order to understand the patterns, linkages and influences emerging from the case studies.

1.3.8 Research Ethics

As the research conducted for Chapter 4 required the involvement of human participants, relevant risk assessments were completed and Ethical Approval from the University of Leeds Ethics Review Committee was sought and obtained (AREA 13-004) before the data collection commenced. The key concerns covered in the ethical review for this research were obtaining participant consent and ensuring confidentiality (Berg, 2007).

The first stage for each respondent was an introductory email giving a brief overview of the aim of the research, and which informed them that if they had further questions before taking part in this research, they could contact me (see Appendix A 3i). Once participants had agreed to the interview they were sent, at least three days before the interview, one of four different Participant Information Sheets (see Appendix A 3ii (a), (b), (c), (d)), depending on the type of organisation to which they belonged. The detailed information about the project, confidentiality and informed consent were secured through respondents verbally agreeing to these Information Sheets at the start of each interview, or deemed to having been agreed by participants responding to the interview questions via email. A key concern was to ensure anonymity in the research. Quotes were used and attributed to roles, but care taken in the role descriptions, so that the individuals could not be identified from the quote. This was especially sensitive and important for individuals working with detergent companies, having a high risk of identification because there are only three main companies across Europe. All records were kept under a code name for each respondent, and these were used within the NVIVO software. One password-protected document was kept to identify the respondents with their code names (see Appendix Bi in Chapter 4).

For the paper that forms Chapter 4, and the drafting of the A.I.S.E. report that preceded it, a formal Consultancy Agreement was made between A.I.S.E. and

the University of Leeds. The contents of this Agreement itself, and the data gathered for the research via A.I.S.E., were considered to be confidential, to be used only for the publication of the A.I.S.E. report and for this thesis.

The research as a whole was defined as 'Medium Risk', since some of the interviews and meetings took place in person at businesses' offices or conference facilities in the UK and in Brussels.

1.4 Contribution to advancement of knowledge

This thesis offers a number of empirical and methodological contributions to advance the field of businesses' strategies for sustainable consumption, which will be outlined below and articulated in detail in the respective empirical chapters. Firstly, in developing the Clothing Use Chain framework described in Section 1.2, the interconnections between systems of provision has been identified in a novel way, especially bringing out the key role of retailers for more sustainable consumption strategies. Secondly, the novel use of the FSSD, ISM and coevolutionary frameworks together has brought new empirical light to the depths and complexities of business strategies and implementation for consumption emissions reduction. Thirdly, the methodological approach to engaging business entities with the research, through associations and working groups, has enabled data to be drawn from respondents who would have otherwise been difficult to access. These contributions will be set out more fully in the discussions and conclusions in Chapter 5.

1.5 Structure and content of the rest of the thesis

This thesis is set out in 5 chapters. Having outlined the overarching research context, justifications for this thesis and research strategy as well as the contribution this thesis makes to the advancement of knowledge in this first chapter, Chapters 2, 3 and 4 will present the literature reviews, detailed methodologies and research findings specific to answering the research questions, at three different business scales: examining the role of an individual firm, a set of firms in the same sector (both from 2007 to 2013) and a whole industry over a twenty-year period to 2015. Chapter 5 will present the discussion and concluding remarks.

Chapter 5 demonstrates how the research questions set out in 1.1 have been answered and draws together the research findings from the three results chapters to highlight the overarching implications for evaluating the motivations, outputs and effectiveness of voluntary activities from consumer-facing businesses and what this indicates for climate change mitigation governance and policy. The chapter also reflects on the research approach taken, its potential limitations as well as future research directions before setting out the contributions to the research field and providing concluding remarks.

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2. Chapter 2 'Plan A': Analysing business model innovation for sustainable consumption in mass-market clothes retailing

2.1 Abstract

Mass-market retailers account for the majority of sales to consumers in developed markets and therefore have considerable influence on sustainable consumption. However, retailers' approaches and business model innovation for sustainable consumption, as described in their own reports, have rarely been investigated. The clothing sector has been identified as having huge environmental impacts, but is under-explored in terms of innovation for sustainability. This study develops a clothing 'Use Chain' and analyses the clothing initiatives within a well-known corporate responsibility programme from the UK's leading clothing retailer, Marks & Spencer's 'Plan A', in order to assess evidence for business model innovation. CSR reports were analysed across seven years, using a framework that integrates elements of the business case rationale with the identification of business model innovation. It finds evidence that Marks & Spencer had no initial plan for business model innovation, but over the period, it emerged from two of the initiatives, although not at systemic scale. It finds also that several of the initiatives were built on the business's sources of competitive advantage and therefore these would not necessarily be replicable by other firms. These findings suggest that, while leading firms may be capable of creating new sustainable business models, sector-level sustainable consumption may not necessarily follow. Nonetheless, the Use Chain has highlighted new opportunities for clothing businesses to innovate for sustainable consumption.

2.2 Introduction

Clothing is an important system to be investigated for new insights into sustainable consumption. Sustainable consumption lacks a precise definition against which an individual or business can be assessed (Jackson, 2005) and is contested (Jackson, 2006). However, it encompasses ideas of intra-generational equity and planetary carrying capacity, similar to the equally

contested field of sustainable development. Examples of these demand fourfold (von Weizsäcker et al., 1998) or tenfold (Wackernagel et al., 1997) improvement in output per unit of resource. If there is to be such transformational change in resource efficiency for sustainable consumption in developed countries, then retailing will need to transform. Large retailers are key actors; innovation in their business models will be necessary. Whilst smaller companies can break new ground in sustainability, it is the large incumbent companies that have the scale to deliver significant impact (Hockerts and Wüstenhagen, 2010). Retailers as influencers of consumer behaviour in fashion and clothing have only recently been researched, and in limited contexts (Kozlowski et al., 2012).

In clothing, the consumer use phase has the largest environmental impact (Madsen et al., 2007, Allwood et al., 2006), yet this is a 'vastly under-explored area of innovation' (p76, Fletcher, 2008). This paper examines how the leading mass-market clothes retailer in the UK, Marks & Spencer (M&S), has sought to promote more environmentally sustainable consumer behaviour in clothing. The paper analyses M&S's business case drivers and to business model innovation for eight initiatives about clothing use, employing Schaltegger et al.'s (2012) framework. The initiatives are selected from M&S's 'Plan A', a well-documented Corporate Responsibility programme. This analysis identifies the business case rationale for the activities and how they are linked to business model innovation. Drawing on this, the paper considers implications for the study of business model innovation for sustainability and system level innovation, and reflects on how the framework could be developed.

The paper is set out as follows. The first section establishes the importance and interest in studying clothes retailing, and the case of M&S, the largest UK clothes retailer. The second explains why business model theory and business case theory for sustainability can be used together to identify patterns of systemic change. The methodology is explained in the next section. The fourth section has the results, the fifth discusses them, and the final section provides a conclusion.

2.3 Retailers, Clothing and Innovation for Sustainable Consumption

Many researchers have sought to understand and explain how long-established systems of production and consumption could be influenced to transform through innovation, in order to achieve the goal of dramatically increased environmental sustainability (Tukker et al., 2008, Shove, 2003, Berkhout et al., 2004). Large existing businesses are seen as being trapped in systemic interdependencies (Tukker et al., 2008). This is especially so in consumer businesses with short term profit focus, such as retailers (Charter et al., 2008). On one hand, individual firms are said to have too limited a role to make changes happen in systems (Smith et al., 2005), yet, on the other, large businesses have a broad reach of influence (Hockerts and Wüstenhagen, 2010). This paper examines one large business in order to assess if and how its activities in the clothing system could represent system innovation for material scale improvement in environmental sustainability.

Systems of clothing in developed markets are large, complex and wide-ranging; in 2011, £41 billion was spent on clothing in the UK (Mintel, 2012b); it is the second largest consumer goods category after food and drink at £102 billion (Mintel, 2013a). Spaargaren (2011) identifies clothing as one of the sectors in which socio-technical transitions approaches for increased sustainability have been least applied (in comparison to food and housing). The UK Government also identified clothing as one of ten priority areas for action for sustainable consumption and production (DEFRA, 2010b). It brought together nearly 300 clothing stakeholders (including businesses, charities and NGOs) to work on a Sustainable Clothing Action Plan (DEFRA, 2010a). The output included a schematic of the life cycle of clothing and its extensive environmental and social impacts (p5, DEFRA, 2010b). In clothes retailing and consumption, each of the stages has a complex socio-technical system of its own; in the use phase alone, Shove (p137, 2003) describes a complex 'system of systems' just for domestic clothes laundering. Figure 2 1 shows six inter-related systems in the 'Use Chain' and the businesses that provide products and services within it. This has been built on the Sustainable Clothing Action Plan (DEFRA, 2010a), Shove

(2003) and on Solomon and Rabolt's (2004) explanation of the interrelated systems in the retailing, consumption and disposal of clothing.



Figure 2-1: The Use Chain for clothing, developed by the author, informed by DEFRA (2010b) and Shove (2003)

This Use Chain distinguishes between shoppers (or 'customers' in M&S reports) and consumers. The process of clothes shopping has become a leisure activity in its own right, over 50% of women agreeing that it fulfils a need for entertainment (Corker, 2011). The term 'consumer' is reserved for those wearing, cleaning, washing, drying, ironing and, later, recycling, or otherwise disposing of clothes. The cycle of use and re-use requires detergents, appliances, water, and power (Shove, 2003), before disposal, possible alteration, re-use or recycling.

In each of the Use Chain systems, retailers of clothing are intermediaries between shoppers and manufacturers, potentially playing a number of relevant roles for sustainable consumption. Firstly, they proactively construct the shape and constraints for consumers' consumption choices, for instance in 'choice

editing' (Charter et al., 2008). Secondly they are gatekeepers for good consumption behaviour (Lee et al., 2012, Solomon and Rabolt, 2004) and thirdly they represent their views of consumer needs to government (Marsden and Wrigley, 1995, DEFRA, 2010b). Therefore retailers are an influential link in the production and consumption chain for consumer goods such as clothes. The demand for more frequent replacement of clothing has increased over recent years (O'Cass, 2004). More garments are being disposed of after being worn relatively few times (Birtwistle and Moore, 2007, McAfee et al., 2007). Reasons given for this include price decreases (Morgan and Birtwistle, 2009), due to clothing being sourced at lower cost from developing countries (Jones et al., 2005). Furthermore retailers have promoted 'fast fashion', thereby increasing the frequency of purchase of clothing to five or more 'seasons' (Solomon and Rabolt, 2004), through heightened trend exploitation, and supported by shorter development cycles (Reinach, 2005, Tokatli, 2008, Tokatli et al., 2008). This has led to an increasingly detrimental environmental impact (Ritch and Schröder, 2012).

2.1.1 Marks and Spencer

M&S is the long term market leader in clothes retailing in the UK (Mintel, 2012b, 2012a, 2010, 2009, 2008, 2007), with a longstanding reputation for quality at good value (Worth, 2007). Its main categories of goods are clothing and food (Marks and Spencer, 2013a) and is predominantly a UK business; the UK accounts for 88% of its sales revenue, through 790 stores and on line sales (Marks and Spencer, 2013e). The firm is long-established; it was registered as a limited company in 1903 (Worth, 2007). M&S sells clothing under its own registered brand names only and therefore is fully responsible for the supply chain and manufacture of the clothing it sells. From the 1930's M&S has invested in technological innovation in textiles in its supply chain; for instance, in the 1950's and 1960's the company led the mass market availability of clothing manufactured using new synthetic textiles (Worth, 2007). Fletcher (2008) reported that, more than ten years previously, M&S had been working to reduce the environmental impact of its clothing. M&S's specific competitive advantages in clothing arise from its trusted consumer reputation for quality

(Worth, 2007), long established capabilities in considering environmental impacts (Blowfield, 2013), and its textile design and sourcing expertise (Khan et al., 2008). These enable M&S to impact the whole Use Chain for the environmental sustainability of the clothing system and able to 'simultaneously exercise demand-power upwards and supply-power downwards' (p362, Huber, 2008).

M&S has a well-defined Corporate Responsibility programme, launched in January 2007 as 'Plan A' (Marks and Spencer, 2007), consisting of 100 individual initiatives in five areas. In 2010, the five areas were restructured, renumbered and extended, and a further 80 were added, making 180 in total. All the initiatives are tracked within the company's annual reports: 'How We Do Business' (Marks and Spencer, 2013b). In order to find patterns of systemic change arising from Plan A in clothing, this paper will next identify the relevant business model innovation literature.

2.4 Business Models and Innovation

The concept of the business model has become increasingly used to provide explanations and tools for studying the dynamics of businesses (Zott et al., 2011), emerging as e-commerce firms were established and grew. These were often characterised by service that was free at the point of use. Therefore it was not always obvious how the provision of value to customers was to lead to economic value being generated for the business owners. Business model concepts showed how value could be created in these circumstances. Given this provenance, some concepts prioritise the creation of economic value for the business (Zott et al., 2011, Chesbrough and Rosenbloom, 2002, Johnson et al., 2008). A frequently used approach from Osterwalder and Pigneur (2010) deconstructs the business model into nine inter-related 'building blocks'. These blocks require specification of the value proposition (VP), the key resources, the key partnerships, the key activities, the customer segments, the customer relationships, the channels, the cost structure, and the revenue streams.

The concept of competitive advantage, the capacity to improve and innovate continuously (Porter and van der Linde, 1995), is treated by authors within business model analysis differently. Teece (2010) and Magretta (2002) explicitly exclude it and regard it as part of consideration of business strategy whereas Morris (2005), Chesbrough and Rosenbloom (2002) include it. Johnson et al. (2008) regard competitive advantage as resulting from a unique way the elements of the business model are put together. Competitive advantage will also be considered later in connection with business cases for sustainability, since it seems important when considering system-level innovation.

2.4.1 The Business Case for Sustainability

The business model concept has recently been employed in the context of sustainable innovation (Boons and Lüdeke-Freund, 2013, Wüstenhagen and Boehnke, 2008, Wells, 2008, Hannon et al., 2013). Because it is used to define a company's activities in the context of its customers and the entities it interacts with, on its activities, where they take place and what value is accrued, by whom, as a result, it therefore enables the business to be seen as part of a system, rather than operating in isolation (Johnson and Suskewicz, 2009). Schaltegger et al. (2012) condense Osterwalder and Pigneur's (2010) nine business model innovation 'building blocks' into four pillars (A, B, C and D in Figure 2-2). A high degree of business model innovation relates to changes that can be identified across all four pillars (Schaltegger et al., 2012).

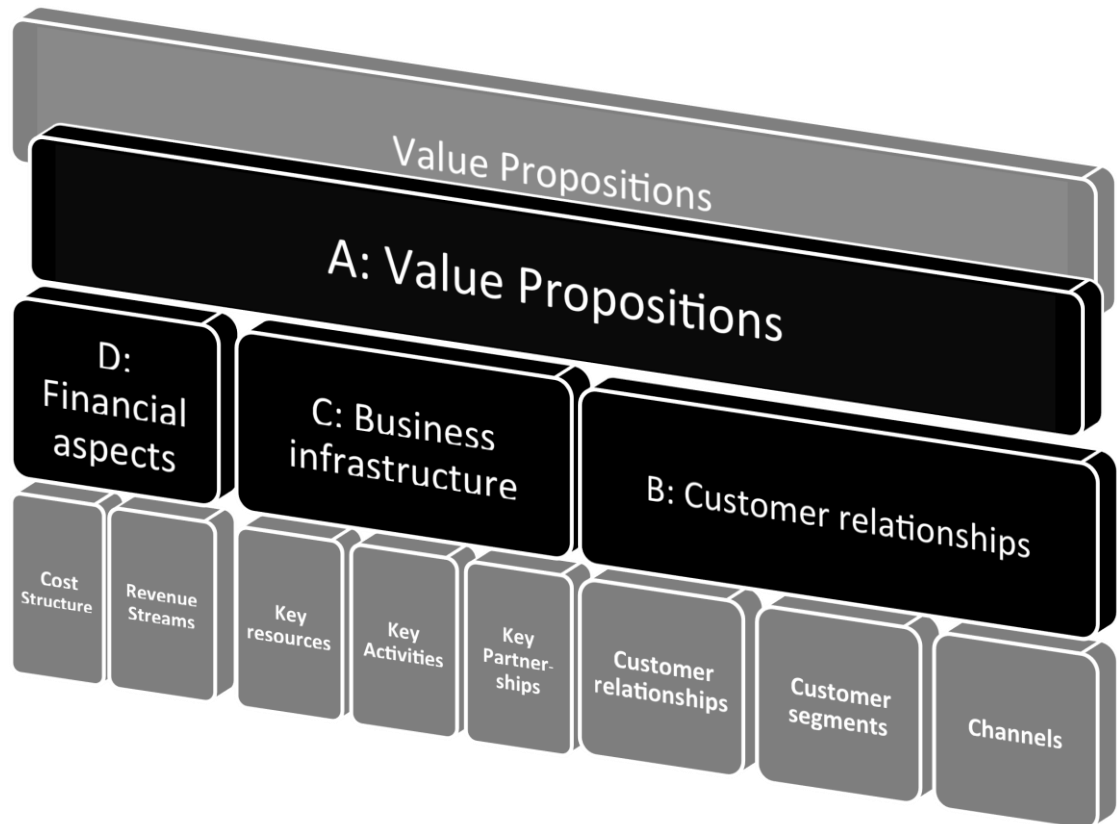


Figure 2-2: Business model innovation canvas, and business model pillars, adapted from Osterwalder and Pigneur's (2010) and Schaltegger et al. (2012)

(building blocks shown in grey and pillars A, B, C and D, shown in black)

Schaltegger et al. (2012) use the four pillars of the business model from Figure 2-2 on one axis and use business case drivers for sustainability on the other, to show the interrelationships between them, as shown in Table 2-1. Business case drivers arise from the choices to be made in each business (Hahn et al., 2010), appropriate to that business's strategy (Porter and Kramer, 2006). Researchers have categorised these choices in different ways across a number of business case drivers (Porter and Kramer, 2006, Garriga and Melé, 2004, Hoffman and Henn, 2008, Okereke, 2007, Bansal and Roth, 2000). Schaltegger et al.'s (2012) approach identifies business case drivers in six categories and cross-analyses them against observed elements of the business model. Once again, firm specific competitive advantages are not explicitly included in this framework, yet strengthening and creating these through sustainability strategies has been regarded as important by a number of authors (Porter and

Kramer, 2006, Kolk and Pinkse, 2008). However, this framework is used because it uniquely combines the assessment of degrees of business model innovation with the ways in which the initiatives have addressed the core drivers of the business case.

Table 2-1: Framework showing interrelations between business model and business case drivers for sustainability, simplified from Schaltegger et al. (2012)

Generic business model pillars for new, more sustainable products or services				
Core drivers of business cases for sustainability	Pillar A Value Proposition (VP)	Pillar B Customer Relationships	Pillar C Business Infrastructure	Pillar D Financial Aspects
Costs and cost reduction	Lower costs for customers	Closed-loop service systems	Lower costs through partnerships	Balancing cost reductions for customers and the business's cost structure
Sales and profit margin	Environmental superiority generates sales and profits	Increased customer retention and value per customer	Partnerships deliver or overcome market barriers	New customer relationships contribute to diversified revenue streams
Risk and risk reduction	Lowering risks to society is valued by some customer segments	Reduced sustainability risks for customers lead to higher customer loyalty	Partnerships can minimise internal and external risks	Improved risk and credit rating resulting from lowered sustainability risks
Reputation and brand value	Good corporate reputation	Increased customer loyalty from marketing sustainability	Strategic partnerships enhance company reputation	Good ratings in sustainability indices
Attractiveness as employer	Employees identify with VPs	Better customer service as a result of higher employee motivation	Partners encounter motivated employees	Increased employee retention leading to lower costs

Innovative capabilities	New VPs arise as sustainability potential is recognised	Innovative products and services improve customer retention	New activities and partnerships.	Higher innovation potential leading to an increase of shareholder value
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2.5 Methodology

In order to explore sustainable consumption within the Use Chain for clothing, a case study of a subset of M&S's Plan A's initiatives were chosen. The one hundred original 2007 Plan A commitments were selected on the basis of two criteria:

1. Those that apply, at least in part, to M&S's business in the clothing system.
2. Those that are designed directly to encourage consumers to behave more sustainably, for environmental benefit, in the use of clothing. Initiatives for reducing, recycling, and recyclability of packaging, plastic bags, and clothes hangers were excluded because these are related to shoppers, rather than consumers.

Eight initiatives were selected and then reviewed by content analysis of three of the six annual 'How We Do Business' reports, together with the longer term review report 'The key lessons from the Plan A business case' (Marks and Spencer, 2012b). The first and last reports were chosen (Marks and Spencer, 2007, 2013b) so that what had been said to have been achieved over the maximum time period could be assessed. In 2010, Plan A as a whole was increased in scope and its aims restructured (Marks and Spencer, 2010a), so this report was also selected for analysis, as the mid-point of the period. Key words were searched for, based on those that corresponded with the criteria in Schaltegger et al.'s framework. The key words used were 'cost/s', 'sales', 'profit', 'risk', 'reputation', 'brand', 'loyalty', 'employee', 'staff' (whilst not in the framework, this word seemed to be synonymous with 'employee' within the reports), 'innovation', 'innovative', and 'business model'. The relative quantities of word counts within the framework were used to assess the business case

rationale and business model pillar according to the framework (see Appendix B).

M&S had no direct involvement in this research, but Oxfam, as an NGO partner with M&S for one of the initiatives, were contacted to understand the extent of the effect of one of the initiatives on their own business model. Written responses to questions were received. The outcomes and results of each initiative were then mapped onto the framework (Table 2-1), by selecting the business case drivers and business model pillars indicated by the terms used in the data, related to the specific initiatives. The actions set out within DEFRA's (2010b) Sustainable Clothing Action Plan were used to cross check the originality and distinctiveness of M&S's initiatives against its UK competitors, in order to assess the extent of firm-specific advantage that they represented. The completed framework was used to evaluate the degree of business model innovation, by assessing the number of business model elements that had changed. Finally the initiatives were mapped on the Use Chain to assess which of them impacted across more than one of the inter-related systems.

2.6 Results

2.6.1 Marks & Spencer Plan A Commitments Across The Period

Table 2-2 shows the description of the aim of each of the eight initiatives and their status across the three selected years, together with the elements identified using the framework. Six of the eight initiatives selected were declared achieved by 2010 and the other two declared to be 'on plan' (Marks and Spencer, 2010a). All eight nevertheless remain amongst the 180 initiatives reported in 2013 (Marks and Spencer). The 2007 Plan A launch numbering is used as the principle reference throughout this paper (the 2010 numbering scheme is shown also in Table 2). Two of the eight (26 and 44) were restructured in 2010 to form two of the additional 80 created that year. It suggests that some of these initiatives were seen as experimental and ambitious; not all were achieved, but led to new targets later; a 'learning by doing' approach.

At the start in 2007, the specificity of the descriptions of the eight initiatives varies, ranging from clear, measurable, and timed targeting, to non-measurable intentions to support the work of others. Three of the initiatives that were declared achieved in 2010 were single stage activities having no element of outcome measurement (25, 27, 28, see Table 2-2). It is notable that each of the other commitments that remained current in 2010 had been rephrased to include both an outcome assessment standard and a specific date target. This indicates that the need to monitor and justify results over time led to reconstruction of the aims in a way that allowed for clear measurement of outcomes.

Table 2-2: The eight Plan A commitments selected for analysis, their status across three years, 2007, 2010, 2012, and summary of their business driver and business model impact using Schaltegger et al.'s (2012) framework

(full analysis in Appendix B)

2007 no	Name of initiative	Aim description (Marks and Spencer, 2007)	Status (Marks and Spencer, 2010a)	Status (Marks and Spencer, 2013b, 2012b)	Elements observed using Schaltegger et al. (2012) framework
44	Customer recycling services	Introducing a range of recycling services for our customers including a project for used clothing.	Restructured into two commitments; 12.2 'Help our customers recycle 20 million items of clothing each year by 2015' and 12.12, for which 'by 2012' was added to the original 2007 wording and it was declared achieved; the Oxfam Clothes Exchange having been launched in 2008	<p>12.2: declared to be 'On Plan', 3 million garments having been donated in the previous year, the fourth year of collaboration with Oxfam. The initiative was rebranded 'Shwopping' in April 2012 and further plans declared to buy recycled materials back from Oxfam as raw materials for new garments.</p> <p>12.12: No further update since 2010. Further development through a trial with Oxfam and the British Heart Foundation for recycling furniture.</p>	<p>The value proposition and customer relationships were created through a closed-loop system that made it easy, convenient, and attractive for customers to recycle at M&S stores and rewarded them with a £5 voucher. More customers visited M&S on clothing return days. Customers were later able to buy a low cost wool coat that M&S had arranged through its suppliers to be made with recycled fibres.</p> <p>M&S created new infrastructure and new partnerships to process the items that were returned or faulty, and to collect clothes through Oxfam stores. Oxfam has a pre-existing trading division to re-sell, reuse, and recycle clothes. 'Recycle at Oxfam' appears on clothing</p>

26	Low carbon products	Developing and selling products with a lower carbon impact.	<p>Changed to: ‘Develop a low carbon products and services business, including the provision of energy and insulation services by 2010’. Became commitment 9.5.</p> <p>In addition, a new commitment was introduced; 9.3 ‘Energy Efficient Electrical</p>	<p>9.5 declared achieved; a new, separate business ‘Marks & Spencer Energy’ had been created in 2008, offering energy supply, solar panel installation and insulation services.</p> <p>9.3 declared to be ‘On plan’. The products were said to have included washing</p>	<p>care labels. Both M&S and Oxfam had worked previously on the Sustainable Clothing Action plan. M&S benefitted financially because the recycled fibres in the wool coat reduced the raw material costs and, it’s assumed, there were additional sales revenues from the increased customer visits. Oxfam also benefitted from the items brought to them, raising £2.6m to 2012, arising from the increased number of collection points and audience for, and awareness of, the service.</p> <p>The new M&S energy business required new infrastructure, new partnerships, created a new revenue and profit source, arising from services M&S had not previously sold. It gave customers a new value proposition through cost incentives for reduced energy use and enabled cross selling and easy access to the</p>
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			Products'. Aim wording: 'Ensure that by 2015 at least 90% of our household electrical products meet a credible energy efficiency standard and improve the energy efficiency of the most energy intensive products by at least 25%'.	machines and tumble dryers, but M&S no longer sold these from 31/08/2012 (Marks and Spencer, 2012d)	service for existing customers. Employees benefitted from free home insulation.
27	Footprint campaign	Launching campaigns with the WWF and National Federation of Women's Institutes – to help our customers and employees understand their carbon footprint and how to reduce it.	Became commitment 9.6 and declared achieved	No further update since 2010	WI members pledged to save around 10,000 tonnes of CO ₂ through the campaign; implying it enhanced M&S's reputation with this group. Public link with NGOs (in the case of WWF, on their website) enhances their reputation.
28	The Climate Group campaign	Working with the Climate Group on a major educational campaign in 2007 encouraging people to wash clothes at 30°C to	Became commitment 9.7 and declared achieved	No further update since 2010	The value proposition was originally communicated as designed to help customers cut CO ₂ emissions (therefore to gain loyalty from marketing sustainability) but changed in 2009 to emphasise the cost reduction customers could

cut energy use and CO₂ emissions.

achieve: 'Wash at 30°C save up to 40% energy' appears on many M&S clothing care labels.

55	Cotton	<p>Launching a sustainability strategy covering all our cotton including approaches such as 'Fairtrade', organic and the international cotton industry 'Better Cotton Initiative' by 2008.</p>	<p>Changed to 'Procure Sustainable Cotton', with the aim: 'Procure 25% of cotton from sustainable sources by 2015 and 50% by 2020.' This said now to include 'Fairtrade, organic, 'Better Cotton Initiative', recycled fibres and other, more sustainable forms of cotton production' (p10, 2010a). (Now commitment 16.15)</p>	<p>16.15 declared to be 'On plan', having sold over 8 million items made from these materials, 3.8% of total cotton usage.</p>	<p>The activities under this commitment contributed to reducing future financial risk arising from shortage of cotton, a key raw material for M&S.</p>
		<p>This commitment overlaps with initiative 81: 'Fairtrade' clothing: Converting 20 million clothing garments including £5 plain t-shirts, women's strappy vests, oxford shirts to 'Fairtrade' cotton – equal to 10% of all M&S</p>	<p>Declared M&S had, in 2009, 'become the UK's largest retailer of Fairtrade certified cotton clothing' (p12, 2010a), nevertheless the initiative number 81 was declared to be 'Behind Plan' since Fairtrade certified cotton was estimated to have been 2.5% of all the cotton M&S used against the target of 10%. (Now commitment 17.20)</p>	<p>17.20 declared 'Not achieved' due to the complexity and availability of Fairtrade cotton in the supply chain. It was estimated that 1% of cotton used was Fairtrade, representing a reduction from 2010. The commitment is to be replaced by the overall commitment, 16.15.</p>	<p>The partnership with the 'Better Cotton Initiative' membership organisation had business infrastructure benefits, for instance, reduced risks and barriers compared to acting alone. However the Fairtrade partnership did not meet its objectives apparently due to supply chain difficulties.</p>

60	Polyester	<p>cotton use' Using recycled plastic (e.g. used bottles) to make polyester, rather than using oil. Make ranges of men's, women's and children's polyester fleeces from recycled plastic within a year. Extend to other polyester ranges such as trousers, suits, and furniture 'fill' by 2012.</p>	<p>Became commitment 16.20 and declared achieved</p>	<p>Declared to have been 'Previously achieved'. The 2011 report (Marks and Spencer, 2011) had noted that the use of recycled polyester increased from 1100 tonnes to 1900 tonnes from 2010 to 2011.</p>	<p>The use of recycled polyester rather than new polyester, derived from oil, is well established and is not unique to M&S.</p>
54	Sustainable textiles	<p>Reducing the environmental impact of the textiles we sell by trialling new fibres such as bamboo, renewable plastics, and new ways of producing fibres such as organic cotton, linen, and wool.</p>	<p>Changed to: 'Reducing the environmental impact of the textiles we sell throughout our supply chain by 2012.' Became commitment 16.14 and declared achieved</p>	<p>No further update since 2010</p>	<p>The originally worded commitment indicated a desire to mitigate the business infrastructure risk of future raw material supply issues. The later wording implied innovative supply infrastructure actions and therefore no longer sought to influence consumption directly</p>

25	Carbon labelling	Supporting The Carbon Trust to develop a carbon-labelling scheme for consumer products.	Became commitment 9.4 and declared achieved. M&S chose not to adopt the carbon-labelling scheme.	No further update since 2010	None, as no action was taken as a result of this commitment
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2.6.2 Selected Plan A Commitments in Relation to Business Model Pillars, Competitive Advantages and Business Case Drivers

Seven of the eight initiatives were mapped on Schaltegger et al.'s (2012) framework for cross analysis, summarised in Table 2-2 and shown in detail in Appendix B. The eighth, the development of a Carbon labelling scheme (25), was not implemented and therefore was not mapped. Looking at the pattern of the business drivers, it is costs, sales revenue, and reputation that are most prominent. Plan A as a whole was originally planned to cost £40m per year, but became cost neutral in its second, and had delivered net business benefits of £105m in total up to 2012 (Marks and Spencer, 2012b). Therefore the business case has been secured through cost savings.

As for risk, there is substantial evidence of M&S working with NGO and government partners such as Oxfam (44), DEFRA (54), WWF (27 and 55), The Climate Group (28), and The Carbon Trust (25), although not explicitly for risk mitigation. Innovation capability appears as a justification only in the more recent reports. The publicly declared five-year time horizon is said to have enabled M&S to implement more far-reaching change than would otherwise be possible on a usual shareholder-led one year planning timetable. Attractiveness as an employer did not feature strongly for these initiatives, not surprisingly, since they were selected for analysis based on design for consumer impact consumer impact. Yet internal structure, and personal incentives, changed over the period, to enable the business to become more integrated and responsive in its management of Plan A and this may have had an effect on employee motivation.

Thinking of M&S's firm-specific competitive advantages, four of the initiatives relied on, and may have strengthened, M&S's capacity to innovate through textile design and sourcing (44, 54, 55 and 60). Three (26, 27, 28) capitalise on M&S's trusted customer reputation. Its environmental impact expertise underpins 4 of the initiatives (25, 28, 54, 55).

At a broader level, the extent of business model innovation can now be identified. Two of the commitments feature in all four columns, indicating that they each

represent a high degree of business model innovation: low carbon products (26) and clothes recycling in partnership with Oxfam (44). The first of these led to a new business for M&S: energy supply and insulation services. However, there is no evidence that new business models were intended to result from Plan A at its start (Marks and Spencer, 2007). In the latest report, there is explicit reference to the need for new business models (Marks and Spencer, 2013b). Therefore incremental achievements seem to have led to the creation of new business models, rather than new business models being planned initially.

2.6.3 Selected Plan A Commitments in Relation to the Use Chain

Three of the initiatives act across the Use Chain (Figure 2-3). Firstly, processing of discarded clothing (44), produced recycled fibres to be used in new garments. M&S organised partnerships with Oxfam, its textile suppliers, processors so that recycled textiles could be reintroduced as material for new garments. M&S report increased numbers of shoppers on clothing return days (Marks and Spencer, 2012b) and give £5 voucher redeemable against a future purchase to those returning clothes. M&S communicated this initiative to consumers as 'every time you buy something new, give us something old' (Marks and Spencer, 2012c), positioning the trigger for action as the purchase of a new item, rather than the trigger being the receipt of a voucher. Nevertheless, it is reasonable to assume that some of the £5 vouchers led to new sales of clothing items. If these sales represent additional sales in the market (rather than substitution of sales that would have occurred in other retailers) then the initiative has resulted in a rebound effect of greater consumption, rather than less. However it has also created a new closed loop mechanism and new consumer recycling actions, through easy, risk-free, and cost-free mechanisms for customers.

Secondly, M&S promoted lower temperature washing. Other retail businesses such as Asda, Sainsbury, and Tesco (DEFRA, 2010b), detergent manufacturers (Unilever, 2012, Business in the Community, 2008) and appliance manufacturers (AMDEA, 2013) have done the same. However M&S's initiative to wash at 30° appears to present a future opportunity, shown by the 'bubble' box in Figure 2-3, to partner with companies selling more energy efficient washing machines and detergents, by

proactively making clothing available that is designed to be washed at low temperatures. Thirdly, they created a new business to sell energy services.

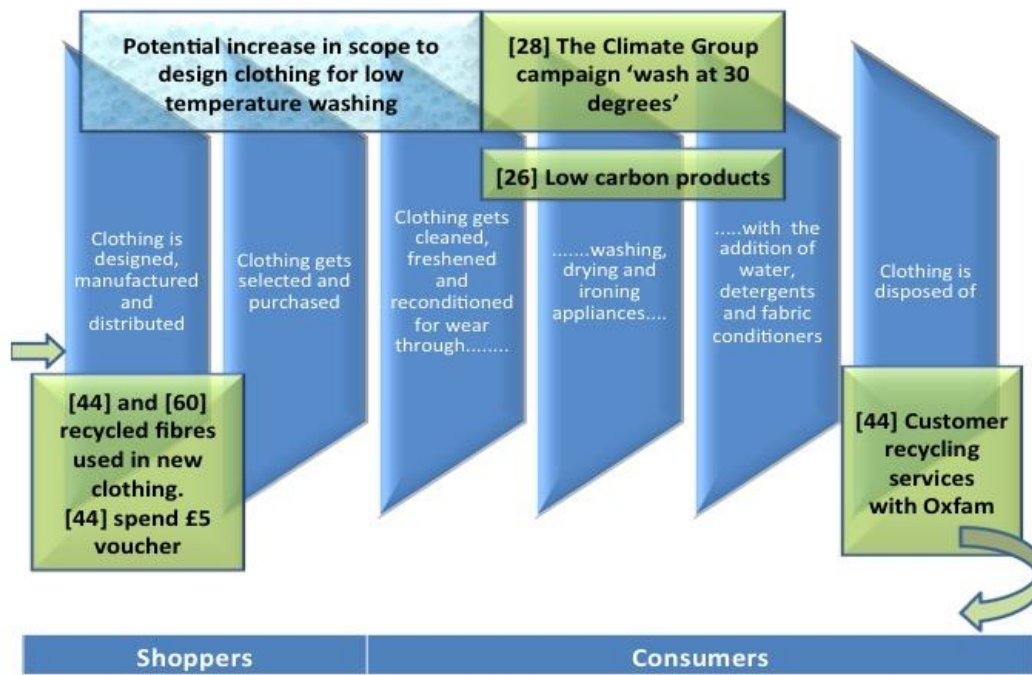


Figure 2-3: The Use Chain for clothing showing Plan A commitments that extend across systems

2.7 Discussion

2.7.1 System Innovation

None of M&S's clothing commitments exhibit fourfold or tenfold systemic improvement in environmental efficiency. Yet perhaps clothing recycling could represent the 'take off' phase towards a system innovation (p371, Kemp, 2008), since the commitment originally was to provide a service for customers to recycle their clothes, but this became a new recycle loop, even though this had not been planned at the start. Furthermore, M&S worked with Oxfam and its raw material suppliers as partners, to design and encourage new consumer practice, to lead and create a new market (for clothes using the recycled material), and devise a new infrastructure of service and provision. This analysis has shown examples of positive outcomes from 'learning by doing' within an established large consumer business.

M&S's commitment over a long period, and adjustments that it has made to its own organisation to facilitate the further development of Plan A, show that an established business can develop new business models in the interest of achieving long term sustainability goals. Whilst many reasons have been given for regime actors not seeking system change (Elzen et al., 2004), there evidence here that M&S have not felt entirely constrained by these. In this case, business model innovation took place as a result of initiatives being taken and developed over the years, not as an explicitly declared intention at the start.

2.7.2 The Use of the Analytical Framework

Three points can be drawn from the use of Schaltegger et al.'s (2012) framework. Firstly, it proved useful for categorising the elements of the initiatives across both business case drivers and business model pillars. This enabled two new business models to be identified by looking across the pillars, yet M&S's core clothes retailing business model has remained its main sales and profit driver. It is not that this business model has been redesigned, but added to. This suggests that further theoretical approaches would be of value, to conceptualise degrees of business model innovation.

Secondly, by identifying where M&S has used its established firm-specific competitive advantages, this paper has also identified difficulties for other retailers who may seek to follow their approach. However, the framework lacks a way to recognise existing competitive advantages on which innovative capability can be built further. Thirdly, an limitation of the use of this framework for only some of the initiatives in 'Plan A', is that the individual initiatives are merely part of the whole Plan A picture, to which business case drivers might be attributed by M&S within the reports, rather than to individual initiatives.

Separately, the novel Use Chain framework has identified activities and further opportunities across a number of inter-related systems in clothing. It has highlighted new opportunities for clothing businesses to work in partnership with other businesses across the chain to reduce consumption emissions. It serves also to emphasise the critical role of retailers within and across each of these systems; this has not previously been identified in this way.

2.8 Conclusion

This paper acknowledges the leadership shown by M&S and its capability in moulding its sustainability initiatives over time, through learning from its results, within a strong, transparent and coherent framework. M&S itself does not believe that unit volume consumption will decline, yet it declares that it will continue to seek closed-loop and service-based solutions for the future (Marks and Spencer, 2012b). As the market leader in the UK, the firm has undertaken ambitious environmental goals and built new business models. This is contrary to the predictions of many researchers. It has not been wholly trapped in a system, as Tukker et al. (2008) describe it, but has found ways to start to change within a system, by taking a long term perspective and seeking to influence consumer behaviour.

Whilst M&S has seen business case benefits from the strategic choices it has made through Plan A, as Porter and Kramer (2006) predict for individual businesses, M&S's competitive advantages make it less valuable for competitors to imitate the initiatives, serving as barriers to those competitors participating in system change. For wider system change, it would be beneficial if these barriers could be overcome. Therefore perhaps the role of government is to recognise when businesses have created a new business model for a more sustainable consumption system and subsequently to support the system's continuing development through finding ways to make it attractive for other businesses to take part.

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3. Chapter 3 Large UK retailers' initiatives to reduce consumers' emissions: a systematic assessment

3.1 Abstract

In the interest of climate change mitigation, policy makers, businesses and non-governmental organisations have devised initiatives designed to reduce in-use emissions whilst, at the same time, the number of energy-consuming products in homes, and household energy consumption, is increasing. Retailers are important because they are at the interface between manufacturers of products and consumers and they supply the vast majority of consumer goods in developed countries like the UK, including energy using products. Large retailers have a consistent history of corporate responsibility reporting and have included plans and actions to influence consumer emissions within them. This paper adapts two frameworks to use them for systematically assessing large retailers' initiatives aimed at reducing consumers' emissions. The Framework for Strategic Sustainable Development (FSSD) is adapted and used to analyse the strategic scope and coherence of these initiatives in relation to the businesses' sustainability strategies. The ISM 'Individual Social Material' framework is adapted and used to analyse how consumer behaviour change mechanisms are framed by retailers. These frameworks are used to analyse eighteen initiatives designed to reduce consumer emissions from eight of the largest UK retail businesses, identified from publicly available data. The results of the eighteen initiatives analysed show that the vast majority were not well planned nor were they strategically coherent. Secondly, most of these specific initiatives relied solely on providing information to consumers and thus deployed a rather narrow range of consumer behaviour change mechanisms. The research concludes that leaders of retail businesses and policy makers could use the FSSD to ensure processes, actions and measurements are comprehensive and integrated, in order to increase the materiality and impact of their initiatives to reduce consumer emissions in use. Furthermore, retailers could benefit from exploring different models of behaviour change from the ISM

framework in order to access a wider set of tools for transformative system change.

3.2 Introduction

Businesses shape how consumers consume. Companies that serve consumers directly have become adept at presenting themselves as powerful and trustworthy actors for the good of the environment. Yet this presentation may not be reflected in what they do and how they organise their plans for successful outcomes. This paper takes one aspect of consumption, carbon emissions at home, and one business sector, retailers, and examines initiatives, between 2007 and 2013, declared by the largest companies operating in the UK. It seeks to identify possible opportunities for retailers to increase the success of their initiatives, through both improving planning coherence and widening their perspectives on mechanisms for consumer behaviour change. It uses two complementary systematic frameworks, and is based on retailers' own reporting.

3.2.1 Retailers and consumer behaviour at home

Governments have declared that individual citizens will have to cut their own greenhouse gas (GHG) emissions if global emissions reduction targets are to be achieved (Jackson, 2009, OECD, 2011). Policy makers, businesses and non-governmental organisations have attempted to design initiatives to reduce in-use emissions. Yet in developed markets, such as the UK, people are using an increasing number of energy-consuming products in their homes (Owen, 2012) and GHG emissions arising from domestic product use continue to rise (Department for Energy and Climate Change, 2014); total amount of electricity consumption by household domestic appliances between 1970 and 2013 grew by around 1.7 per cent per year. Consumer electronics was the largest consuming category in 2013, followed by wet appliances, lighting, cold appliances and cooking (Department for Energy and Climate Change, 2014). Interacting systems of user practices, technologies, institutions and businesses are at play here (Shove, 2004a, Spaargaren, 2011, Tukker et al., 2010, Foxon, 2011).

Within these interacting systems the role of large retail businesses is important for five reasons. Firstly, retailers influence people's needs, desires, lifestyles and product choices through their role as intermediaries (Stewart and Hyysalo, 2008), through pricing (Shankar and Bolton, 2004), promotion, shelf space allocation and shelf positioning (van Nierop et al., 2011, Kök et al., 2009). Secondly, retailers are adept at representing their views of consumer needs to government (Marsden and Wrigley, 1995, DEFRA, 2010b). Thirdly, retailers' scale of possible influence on social norms seems also large; on the one hand, almost every person in the UK visits shops regularly and, on the other, the retail sector directly employs one in eight workers (British Retail Consortium, 2014). Fourthly, retailing has become increasingly concentrated (Jones et al., 2005) with few large chains accounting for most consumer spending; the top four grocery retailers in the UK now have two thirds of all grocery sales (Intel, 2013a) and thus increased buyer power with suppliers (Inderst and Wey, 2007). Finally, then, these large retailers have been increasingly the gatekeepers between manufacturers and consumers through their global supply chains (Huber, 2008). Through these supply chains, large retailers influence the specifications and standards of the goods they commission from suppliers to sell (Stewart and Hyysalo, 2008). Since, the vast majority of consumer goods in developed markets are sold through large retailers, in shops or online, these retailers act as choice editors (Charter et al., 2008) for what consumers are able to purchase for use at home.

3.2.2. Retailers and corporate responsibility for consumption emissions

Large retailers in general have a consistent history of corporate responsibility reporting, have recognised the importance of climate change to sustainability, and made emission reduction commitments for their own operations (Gouldson and Sullivan, 2013). Retailers' choices about the assortment of goods that they stock, and how they display, price, promote and suggest methods of use for them, have an influence on shoppers' purchase decisions, and therefore, ultimately, on usage. It is therefore important to analyse their plans and actions for the types of goods that generate carbon emissions from the use of the

products they sell. There has been research on retailers' assortment strategies and space allocation choices in the interests of corporate responsibility, but largely focused either on Fairtrade products (Nicholls, 2002, Jones et al., 2003) or organic and Fairtrade food products (van Nierop et al., 2011, van Herpen et al., 2012), with the exception of Carrero and Valor (2012) who examine retailers' assortments for a broad range of ethical and environmental issues. There has also been research on the role of labelling schemes for relative energy efficiency in use, some of them devised by retailers (Heinzle and Wüstenhagen, 2012, Horne, 2009). Berry et al. (2008), McKinnon (2010), Upham and Bleda (2009) and Upham (2011) have examined retailers' use of carbon labelling schemes and their potential impact across the whole value chain. However, there is a gap in research focused solely on the influence of retailers on consumer emissions, whilst energy-consuming products in the UK are purchased predominantly from large retailers (Mintel, 2014). Therefore there is an importance in understanding what retailers have done for consumer emissions reduction relating to domestic goods.

Researchers have examined shoppers and shopping behaviour and how it is influenced from a number of disciplines; examples are from psychology (Dholakia et al., 2010), history (Błaszczuk, 2000, Trentmann, 2004, Spiekermann, 2006), sociology (Cochoy, 2007), social psychology (Gabriel and Lang, 2006) and operational research (Kök et al., 2009). Recently, behavioural science has increased its impact in policy making, for example through Thaler and Sunstein (2008), and practical guidance has been published for policy makers seeking to influence consumer behaviour change, based on considering three academic perspectives; behavioural science, social psychology and social practice theory, some examples of this are Southerton et al. (2011), Dolan et al. (2010) and van Bavel et al. (2013). Given the breadth of research on how shoppers can be influenced, then, there are gaps in research examining retailers' strategies that explicitly set out to influence consumer behaviour in the use phase of energy consuming goods, or goods that are serviced through energy consuming appliances, such as clothing.

3.2.3. Research Objectives

Changes in carbon emissions from consumption are needed and retailers are a means of influencing consumption emissions. Retailers can influence the selection of products and services at the shopping stage, and also the usage behaviour at home. The aim of the paper is a structured assessment of the initiatives that retailers have publicly declared that they've undertaken in these two areas of influence, against criteria that are set out within a well-known strategic sustainable development framework. There are two aspects to this assessment; what has been their strategy for the design of the initiatives and how they frame consumer behaviour change, from the selection of mechanisms used.

The objectives of this research then, are, firstly, to identify possible gaps in the strategic planning for these retailers' initiatives, using the attributes and general design of a framework for strategic sustainable development, set out in Table 3-1 below, and, secondly, to identify possible gaps in the framing used in the selection of mechanics for influencing consumer behaviour change, shown in Table 3-2 below.

The paper is structured as follows. Section 1 has described the relevance and importance of retailers to consumer behaviour and the research gaps and objectives. Section 2 makes the case for the research frameworks and methods used, describing also the eighteen identified initiatives. Section 3 analyses those initiatives using the frameworks. Section 4 discusses the results, their validity and limitations. Section 5 concludes with suggestions for policy makers and retailers for future use of the research methods.

3.3. Methods

3.3.1. Framework for Strategic Sustainable Development

The Framework for Strategic Sustainable Development (FSSD) is a planning method that has been successively developed since the early 1990's (Robèrt, 1994, Holmberg, 1995, Holmberg and Robèrt, 2000, Missimer, 2013), and has

been used by businesses in order either to design programmes of action, in dialogue, that work toward their vision of sustainability, whilst meeting their customers' needs, or to create engagement (Broman et al., 2000, Holmberg and Robèrt, 2000). It has also been used as a unifying framework to complement other methods, tools and concepts for sustainable development, either for addressing sustainability from a full sustainability perspective, or to assess whether this has been the case, see Hallsted et al. (2010) for references, and, in broader contexts, in Lifecycle Analysis (Ny et al., 2006) and analysis of Planetary Boundaries approaches (Robèrt et al., 2013).

The FSSD can be likened to a building having five levels and each level is constructed on top of the preceding one. While each level has a purpose in its own right, the building is an integrated whole; the design of each floor being coherent with the other floors, or levels. This framework is useful to answer the research objectives in this study because, if retailers' initiatives were likely to be successful in meeting their objectives, they would have been well planned, in that they would be designed like a whole building, with the declared definition of the scope (first level) and the specified desired outcome (second level) lining up with the strategy (third level), the actions undertaken to achieve it (fourth level) and all the tools (including those for monitoring, assessment and competence-building) needed to operationalise the actions (fifth level); the levels relate to each other to form a unified whole, whilst both being interdependent and having logical and consistent elements linking the levels.

Bratt et al. (2011) elaborated the FSSD, using it as an assessment framework for criteria development for existing eco-labelling schemes. The present study also elaborates the FSSD to assess pre-existing activities, but by using it to evaluate possible planning gaps in strategy for retailers' initiatives that are stated to have been designed to reduce carbon emissions in use. This has been undertaken by analysing data in the public domain, which largely comprises data that retailers have chosen to make available, through corporate reports. This set of data is a subsystem in itself. The full FSSD has not been engaged because published reports do not necessarily make visible the businesses' whole system approach to sustainability. Therefore it is the general

design and attributes from the FSSD that are used, in seeking to identify such gaps in the publicly stated processes that would seem to reduce the likelihood of achieving what the retailers themselves set out to achieve. The FSSD has been adapted to derive questions that can be asked of each retailer initiative so that it can be used to assess their internal coherence, as shown in Table 3-1. Its strength lies in the clear linkages between the five levels addressed by these questions.

Table 3-1: FSSD-derived model for this study, adapted from Bratt et al. (2011)

(questions have been derived for each level, to identify possible gaps in strategic planning)

1. **Systems Level** The Systems Level describes the overarching system in which the planning and acting takes place.
Is there evidence of a clear, underlying, systemic scope, and across a number of years, for all the initiatives connected with consumer carbon emissions reduction described in corporate reporting from this business?
2. **Success Level** The Success Level describes the overall principles that are fulfilled in the system, above, for favourable outcomes.
Is there a defined objective for the initiative? If so, is it linked to a higher level scope?
3. **Strategic Guidelines Level** The Strategic Guidelines Level describes the strategic guidelines for planning and actions towards the objective, how the desired favourable outcomes are to be achieved. A prominent role is played by a process called 'backcasting', by which the future successful outcome is imagined, following by the steps to reach that outcome (Dreborg, 1996).
Are strategic guidelines visible to reach any objective and prioritise criteria?
Are there strategies or plans set out, step-wise?
4. **Actions Level** This level describes various actions, or proposed actions, specified by the organisation. These actions should be prioritised with respect to the strategic guidelines, as above, in order to maximise the chance of reaching the desired success in the system.
a. What are the concrete actions?
b. Are they prioritised?
5. **Tools Level** The Tools Level describes the methods, tools and concepts used to manage, measure and monitor the actions, in order to make strategic progress to success.
Are there tools explicitly stated to monitor or assess the outcomes of the actions?
If so, are they relevant, in that they are able to monitor the actions or assess the outcomes of them, against the defined, or assumed, objective?

Using the FSSD-derived model, with a focus on consumer use carbon emissions, allows for an analysis of whether there is coherence from scope to

objectives to actions and tools used for one specific group of initiatives (carbon emissions in the use phase of products sold) published in the retailers' corporate responsibility reports.

3.3.2. Models of consumer behaviour change mechanisms

For the second objective of the research there is a need to identify perspectives that have been developed to describe drivers of change in user behaviour and practice. Southerton et al. (2011) originated an 'Individual Social Material' (ISM) framework of three contexts for consumer behaviour change mechanisms, to enable policy makers to assess which of them underpin particular interventions. The three contexts are derived from several disciplines. The *individual* context refers to attitudes of individual consumers being influenced so as to change their behavior. The *social* refers to social norms, cultural conventions and consumer practices. The *material* refers to products and infrastructure that enable or constrain ways of behaving. Southerton et al. (2011) also offer an analysis of thirty cases of State and civil society sustainable consumption behaviour initiatives. It concludes that there were gaps in the systematic monitoring and reporting of these behaviour change initiatives and that most of the interventions aimed at incremental, rather than radical, behaviour change. Furthermore a large number of these cases focused on the individual context, and the authors call for approaches that integrate the three contexts, drawing a lesson that targeting multiple contexts appears to have greater impact. The ISM framework was itself the basis for a policy report written for the Scottish Government (Darnton and Evans, 2013), which notes the disciplinary dominance of different approaches. There are different disciplinary perspectives underpinning consumer behaviour change contexts in the field of environmental sustainability covered elsewhere, for instance, in Southerton et al. (2004, 2011) (social context) and Abrahamse et al.'s (2005) review of intervention studies aimed at household energy conservation (social psychology context).

However, the very simplicity and accessibility of the ISM framework means it could be equally of interest to businesses, as to policy makers, in seeking to influence consumer behaviour change. It is used for this research because it

combines factors from multiple disciplines in a clear way that makes it possible to analyse identified initiatives to assess which of the three contexts has been addressed, as shown in Table 3-2. It complements the FSSD-derived model because it helps to evaluate retailers' framing of consumer behaviour change content within the initiatives, whereas the former assesses the strategic coherence of their planning.

Table 3-2: ISM Framework for behaviour change initiatives**Mechanisms employed in behaviour change address at least one context**

Individual context	Social context	Material context
Theoretical basis: Behavioural economics/science and psychology	Theoretical basis: Social psychology and sociology	Theoretical basis: Sociology/theory of practice

Example Mechanisms

Economic incentives	Use of social institutions	Infrastructures and technologies
Information giving	Cultural tastes	Design of products
Promoting environmentally friendly alternatives	Community-based initiatives	

Factors that influence behaviour in these three contexts

Values	Roles and identity	Infrastructures
Beliefs	Social norms	Technologies, research and development strategies and funding
Attitudes	Tastes	Objects
A consumer's personal evaluation of costs and benefits	Meanings	Formal and informal rules, regulations and policy instruments
Emotions	Opinion leaders	Consumers' time and scheduling
Agency	Institutions that influence groups of individuals	
Skills	Networks and relationships	
Habit		

Retailer devices that can be used to influence consumers

Price and price promotions (Shankar and Bolton, 2004)	Social media, through which groups self- identify by electronic 'word of mouth' (Chu and Kim, 2011, Smith et al., 2007)	The assortment of products and shelf space given to them (Kök et al., 2009, Borin and Farris, 1995)
Advertising material designed to appeal to individuals, rationally or emotionally (Vakratsas and Ambler, 1999, Stafford and Day, 1995)	Shared cultural understanding through, for instance, advertising designed to appeal to shared engagement, or opinion leader endorsement, or through workplace initiatives (Southerton et al., 2011)	Product shelf positioning (van Nierop et al., 2011)
Point of sale information (Broeckelmann and Groepel-Klein, 2008)		
Product packaging (Gómez et al., 2015, Löfgren et al., 2008)		

Source: Southerton et al.(2011), Darnton and Evans (2013) and extended by the authors to include, and categorise, retailer devices.

3.2.3. Using the two frameworks sequentially

These two frameworks are used in sequence. The retailers' initiatives were assessed by applying the five Levels of the FSSD and then assessed for evidence of the consumer behaviour mechanisms employed, using the ISM framework. This enabled the internal coherence of the retailers' public statements to be assessed together with the implicit models of consumer behaviour change underpinning them.

3.2.4. Identification and analysis of retailers' initiatives

Initiatives were defined as actions, or proposed actions, that retailers declared were designed to reduce consumer carbon emissions at home. Eight of the UK's largest retailers were selected for analysis. These were the largest 4 grocery retailers, representing 67% of UK grocery market sales between them (Mintel 2012), the largest home improvement retailer, the largest health and beauty retailer, the largest clothing retailer and the largest department store group (these last two also have considerable grocery retailing interests, accounting for another 8% of the UK market). For each of them, a number of texts originating from 2007 to 2013 were analysed. The initiatives were found by systematic search for the words 'consume*' and 'customer' within the Corporate Responsibility reports. This resulted in the identification of eighteen initiatives that had the declared aim of reducing consumer emissions. Then, more information on each of these was found through searching webpages and other publicly available material. Each of the initiatives was then examined using the questions shown in Table 3-1. Then the initiatives were analysed through the ISM framework shown in Table 3-2, by identifying 'Example Mechanisms' or 'Retailer devices' from the Table and categorising them.

3.3 Analysis of the initiatives

3.3.1 Summary of the results

Through the systematic search, eighteen retailer initiatives were identified. Appendix C describes these and the data sources. Applying the questions in Table 3-1 and identifying the mechanisms of consumer behaviour change underpinning the business's initiatives in Table 3-2, resulted in a comparative

analysis of both the strategic coherence and the underpinning behaviour change contexts. Table 3-3 presents these results.

Table 3-3: Analysis of initiatives

Initiative	Systems level Is there evidence of a clear, underlying, systemic scope, and across a number of years, for all the initiatives connected with consumer carbon reduction described in corporate reporting from this business?	Success level Is there a defined objective that constitutes success, and if so, is it linked to a higher level scope?*	Strategic Guidelines Level Are there (a) strategic guidelines for prioritisation and (b) step-wise plans?	Actions level (a) What are the concrete actions, or proposed actions? (see Appendix for further detail and timescale) (b) Are they prioritised?	Tools level Are tools explicitly stated (a) to monitor or assess actions? (b) if so, are they relevant to reaching the objective?	What seem to be the assumed behaviour change contexts? I: Individual S: Social M: Material (based on Table 3-2 categories)
1. Asda: employee carbon footprints	No	No. Walmart, Asda's US parent company, had a greenhouse gas emissions reduction target that included consumer use but did not quantify it separately from supply chain reductions	(a) No (b) No	(a) 4 employees took a household 'Sustainability Challenge' (b) No	(a) Yes, employees monitored their usage emissions over an unspecified period (b) Yes	I, S
2. Asda: energy	No	No	(a) No (b) No	(a) A trial to remove standby buttons on	(a) No (b) No	M

efficient TVs trial				some TVs.		
3. Boots: product carbon labelling	No	No	(a) No (b) No	(b) No (a) Through a carbon footprint on two shampoos, promoted lower temperature hair washing to customers (b) No	(a) No (b) No	I
4. B&Q: 'eco products'	Yes; consumer emissions from products sold are explicitly included in consideration, and consistently	Yes, and is linked to the scope: the aspiration is that every customer's home is zero carbon or generates more energy than it consumes, by 2050 (from 2012)	(a) Yes (b) Yes; the number of products meeting criteria increase by year towards total targets	(a) B&Q-defined 'eco products' are made available and promoted to customers (b) Yes, implied through the proportion of products they represent	(a) Yes (b) Yes, in part.	I, M
5. B&Q: choice editing	Yes and see above.	Yes, as 4 above	(a) Yes in part (b) Yes	(a) A 'Range Sustainability Buying Standard', leads to products being withdrawn from sale over time. (b) Yes, implied through the	(a) Yes (b) Yes, in part	I, M

6. B&Q: loft insulation trial	Yes and see above.	Yes, as 4 above	(a) No, reported as a trial (b) No	proportion of sales they represent (a) Two trials run on loft installation (b) No	(a) Yes (b) Yes	I, M
7. John Lewis: energy efficient appliances	No	No	(a) No (b) No	(a) A range of energy efficient appliances is sold and promoted in stores (b) No	(a) No, other than for one short-term labelling trial (b) No	I, M
8. Marks & Spencer: low carbon products and services	No	No	(a) No (b) No	(a) Various promotions and incentives to help customers reduce carbon emissions and energy use in their own homes (b) No	(a) No (b) No	I, S, M
9. Marks & Spencer: wash clothes at 30°	No	No	(a) No (b) No	(a) 'Wash clothes at 30°' message in point of sale materials and on clothing labels (b) No	(a) No, except for one small consumer survey (b) No	I
10. Marks & Spencer: product carbon labelling	No	No	(a) No (b) No	(a) Assistance given to development of a carbon labelling scheme, not subsequently implemented	(a) No (b) No	I

11. Marks & Spencer: carbon footprint campaign	No	No	(a) No (b) No	(b) No (a) 'Carbon Footprint' communication campaign (b) No	(a) No (b) No	I
12. Morrisons: product carbon labelling	No	No	(a) No (b) No	(a) Explored methodology for a carbon labelling scheme, not subsequently implemented (b) No	(a) No (b) No	I
13. Morrisons: energy efficient lightbulbs	No	No	(a) No (b) No	(a) Sales promotion of energy efficient light bulbs (b) No	(a) No (b) No	I
14. Sainsbury: energy efficient products	No	No	(a) No (b) No	(a) Energy efficient own brand household electrical goods; range development and promotion (b) No	(a) No (b) No	I (in part)
15. Sainsbury: energy advice and supply	No	No	(a) No (b) No	(a) 'Energy Shop' offered insulation advice (b) No	(a) No (b) No	I

16. Sainsbury: own brand detergent	No	No	(a) No (b) No	(a) Reformulated own brand detergent to wash at lower temperature (b) No	(a) No (b) No	I
17. Tesco: product carbon footprint labelling	Yes. Up to 2013, reports include statements about the importance of Tesco leading and guiding consumers to reduce emissions arising from use of products they sell	Yes, from 2009, and is linked to the scope: to find ways to help our customers reduce their own carbon footprints by 50% by 2020	(a) No (b) No	(a) Carbon labelling of individual products, reaching a maximum of 525 (b) No	(a) Yes (b) No	I, M
18. 'Together' group campaign, included by B&Q, Marks & Spencer and Tesco	No	Yes: to help UK households reduce carbon dioxide emissions by one tonne over three years from 2007	(a) No (b) No	(a) Communications campaign to consumers to encourage carbon saving pledges (b) No	(a) Yes (b) No	I, S

*If no defined objective, an objective is assumed for the purpose of analysis at the next three levels: 'to achieve a carbon emission reduction per household on an annual basis', see section 3.3.2.2

3.3.2 Commentary on the results

3.3.2.1 *The Systems Level*

Two retailers, B&Q and Tesco, related the initiatives to scope boundaries within their reports, in terms of stating that they seek to help consumers to reduce use emissions, and these two have done so consistently across a number of years. Asda's parent company, Walmart, have a similar approach for the whole international business, but Asda's UK reporting does not mirror this. Other retailers have abandoned consumer use emissions as a declared focus, following its inclusion intermittently from 2007 to 2009.

The broader context is that most retailers have either explicitly or implicitly drawn the boundaries of their carbon emissions to exclude consumer use of products they sell, in total. However, they also frequently acknowledge, in the same reports, that they do have influence on consumer behaviour. Not one of these retailers chooses to give a rationale for not including usage emissions in their overall boundary, even where responsibility for influencing consumption is acknowledged elsewhere in the report.

3.3.2.2 *Success Level*

The two companies who declare a consistent objective relating to carbon emissions reduction in use (B&Q and Tesco) also indicate consideration given to the criteria for success, in that there are descriptions of how certain categories of goods have been selected for focus in the context of overall domestic-use emissions, and both declare an element of external oversight to this selection. The success criteria for these two, and for the 'Together' campaign, are defined in terms of household carbon emissions reduction. For the other retailers, there is no description of the overall principles being fulfilled to achieve favourable outcomes. For instance, certain categories of goods are chosen for attention without explanation; often these are electrical items. The need to comply with 2009 European regulation for the design of electrical items (which was primarily focused on energy in use) was presumably an underlying objective for a number of initiatives in the years up to 2009, but only B&Q explicitly include it as such. The lack of overall success criteria leads to a difficulty in

assessing the remaining levels for the other initiatives. Therefore, for the purpose of the analysis, an assumed objective has been used: 'to achieve a carbon emission reduction per household on an annual basis' (consistent with the three above) and this has been used to assess the Strategic, Actions and Tools levels for all the initiatives.

3.3.2.3 Strategic Guidelines Level

Little evidence was found that the initiatives were selected or prioritised using strategic guidelines, other than by B&Q. Only B&Q shows clear evidence of plans designed to lead towards the declared Success Level; there is a target for 2020, which is a step toward the 2050 goal. There are plans that set out how buying teams are progressively to achieve a greater proportion of products that will save energy, within the ranges of products that they decide will be stocked. These include clear choice editing of defined 'Red List' products, which will not be stocked by 2020; for example, patio heaters.

3.3.2.4 Actions Level

Most of the actions are small in scale, relative to the tens of thousands of products sold by these large retailers, and limited in the time during which they were applied. The exceptions to this, that is, those of material scale in terms of the number of products impacted and the length of time of activity, are B&Q 'eco products' and choice editing, and Marks & Spencer's 'Wash at 30°'. Since only B&Q have strategic guidelines, then none of the others analysed can have actions being prioritised in accordance with such.

3.3.2.5 Tools Level

Only B&Q and Tesco demonstrate measurement and monitoring tools. Both use external bodies to validate their actions. B&Q calculate energy saved by using a model that estimates the annual energy saving from each of the energy efficient products sold and multiplying this by the number of those products sold, compared to standard mainstream alternatives. Therefore this does not take account of energy

saved from products that would have been sold if they had not been edited by buying teams, but nor does it take account of any type of rebound effect. B&Q also monitor and publicise the proportion of their sales that meet their defined 'Eco Product Guidelines'. In contrast, Tesco measure the number of individual items that were Carbon Footprint labelled and what proportion of customers had bought at least one, therefore the measure of progress made is not directly relevant to the objective of halving customers' carbon footprint by 2020; this follows from the lack of criteria for prioritisation at the Strategic Guidelines Level.

3.3.2.6 Summary of FSSD analysis

B&Q only can be said to have a fully coherent, planned approach to consumer use emission reduction. For instance, for its initiative to edit choice within its ranges, the objective is to increase the proportion of products meeting their own published criteria for products that save energy in use, so the buying teams edit the choice such that other products are not available to be purchased. Then, at the Strategic Guidelines Level, step wise plans are set out to achieve this objective and, at the actions level, prioritised instructions are given to buying teams as to how this will be achieved. Tesco's carbon labelling initiative also exhibited a number of the characteristics of coherent planning, however, strategic guidelines are missing from the data available. Other than these, the initiatives mentioned by retailers in their reports are inconsistently described across the years, suggesting that they were either single acts of opportunistic good intent or 'learning by doing' projects. However, and in contrast, it is B&Q and Tesco that demonstrate prioritised actions, linked to strategy, although, only B&Q come close to being transparent about how they are prioritised. However, Tesco gave up carbon labeling in early 2012 and, from 2013, their aim to help consumers halve their own carbon footprint by 2020 is barely mentioned. This is by no means to indicate that other retailers' initiatives had no value, but that, from the available public data, the majority would appear to have been, at best, 'pilot projects' rather than strategically planned approaches.

3.3.2.7 ISM

Assessment of the initiatives, using the ISM framework, and based on the description of them, reveals that seventeen of the eighteen initiatives assumed an

individual context of behaviour change. Nine of them used only this context and nine relied on information imparted only through packaging and point of sale materials. Only three assumed a social context, based on the description of them. One initiative used the social context of the workplace to encourage employees to learn about changed lifestyles for lower carbon emissions at home, demonstrated by some of their colleagues.

Seven initiatives targeted the material context, two of which included editing out products on the basis of carbon emissions in use. However, only B&Q both exhibited strategic choice editing and published a purposeful product design guide, in order to reduce consumption emissions. Whilst a number of other retailers declare, from time to time, intentions to reduce choice of less environmentally efficient products, no evidence of planning for these has been found.

3.4. Discussion

3.4.1. Findings in comparison with other studies

The FSSD is based on a full sustainability perspective, in that the full scope of sustainability is considered. This is not the case when considering only initiatives in the public domain, and only those designed to affect carbon emissions, and in one phase of the life cycle only, therefore this research is not directly comparable to other assessments that use the full FSSD. Without having knowledge of the full sustainability perspective of each business, it is not possible for this research to identify any risks that the initiatives analysed were suboptimal, and perhaps created path dependencies, and precluded focus on initiatives that would have represented better steps towards sustainability. However, and with this limitation, the results are similar to Bratt et al. (2011), which also employed the FSSD as an assessment tool, in that it seems likely that processes were not as effective as they could have been, due to gaps in the steps taken to define and plan them. Another important point is the lack of apparent consideration of any rebound effects by any of the retailers; direct and indirect rebound effects of household efficiency improvements are not trivial (Chitnis et al., 2014) and one retailer had actively encouraged rebound behaviour (Chitnis et al., 2013). Exclusion of rebound effects perhaps reflects

tension between these very large retailers' overall objective to increase sales, and their taking responsibility to reduce overall carbon emissions.

The broad results revealed through the ISM are strikingly consistent with those observed by Southerton et al. (2011), in that there is a lack of integration of the three contexts. It may indicate that, then, there is scope for retailers to include mechanisms from wider contexts, for successful outcomes. This similarity of results might indicate that the ISM framework is particularly sensitive to the social context, a context that is underemployed. Alternatively, perhaps, retailers may lack understanding of the mechanisms for addressing the social context, or perceive it as less important to successful behaviour change initiatives than the framework assumes. Further research to operationalise and test this framework across more cases and in depth would be of value. The analysis at the Tools level has revealed gaps in systematic monitoring and reporting, also consistent with Southerton et al. (2011) findings.

3.4.2. Validity of findings: FSSD

The extent to which retailers include, within their reports, their responsibility for carbon emissions arising from the use of products they sell, varies across time for each retailer and is not consistent across retailers in the same sector; the scope for what they choose to report is not declared. The reports are not designed for consumers, but for professional and academic commentators and stakeholders. Therefore the representativeness of both the corporate reporting and the consumer communication materials accessed for this research is not known, but likely to be incomplete. The reports have been augmented by Internet searches for original consumer communication materials, but it seems likely that this will have missed details of the earlier initiatives, as these are not necessarily continuously available. Nevertheless, as retailers seek to be thought well of by stakeholders and their customers, and the research relates to customer-facing activities, it has been assumed that most initiatives seen by retailers to have been of any importance, will have been identified in the public domain. Indeed, a common theme from the analysis is that there are a number of initiatives that have been publicised that would appear to have had very little material or strategic significance. However, a limitation

is that retailers may simply not have chosen to make publicly available all the steps of their processes, or indeed, experimental initiatives undertaken in the field of consumer behaviour change for environmental benefit.

In using publicly available data exclusively, it is recognised that public communication by businesses does not equate with corporate practice and therefore limits the depth of this assessment. Corporate responsibility reporting has been researched extensively in terms of its goals and benefits (Herzig and Schaltegger, 2006), its norms (Brown et al., 2009), trends (Kolk, 2003) and effectiveness (Adams and McNicholas, 2007). There are less stringent directives for it than those for financial reporting, although there are voluntary, standardised guidelines, such as the well-used Global Reporting Initiative (2012), which some of these retailers have used. Nevertheless the FSSD is meaningful because the set of initiatives reported upon represents a system in itself.

The majority of the initiatives lacked a definition of success, and therefore an assumption was made in order to analyse the Strategic, Actions and Tools level. This may have misrepresented what the businesses actually sought to achieve. Nonetheless, it is insightful to use this adaptation of the FSSD to review the consistencies and patterns of initiatives included, across the body of material, by retailer, in their own terms and in what they chose to communicate over time.

3.4.3 Validity of findings: ISM

It was straightforward to attribute the initiatives to one or more of the three sets of mechanisms. However, this might have been time consuming if all the consumer communication materials for each of the initiatives had been fully available for analysis. More fundamentally, the use of publicly available materials exclusively for this research means that it did not include considerations that may have been made inside the businesses and not made public, about consumer communications. This might have included choices retailers made because they may, at least in the short term, be acting against their own commercial interests by deploying mechanisms that might reduce short term profitability, for instance by withdrawing products from their shelves.

3.4.4 Validity of findings: the use of corporate material

A further limitation in the selection of corporate material sourced from the internet is that it included current pages, in the main. From 2012 some retailers' webpages were copied so that they remained available for analysis by the researcher, however this was not systematically undertaken until late 2013. Therefore some webpage information from 2007 to 2013 has been missed. Webpage information provision, if not backed up fully by formal reports, allows companies to update information and possibly 'lose' history of previous targets that had been set, and perhaps missed, for instance. Furthermore two of these retailers' corporate responsibility reports are now no longer available on line and had to be requested of the companies concerned (see Appendix C).

3.4.5 Theoretical compatibility and validity

The use of the FSSD-derived framework has enabled an analysis of the strategic coherence of the planning of interlinked levels of businesses' initiatives, within the system of what is publicly available, yet the strategy for deciding what is made available is not transparent, and this represents a limitation. Nevertheless, businesses may benefit from this assessment since it identifies, in its own terms, what might be regarded as missing from what is put into the public domain. Whilst coming from different fields of theory, the FSSD model and ISM framework have been successfully used in sequence. The ISM framework itself combines factors and influences from a number of disciplines and therefore it is complementary to the FSSD model, which itself sets out to be a systematic approach that can be applied to many circumstances. The use of the ISM framework, following the FSSD-derived framework, can be seen as an analysis of the retailers' framing of the consumer behaviour change content at four levels; at the Success level, in terms of the context in which the objective, if it exists, is defined, and at the Strategic Guidelines Level, in terms of the three contexts being appropriate for planning, and at the Actions level, the prioritised actions towards the objective, and at the Tools level, to identify gaps in measures and monitoring.

3.5 Conclusion

For retailers and policy makers planning to undertake consumer behaviour change initiatives, the FSSD model forces consideration of inter-linkages between strategy and systems over time. In using publicly available data only, this research does not make a judgement on the overall strategic scope and coherence of retailers' policies towards consumer interventions in the interests of environmental benefit. However, it has shown that there is broad scope to improve the externally communicated coherence and apparent planning of retailers' initiatives designed to help their customers reduce their emissions. For the majority, there may also be scope to increase the efficiency and effectiveness of their resources deployed in such initiatives by them being transparent about how they are framed within a whole system approach. Use of the FSSD's backcasting principle, with the full sustainability perspective, would ensure that 'the specific actions....are flexible platforms for further investments in the right direction' (p16, Broman et al., 2000) and this would allow the potential rebound effects to be surfaced and dealt with.

However, complying with a planned strategic approach might be at odds with adopting a genuine 'learning by doing' strategy, illustrated by some retailers through individual initiatives; some of the earlier initiatives in Marks and Spencer's 'Plan A' seem to have been insubstantial 'one-off' actions, albeit consistently reported and reflected upon in later reports. These may have been pilot approaches, to be built upon, for a more robust interlinked approach in subsequent years, but this would be a further study. This is in contrast to the use of opportunistic use of positive, but single-occurrence, context-less, stories about consumer emissions reduction successes, often under the heading of 'Case Study' within material such as a sustainability report.

Demonstrable adherence to a planning approach of any kind does not necessarily indicate a successful outcome for sustainability, since good planning across the levels could happen for inconsequential initiatives. In terms of a successful outcome in their own terms, few of the initiatives showed good planning or linking across each of the levels. Of those that did, B&Q's is the most coherent and internally consistent across time. Tesco's carbon labelling programme had substantive content at four of

the five levels, however, arguably, its definition of the scope of sustainability at the top level was wanting, certainly in the context of a full sustainability perspective, and the scope itself was inconsistent over the years. It was dropped completely, in 2012. The ISM model offers an interesting approach to expanding the mechanisms that retailers and policy makers could use to influence consumer behaviour change and so to create both a broader and deeper approach to designing initiatives for success. It appears that retailers have tended to favour information provision alone. Initiatives that also reflect social and material contexts may be more successful in driving behaviour change to reduce consumption emissions. This raises questions for the future direction, scale and scope of consumer behaviour change initiatives led by retailers.

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3.6 References

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4. Chapter 4 'I prefer 30°?': Business strategies for influencing consumer laundry practices to reduce carbon emissions

4.1 Abstract

This paper analyses businesses' initiatives to influence consumption carbon emissions in home laundering, principally by persuading consumers to wash clothes at lower temperatures. A number of voluntary business initiatives have sought to change consumer practices, coming from detergent manufacturers, their industry association and retailers. This paper analyses their impact at system level, by assessing the coevolutionary interactions between 'Supply', from consumer-facing firms, whose principle business is to sell products to consumers, both manufacturing and retailing, and 'Demand' from consumers, whose interactions with the businesses arise from shopping, using and receiving consumer messages from the firms. The research analyses the interactions between the business case drivers for presentation of consumer messages to reduce laundry emissions and the drivers of changes in consumer laundry practices. This enables inductive inference of the causal relationships over time between businesses' strategies to communicate with consumers and changes in users' laundry temperatures.

The paper concludes that, in spite of considerable efforts and resources, these business initiatives have not resulted in the intended level of change in consumer practice that would deliver significant emissions reductions. Consumption emissions from households are a result of interdependent systems of provision, technologies and infrastructure, so stronger actions by business to influence consumer practices as well as further regulatory drivers are likely to be needed to deliver stricter emission reduction targets. This research contributes to the field of sustainable consumption through bringing together a coevolutionary framework with theories of business model innovation and social practices, in order to analyse whole systems of competing businesses' strategies in context with technologies, institutions and ecosystems.

4.2 Introduction

A series of voluntary business initiatives have been undertaken in Western Europe since 1996 to persuade consumers to wash clothes in cooler water, from leading detergent manufacturers, such as Procter and Gamble (Mylan, 2017), Unilever (Kingsbury et al., 2012), their industry association (A.I.S.E., 2013a) and retailers, such as Marks and Spencer (Morgan, 2015). These would contribute to reducing carbon emissions, as well as saving money for consumers, but these initiatives have had limited success. This paper analyses their impact, by assessing the coevolutionary interactions between ‘Supply’ and ‘Demand’ systems (Murmann, 2013). ‘Supply’ is from consumer-facing firms, whose principle business is to sell products to consumers, both manufacturing and retailing. ‘Demand’ arises from consumers, whose interactions with the businesses arise from shopping, using and receiving consumer messages from the firms. The research analyses the factors that have led to the presentation of consumer messages to reduce laundry emissions, using a business model innovation lens (Schaltegger et al., 2012) and the drivers of changes in consumer laundry behaviours, from a social practice perspective (Spaargaren, 2011). This enables inductive inference of the causal relationships over time between businesses’ strategies to communicate with consumers and changes in users’ laundry temperatures.

Domestic laundering (and other consumption activities) needs to become substantially less carbon intensive, in order to contribute towards meeting EU policy targets to reduce greenhouse gas emissions by 20% by 2020 and by 80% by 2050 (both from a 1990 base) (European Commission, 2017a), consistent with the 2015 international Paris Agreement on mitigating climate change. Laundering is important because both washing machines and tumble dryers were amongst the top sixteen appliances consuming the most energy in UK households (Haines et al., 2010), accounting for 10.7% on average of electricity use in UK households (Palmer and Terry, 2014), in what was the most detailed monitoring of domestic electricity use ever carried out in the UK (Owen, 2012). In a carbon footprint analysis of all garments in use in the UK in 2009, washing clothes produced the third biggest emissions, after fabric

production and yarn production (WRAP, 2012), and approximately two thirds of energy expended in the use stage of the clothing life cycle is due to washing (Madsen et al., 2007). The biggest opportunities to reduce the emissions from clothes washing arise from convincing consumers to wash clothing less frequently and with less intensity, identified, for example, by Allwood et al. (2008) for the UK and Ellmer et al. (2017) for Germany and this includes washing at lower temperatures (WRAP, 2012). One study showed that an average automatic machine washing temperature reduction of 6-7°C is equivalent to a 21% reduction in average energy use (Pakula and Stamminger, 2015). There are both behavioural and technical aspects to accessing these opportunities; for instance, clothing can be washed less often, and designed so that it needs less washing (Laitala and Boks, 2012) and clothing can be washed at lower temperatures, with clothing, washing machines and detergents designed so that lower temperature washing is effective (Bain et al., 2009). Detergent manufacturing is a competitive global industry, dominated by three large international companies, Procter & Gamble (P&G), Unilever and Henkel, each selling detergents under advertised brand names such as Ariel, Tide, Omo, Surf and Persil¹ (Wiesmann, 2006). They each invest in researching consumer usage and shopping behaviour, including in relation to sustainability, for example Unilever (Shove, 2004a, Pearce, 2013) and P&G (Stalmans et al., 2007, Stalmans et al., 2013).

The vast majority of consumer detergent sales in Western European countries are made through multiple grocery retailers (supermarkets, hypermarkets and discounters) according to Euromonitor (2018a, 2018b, 2018c, 2018d, 2018e), whereas independent stores have less than 10% share of grocery sales in high income countries and this is declining (Bronnenberg and Ellickson, 2015). Multiple retailers' buyers take the lead in determining what products are stocked to meet their goals of corporate responsibility (Carrero and Valor, 2012), how they are priced, displayed and promoted (van Nierop et al., 2011) and positioned on the shelves, in terms of visibility (van Herpen et al., 2012). Retailers therefore shape and constrain choice of detergents; the purchase

¹ The brand name Persil, is owned by Henkel and is their major detergent brand in many countries, for instance Germany, but licensed to Unilever for a number of countries, notably the UK.

decision at the shelf determines what goes on to be used in the home and can influence the way in which products are used (Charter et al., 2008). Retailers also sell their own label brands, at cheaper prices, promoted through consumer messages in their shops, rather than by external consumer advertising (Mintel, 2013b).

Since 1996, large European detergent manufacturers, individually, as well as through their industry association, have developed various consumer campaigns to urge consumers to reduce washing temperatures for laundry. These campaigns have ranged from TV advertising for their individual brands (e.g. Business in the Community, 2008), long term approaches to consumer behaviour change (Mylan, 2017), industry-wide on-pack messages (A.I.S.E., 2012), to a coordinated, multi-sector, pan-European consumer-facing campaign called 'I Prefer 30°', run in five countries: Belgium, Denmark, France, Italy and the UK (A.I.S.E., 2013a). These types of campaigns have been supported and encouraged by national governments, for instance, in an European Commission Recommendation (1998), in the UK (Bain et al., 2009) and through a cross-sectoral agreement in Belgium (A.I.S.E., 2013a). The size of possible reductions in greenhouse gas emissions from reduced laundry temperatures, according to three studies in Europe and the UK, is shown in Appendix A. The scale of these reductions demonstrates the importance of addressing factors influencing consumers' actions toward lower emissions in use, including the influence of manufacturers and retailers.

This research examines the drivers of lower temperature washing in detail, by assessing the business strategies of laundry detergent manufacturers and retailers, examining both the technical and behavioural factors. This paper uses a coevolutionary framework, developed over time by Murmann (2003) and Foxon (2011), to analyse the factors affecting the relative success of these voluntary business initiatives. This novel approach has been adopted for this research because it allows businesses', and groups of businesses', strategies and their consumers' actions, to be analysed as interdependent entities, recognising that there are links between managerial actions, institutional influences, and technological and social interactions (Lewin et al., 1999).

Coevolutionary theory complements, and adds to, Mylan's (2017) case study on P&G's approach to consumer behaviour change for lower temperature laundering, which uses stakeholder theory, institutional theory and the resource-based view of the firm.

In the next section we set out the theoretical basis for the coevolutionary analysis of 'Supply' and 'Demand' systems. Section 3 sets out the methodology used and the empirical setting for this research and Section 4 sets out the evidence and derives the linkages between the systems. Section 5 provides a discussion of the findings and Section 6 our conclusions.

4.3 Theoretical Basis

4.3.1 The coevolutionary framework used for consumer goods businesses' messages and users' practices

This research uses a coevolutionary framework to analyse the interactions and influences between systems of businesses' consumer messages and consumer laundry practices. It sets out to find system-level insights about business case drivers and how they influence, and are influenced by, consumers' responses to business communications. This is important because analyses at single company or single sector scale can miss feedback loops and influences across scales.

Coevolution has long been valued as an approach for understanding socio-technical transitions for sustainability because it both recognises the importance of cause-effect-cause loops across systems at different scales and yet the partial independence of development within systems (Kemp et al., 2007). Coevolution takes place when systems of two (or more) populations each evolve with significant mutual causal mechanisms between them, occurring in least one of the three stages of evolution (Murmann, 2003), namely, variation, selection and transmission. Thus, each system shapes, but does not determine, each other (Kemp et al., 2007). Murmann (2003, 2013) has undertaken seminal coevolutionary explanations of the history of the 60-year development of the interactions between the synthetic dye industry and the related academic

system. He specifies two steps for a coevolutionary explanation, which are used in this research: firstly, that the industry and important factors of its environment can be each conceptualised as populations that undergo evolutionary change and, secondly, that reciprocal causal mechanisms can be identified between them.

The populations here are markets comprising producers and consumers, which have been conceptualised previously as 'supply' and 'demand' systems; for instance, Safarzynska and van den Bergh (2010) employ a formal model for demand arising from consumer preferences and for supply from the firms providing innovative products, which exhibit variation through technical change. By contrast, Kallis (2010) uses a socio-constructionist, descriptive approach, employing theoretical concepts from coevolutionary theory to connect events and interpret changes for water supply policies and water-demanding households, and it is this approach that is adopted here, to tease out plausible causal influences between the two systems.

Drawing on Murmann's (2003, 2013) theoretical advances, Foxon (2011) developed a coevolutionary framework that provides the underpinning mental model for this research, to analyse coevolutionary interactions between user practices, business strategies, technologies, institutions and ecosystems. Hannon et al. (2012) further developed the framework by putting business strategies at the centre of the analysis. We use a similar approach here, centred on business strategies and user practices as 'supply' and 'demand' systems for consumer laundering, shown in Figure 4-1. The other three of the five systems are technologies, institutions and ecosystems, and these form the wider environment in this study through their interactions with the two central systems.

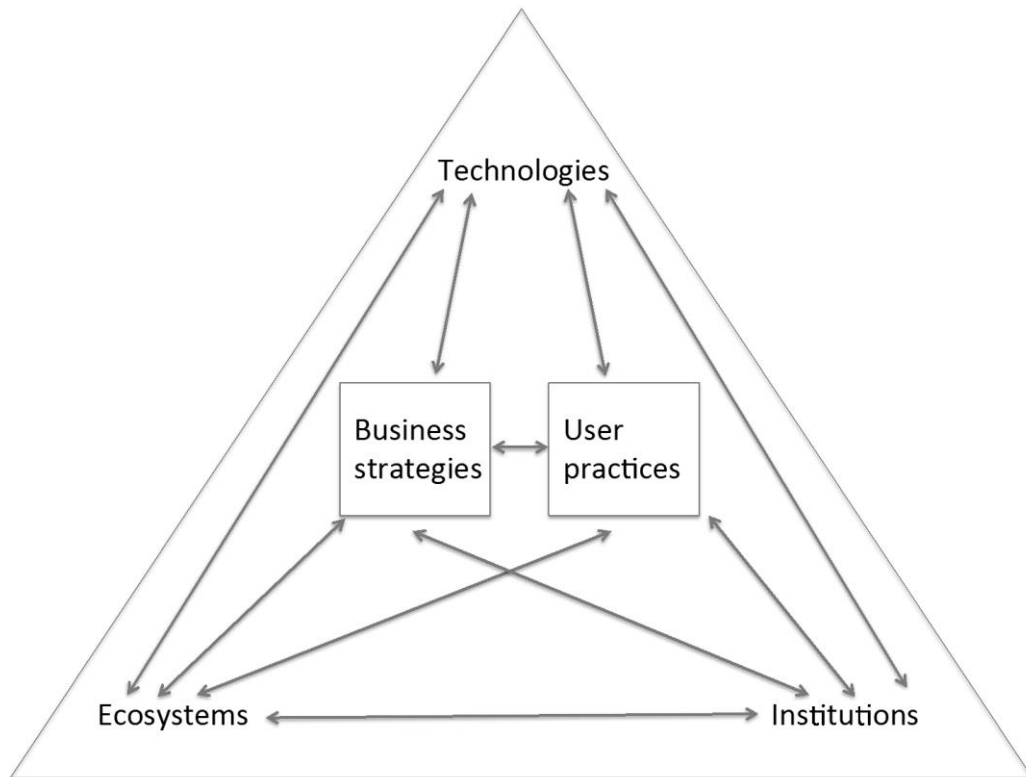


Figure 4-1: An integrated analytical framework illustrating the coevolutionary relationship between business strategies and the various dimensions of the wider socio-technical system

(adapted from Norgaard (1994), Foxon (2011) and Hannon et al. (2013))

This framework is used because it enables changes in business strategies for consumer messages to be interpreted and interconnected to changes in consumer laundry practices over time. The framework provides a way of examining coevolution of both systems and this is of particular interest in this case, because detergents are consumer goods that are purchased and used many times over the course of a year (Mintel, 2011a), in contrast to the markets for goods analysed by Safarzyńska and van den Bergh (2010), which had a purchase cycle of between three and six years. The difference here is that changes in patterns of purchase and use can evolve more quickly because of the frequent purchase cycle.

The first of Murmann's (2013) two step requirements, to specify the supply and demand populations and their roles, are shown in Tables 4-1 and 4-2. We use an evolutionary perspective to deduce the processes of variation, selection and

transmission (VST) in the two populations, which are business' consumer messages (supply) and users' washing practices (demand), in a similar way to Kallis (2010), and inductively infer two causal linkage mechanisms between them, as in Murmann (2013). This is useful because it combines an interpretation of events and changes with the rigour of specifying the coevolutionary mechanisms in each of two populations. Also, it allows the relative contribution between intentional actions and the results of unplanned ex post selection processes to be identified (Murmann, 2013). We now structure the remaining sections using the five systems shown in Figure 4-1.

**Table 4-1: Conceptualising population level causal processes of VST
(Murmann, 2013): Consumer messages as the units of replication**

Role of the system Population of the system	The 'Supply' system This system comprises the population of branded messages that are designed by businesses to impact consumers' behaviour to reduce laundering temperatures, a subset of their marketing and sales strategies. The businesses are detergent manufacturers (and their industry association) and retailers. These messages are the units of replication.
Sources of variation	Intentional variation, through conscious planning, is created by different businesses.
Selection processes	The outcomes arising from the communication of the messages to consumers, as perceived by the businesses, are the units of 'environmental' interaction, which lead to some of the messages being deselected.
Mechanics of transmission	Messages are transmitted through time and space in efforts to affect consumers' actions in both buying and using the products. Messages are duplicated over time either if they are perceived by the business entities as having led to successful outcomes.
Process of transformation	As certain types of messages gain prominence over time, the population of messages becomes transformed.

**Table 4-2: Conceptualising population level causal processes of VST
(Murmann, 2013): Laundry temperatures as the units of replication**

Role of the system Population of the system	The 'Demand' system This system comprises the population of temperatures at which households do their clothes laundering at home These temperatures arise from the use of pre-set programmes in washing machines, the clothing, the use of detergents and pre-wash products, the time taken to do the washing, and the way in which clothes are sorted for washing.
Sources of variation	Variation increases as new ways of laundering become available through new detergent products offered for sale at supermarkets, or appliance retailers, and through households' experimentation
Selection processes	First stage (shopping): Households differentially select practices, ie adopt different temperatures, based on what appliances and detergents are available for them to buy (including laws that limit the variation available), and on consumer messages. Space on retailers' shelves limits the choice available to shoppers. Second stage (consuming): Households differentially adopt temperatures based on the washing programmes and detergents available to them at home, having shopped, and the set of clothes they have to wash at a particular time
Mechanics of transmission Process of transformation	New temperatures are differentially adopted over time if they are perceived as having been successful As lower temperatures gain prominence over time, the population becomes transformed

4.3.2 Business strategies, business case drivers and consumption emissions

Business strategies are defined as the deliberate choices made by businesses about the set of activities they will pursue in order to deliver their objectives, in their competitive context (Porter, 1985). The strategies developed for consumer messages are an important subset of consumer businesses' total strategies, deploying considerable annual resources, and demonstrated by the scale of advertising expenditure (just one element of consumer messaging). For instance, in 2010, main media advertising expenditure on washing detergents

was £46.4m in the UK, 93% of which was spent by just two companies; this is 3% of the total value of market sales (Intel, 2011a).

Consumer goods companies, such as detergent manufacturers and retailers, can be positioned as the initiators of sustainable consumption (Bocken, 2017), since they seek to influence demand. Their consumer messages (the 'Supply' system) are both a public manifestation of their brands' strategies (Gabriel and Lang, 2006) and a vital aspect of how brands seek to achieve sales growth (MacInnis et al., 2002). Consumer messages have also been used to advance consumer businesses' sustainability agendas (Bocken, 2017). We next examine the business case drivers for companies applying their marketing expertise to such messages and the influencing factors for how the messages have been constructed.

The business strategy literature for sustainability offers relevant insights about why businesses choose to pursue strategies for sustainable consumption. The firms in this research are large, public and long established; consumers purchase detergents from retailers many times each year, who, in turn, purchase them, from detergent manufacturers, many times each year, and both sets of businesses report their sales and profit results at least annually (Intel, 2011a). They are run for economic purposes; therefore we used Schaltegger et al.'s (2012) framework, which recognises that firms will require a positive economic contribution from strategies for voluntary activity for sustainable consumption. Schaltegger et al. (2012) identify six core business cases drivers for analysing the drivers of voluntary activities for sustainability, derived from their extensive literature review, and having both direct and indirect influence on firms' economic performance. These are costs, sales or profit margin, risk, reputation, attractiveness as an employer and innovative capabilities, and these drivers are used to analyse the business strategies behind the consumer messaging in this research.

Many large detergent and retailer businesses have undertaken sustainability initiatives under a climate change agenda, in response to wider institutional pressures to reduce carbon emissions from their products. For example, detergent manufacturers, P&G (Saouter and van Hoof (2002)) and Unilever,

have identified opportunities for reformulating detergents to require less water for rinsing (Morrison et al. (2009). P&G undertook a sophisticated, stakeholder management approach, over several years, to achieve consumer behaviour change toward lower temperature washing and it was regarded as successful both by the firm and by many of its stakeholders (Mylan, 2017) because P&G were perceived to have led the industry, stakeholders and even to have had a significant role in influencing the institutional framework in relation to washing machines. Yet there is no public evidence or measures available of the systemic consumption emissions reductions achieved from this approach. For retailers, Gouldson and Sullivan (2013) find considerable achievements made (in this instance, by UK supermarkets) driven by energy cost reduction opportunities, but find scope for them to take more action on indirect consumption emissions. This latter finding is consistent with Whiteman et al.'s (2012) overview of studies on corporate sustainability related to climate change, which finds good practice in carbon reporting, but a fragmented understanding of system level emission reductions by sectors, firms and in regions, including the material impacts of the consumption stage.

4.3.3 Laundry user practices and consumption emissions (impact on ecosystems)

Changing consumer behaviours towards more sustainable consumption is not straightforward (Jackson, 2005), because individual behaviours are strongly influenced by social and institutional factors. Indeed, different combinations of mechanisms have been shown to be effective, stemming from three different contexts in which behaviour might be changed: individual, social and material (Southerton et al., 2011) and these three contexts have been usefully summarised in a tool for social change by Darnton and Evans (2013). From the first of these, derived from behavioural economics disciplines, rational, individual, consumer benefits from lower temperature washing could be said to arise from lower environmental impacts (Laitala et al., 2011) and enhanced clothes longevity (Laitala and Boks, 2012). Yet, even for self-selecting environmentally concerned consumers, Young et al. (2010) find that their values play a relatively weak influence on the purchase decision process,

compared to cultural aspects such as habits, brand strength, demographic characteristics, information shortages, lifestyles, personalities and the complexities they experience in trading off between different ethical factors. These arguments marry with findings from Abrahamse et al. (2005), in that merely providing consumers with information about rational benefits is unlikely, of itself, to lead to long term behaviour change for lower emissions.

This leads to the second and third contexts. In the social context, stemming from social psychology, people are seen as emotionally driven, and drivers to new behaviours or removal of barriers to them can be created through social mechanisms of engagement, awareness or involvement (Lorenzoni et al., 2007). In marketing to consumers, this can include social marketing (Collins et al., 2010), working with opinion leaders and through networks (Berthon et al., 2012).

The third, material, context, stemming from sociology, takes practices as its focus (Darnton and Evans, 2013). Taking this approach, Shove (2004a, p117) sees contemporary laundering as a complex, composite task 'whose accomplishment depends on the active coordination of a multitude of relatively independent sociotechnical systems' and through the construction of these systems it is 'clear that commercial rather than government organisations dominate the specification of service' (2004b, p91). This dominance is concentrated because there are relatively few large, international detergent and appliance manufacturers that sell their products to the mass market in similar ways across the world (Shove, 2004b). Considering the adoption of technological innovation for sustainable consumption, Spaargaren (2011) argues that cultural dimensions of objects and symbols are often overlooked as barriers and he includes laundering as a practice for which such analysis would have value. Darnton and Evans (2013) argue that each of these three contexts are relevant in considering how behaviours can be changed, and this research identifies aspects of each of them in its analysis.

4.3.4 Technologies

The system of appliances, clothing and detergents achieves a valued desire for cleanliness and freshness; a socially constructed standard of personal and domestic hygiene and appearance (Shove, 2004a), but this external outcome is achieved through ‘inconspicuous consumption’ (Shove, 2004a, p2). The interrelationships across systems of commercial businesses involved in the Clothing Use Chain are shown in Figure 4-2, which put the detergent business system in context.

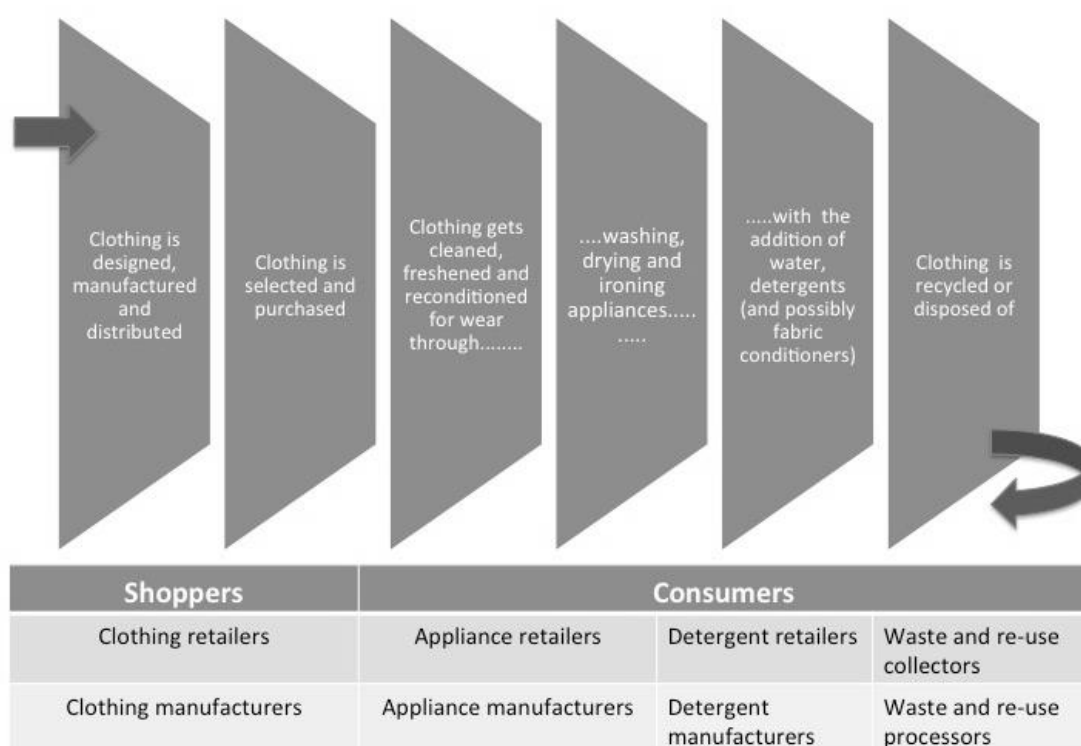


Figure 4-2: The Use Chain for clothing, derived from Shove (2004a), DEFRA (2010b) and Morgan (2015)

Analysing data from Unilever’s own research on users in the UK, Shove (2004a) finds that there are many interdependent elements that have led to a shared understanding of what is seen as normal. These include material aspects such as the types of fabrics used for clothing, the design of household kitchens, as well as detergents themselves. Furthermore, almost all households in Western Europe have had automatic washing machines for many years (Pakula and Stamminger, 2010), and these require appropriately formulated detergents. Together these have influenced how clothes washing is done, and have

contributed to the reduction of average washing temperatures, in part because washing at boiling point is not available within automatic machine programmes. However, stepping away from what has become to be regarded as normal; there may be completely different technological processes to maintain clothes for wearability, generating substantially lower emissions. For instance, there are already machines that wash without heating large amounts of water (Xeros, 2012). Equally, clothing could be developed that would need no washing or cleaning; this would be a threat to the status quo for many established industries. The 1951 British comedy film 'Man in the White Suit'² (Mackendrick et al., 1951) brought this to life (Lees-Maffei, 2009). Given the interdependencies identified in the Clothing Use Chain, new business models would be needed to turn such inventions into successful innovations (Boons and Lüdeke-Freund, 2013).

Though it would be possible to examine the drivers of these technological changes in more detail, in our analysis, these form part of the wider environment, and we focus on the interactions between business strategies and changing user practices. We expand on and update the work of Shove (2004a) on changing laundry practices by adding examination of the behaviours, strategies and choices of actors within incumbent detergent businesses. This helps us to understand the processes of change in consumer practices, connect events and analyse an important linked system: businesses' strategies for consumer messages. Whilst Shove (2004a) identified and highlighted the role of appliance and detergent manufacturers in the specification of user practices, retailers are also influential in product choice, product use and therefore in final consumption emissions, although there are few explorations of this in the literature (Bocken and Allwood, 2012). An exception is retailers' role in sustainable use of clothing, from Goworek et al. (2012).

A number of retail businesses in the UK have undertaken initiatives to reduce carbon emissions by end consumers, including in laundering, over this period

² The film represents a conflict between technical invention and traditional commercial interests. Its protagonist is a scientist who invents a fabric that never gets dirty or damaged. Its durability threatens the entire textile industry and is vehemently opposed by mill owners and trade unions and leads to his downfall.

(Morgan, 2015, Morgan et al., 2015). Therefore, including retailers' strategies in analysis of coevolving business strategies and consumer practices provides an important advance on the work of Shove (2004a).

4.3.5 Institutions

Institutions are defined by North (1990) as 'the rules of the game'. It is relevant that the selection environment for the Demand system has been influenced by legislation requirements for the washing machine appliance sector, principally European Ecodesign (European Commission, 2015) and Energy Labelling Directives (European Commission, 2010). These were designed to improve the energy efficiency of laundry appliances, through energy rating labelling, from 1996. These Directives have been effective in influencing the availability and purchasing of lower temperature washing machines (Sammer and Wüstenhagen, 2006), in part through appliance retailers' choice editing (Sustainable Consumption Roundtable, 2006). A subsequent refinement of these Directives explicitly required data arising from washing cycles at 40° temperatures (European Commission, 2010).

European detergent manufacturers contribute to a Brussels-based industry association (A.I.S.E.), which represents about 900 companies, from large multinationals to small SMEs, through Associations in more than 30 countries (A.I.S.E., 2013b). A.I.S.E. act as the voice of the industry in Europe, working with other organisations; it seeks to ensure stakeholder dialogue takes place in an atmosphere of trust, and to improve the economic and legal environment in which the industry operates. A.I.S.E.'s stakeholders are identified as, amongst others, the European Commission, Member States and Non-Governmental Organisations (A.I.S.E., 2013a).

A.I.S.E. have monitored trends in laundry washing temperatures over time, commissioning five quantitative, self-reported, consumer surveys, from 1997 to 2004, across 23 European countries (2003a, 2013a, 2015b). Trends have also been reported by WRAP in the UK (2012, 2017) and by Laitala et al. (2012) in Norway. Each of these studies show washing temperatures having been

reduced over a five or more year period. However these surveys bear the limitations of self-reporting; there is little published data about actual temperatures, care and maintenance behaviours (McLaren et al., 2015), or about the resulting consumption emissions from the laundering sector.

4.4. Methodology and setting

4.4.1 Data Selection

The underlying intention for data collection was to analyse the influences that had led to the series of consumer messaging initiatives run over time (the 'Supply' system of Table 4-1), as perceived through the perspective of sales, marketing and public relations managers within detergent and retailer businesses (because these actors design their businesses' consumer messages), and the outcomes of them (the 'Demand' system of Table 4-2). The principle researcher sought to interview managers in these roles, who had created or deployed consumer messaging initiatives to reduce laundry temperatures in any one of five Western European countries: Belgium, Denmark, France, Italy and UK. Access to interview was given by 25 individuals who were employed by businesses (either directly or as consultants or through detergent industry associations). Primary data were thus obtained directly from 25 semi-structured interviews conducted by the principal researcher. The five countries were chosen because they each took part in a consumer communication campaign from 2014, led and coordinated by the European Association of Detergent Manufacturers (A.I.S.E), called 'I Prefer 30' (IP30), which provided both one of the communication campaigns and a rationale for contacting potential respondents. The interview guide was developed using Schaltegger et al.'s (2012) business case drivers and Foxon's (2011) five coevolutionary systems. A summary of the respondents and the interview structure are shown in Appendices D2.1 and D2.2. There were three further sources of data; the first of which was provided by A.I.S.E. itself and comprised both published and unpublished data, about a number of their initiatives to reduce laundry-washing temperatures across Europe, including publicly available reports from 1998 to 2015. An agreement was made between the University of Leeds and A.I.S.E., which allowed access to A.I.S.E.'s private data

and to individuals who had been involved in its consumer-facing initiatives³. A further source of data was publicly available, relating to low temperature washing in activities from 2000 to 2014, from corporate reports, press releases, video footage, journal papers and published interviews from large detergent manufacturers and individual employees, and from three of the largest UK clothing retailers. Finally, these data were augmented by secondary data for the Demand system in Table 4-2, collected during the research process from the Sustainable Clothing Action Plan (WRAP, 2015) and from independent market research, audit companies and from qualitative and quantitative reports about how the initiatives were perceived and acted upon by consumers, commissioned by A.I.S.E., its members, and its business partners, and made available subsequently to the principle researcher on a selective basis. It was not possible to collect primary consumer data in this research, due to time and budget constraints. However, A.I.S.E. provided consumer data from their five surveys of 200 respondents in each of 23 countries, across the period from 1997 to 2014. These data are substantial, but were not collected for this research analysis and are framed by the A.I.S.E. design of the sample and questionnaire. It is important to note that, though we have conceptualised changes in consumer behaviour from a social practice perspective in this study, the collection of this consumer data was framed within an individual-level rational choice perspective.

4.4.2 Data analysis

Data were analysed to determine changes in manufacturing and retailing businesses' strategies for consumer messages over a period of eighteen years to 2014. Company reports, press articles, A.I.S.E. data and videos were searched individually for statements or phrases that included the key words: emissions, carbon, user, consumer, customer, temperature, detergent, washing, in order to identify businesses' strategies for consumer messaging. From this, a 'history' of what the consumer messaging had been was developed for A.I.S.E.,

³ The agreement included access to certain confidential information and opportunity to approach individuals for interview. In exchange for access, the principle researcher agreed to prepare a draft of the final report for the IP30 initiative, as a Consultant, and was paid expenses for one visit to A.I.S.E.'s offices in Brussels in order to gather information for the report writing. No other funding was sought or received.

for each of the three large international detergent companies and for Marks & Spencer, the leading UK clothes retailer.

Interviews were recorded and transcribed and the transcriptions input into a proprietary software programme, NVIVO, to support rigorous coding (Welsh, 2002). Codes were deduced from each of two theoretical standpoints. Firstly, instances of the causal processes of variation, selection, and transmission (VST) were identified from the descriptions given in Tables 4-1 and 4-2, and coded; the selection coding was subdivided into 'shopping' and 'consuming' (Demand system), 'manufacturer' and 'retailer' (Supply system). Secondly, the underlying business strategy motivations behind the consumer messaging initiatives were coded according to Schaltegger et al.'s (2012) six core business case drivers.

4.4.3 The empirical research setting

We have set out the context for this research as a map of supply and demand systems, following Murmann's (2013) first step to specify concrete instances of variation, selection and transmission processes and as specified in Tables 4-1 and 4-2. We take the population that is 'supplied' to be the set of consumer messages designed by businesses to influence consumer behaviour to wash their clothes at lower temperatures. These messages are purposeful and voluntary interventions directed to consumers, guided by businesses' strategies, and delivered through a wide range of mechanics, such as advertising, in-store promotions, product labelling, information printed on packs, paid-for editorials, social media and websites. The population that is 'demanded' is the consumer practices relating to the set of temperatures at which household clothes laundering are accomplished. Having taken the first step of conceptualising the populations of businesses' consumer messages and user practices as two evolving systems, we then identify the linkage mechanisms between them inductively, as done by Murmann (2013).

4.4.4 Identifying patterns and linkages

The potential consumer benefits that were communicated within the messaging were identified from the data, and six codes derived inductively from these. In another stage of inductive coding, linkages were identified between the business strategies for consumer messages consumer practices, over the twenty-year period. The coding scheme is shown in Table 4-3.

Table 4-3: Codes used for analysis

Supply system: Consumer messages	Variation Selection - manufacturer Selection - retailer Transmission
Demand system: User practices	Variation Selection - shopping Selection - consuming Transmission
Business case drivers from Schaltegger et al. (2012)	Attractiveness as employer Costs and cost reduction Innovative capabilities Reputation and brand value Risk and risk reduction Sales and profit margin
Consumer benefits communicated emerging inductively	Better clothes care Cleaning performance Convenience and ease of use Energy or emissions saving Generally expressed environmental benefits Money saving
Linkage mechanisms emerging inductively	Consumer research and direct feedback Short term sales performance

4.5 Results

This section describes the results, illustrated by quotes from interview responses. The findings were analysed looking first at the Supply system, businesses' consumer messages, and drawing on the history of the initiatives from coding the content of the consumer messaging, and the underlying business case drivers. The Demand system, consumer laundry practices, was then analysed through the ways in which laundry temperatures had been influenced. The emergent causal linkage mechanisms across the Supply and

Demand systems are then identified. The analysis uses quotations from the interviews to illustrate key points.

We describe how laundry temperature selection is an outcome of shopping and using phases. The focus is on population changes, message competition and linkages between the supply and demand, and then to identify the extent to which the key linkages have affected user practices and businesses' strategies. We do not seek to prove that these are the only possible maps for the fundamental evolutionary mechanics of the populations, but are used to find causal mechanisms between the systems, in order to create useful insights for future design of messaging interventions for behaviour change in consumer markets, through businesses.

4.5.1 The Supply system

Since the 1990s the major detergent manufacturers have used their considerable scientific expertise to be at the forefront of designing products for improved sustainability. Technologically sophisticated enzymes (which can act as catalysts to speed up chemical reactions) enabled reductions in washing temperatures (A.I.S.E., 2013a) and variations in technologies available to consumers. Separately, manufacturers' scientists had identified the importance of carbon emissions from the use phase of the lifecycle, for example by Saouter and van Hoof (2002) (data from P&G, having identified that 80% of energy consumption associated with laundry detergents in Belgium occurs during consumer use). A further benefit of increased use of enzymes is that the physical bulk of the detergents could be reduced (Novozymes, 2016).

As businesses sought to improve perceptions of their sustainability, the industry has also developed a narrative that concentrated product formats are beneficial to consumers due to their general environmental benefits, for example by reducing consumption of resources (same number of washes with less resources per pack), reduction in packaging and pack sizes, and lower emissions in transport (Dombek-Keith and Loker, 2011). This narrative demonstrates the rational, individual context, and combined with the capacity of these products to perform well at lower temperatures, saves consumers carbon

emissions, energy or energy costs per wash, whilst also prolonging the life of the clothes (A.I.S.E., 2013a). However there are also cost reductions in packaging and in transport, which drove business cases for manufacturers, from the early 2000's, whilst being in alignment with consumer environmental messaging:

'If you take something like Ariel, we have a gel which you can use at low temperatures and is very concentrated.....When we ship it, it's got as much as 45pc less packaging and you need 50pc less truck space. When the consumer washes their clothes, they use 20pc to 50pc less energy depending which temperature they choose.'

Huw Waters, Product Supply Director, P&G (Wilson, 2012, online)

Manufacturers saw this as a 'win-win' (Bocken and Allwood, 2012, Mylan, 2017). It is also a 'win-win' for retailers because it results in higher value products per unit of shelf space:

'Retailers welcomed compact detergents because it freed up shelf space and the overall mission of a retailer has to be to maximise the upturn from shelf area.. so if someone says I'm going to take less space....they're going to bite your hand off really.'

(Author interview with Consultant to large UK retailer, July, 2014)

Over an extended period, individual detergent manufacturing businesses ran specific consumer communication campaigns setting out various benefits of low temperature washing, for their brands. These were referred to in their Sustainability Reports: Unilever 2002-2015 (Unilever, 2017a), P&G 2006-2012 (Procter and Gamble, 2017) and Henkel 2009-2015 (Henkel, 2017).

However there is variation in detergent manufacturers' business strategies for consumer messages, arising from differing technological, marketing and selling capabilities and from differing strategic preferences, and, in part, from different geographical retailing contexts for the businesses (Sullivan and Gouldson, 2016). For example, P&G, as a US based company, are more strongly influenced by Walmart, whereas Unilever have almost no presence in the US (The Economist, 2012). Walmart, the largest retailer in the world, had developed a policy for the United States from 2009 to eliminate the large

physical packs required for dilute detergents, in the interests of sustainability (Crawford, 2013). Different strategies are exhibited through different product formats and branded approaches to consumer persuasion, for instance, advertising, packaging design and promotions.

In parallel with individual businesses, A.I.S.E. also developed initiatives that resulted in consumer messages being delivered across Europe. In 1997 A.I.S.E. created the consumer-facing 'Washright®' campaign to raise awareness amongst the industry's consumers of the benefits of changing their washing habits, including reducing laundry-washing temperatures, and from 1998 onwards, over 90% of European household laundry detergent packs displayed this message (A.I.S.E., 2003b). The campaign was also advertised in printed media in many languages, and included a multi-lingual website. From 2000 to 2002, A.I.S.E. developed a pan-European television advertising campaign to promote the Washright® message, at an estimated cost said, in 2002, to be €10m equivalent each year (A.I.S.E., 2003b).

In 2012, A.I.S.E. started to develop a new consumer campaign called 'I Prefer 30°' (IP30), effective during 2014, in five European countries: Belgium, Denmark, France, Italy and the United Kingdom. This initiative was implemented not only through detergent manufacturers, but also retailers, appliance and textile companies, trade associations and government authorities were invited to contribute and use IP30 branding themselves, thus involving a wide variety of stakeholders in its outcomes. It was repeated in four countries (as earlier, but excluding Italy) during 2016 (A.I.S.E., 2015b).

We have seen that cost reduction has been a business case driver. Two more of Schaltegger et al.'s (2012) drivers emerged strongly from the data; reputation and sales or profit. The reputation of a brand is a competitive tool:

'Although a number of other companies added their own 'turn to 30' messages by the second year, independent research showed that 88 percent of consumers who changed their behaviour to wash clothes at 30 degrees associated the message with Ariel.'

(Case study on P&G, (Business in the Community, 2008))

This, perversely, has the effect that a 'turn to 30' message was not selected by competitive brands to use for themselves, because it would not give them a competitively differentiated reputation benefit:

'P&G [Ariel] was the first to do it so either you go one better than P&G somehow, by saying don't wash at 30, but wash with cold water, or you say no, let's do this on a industry scale,this competitive element that started the whole movement, is being eroded by others and you can see how the different companies' interests don't align.'

(Author interview with International Corporate Responsibility Manager, partner company, March, 2015)

Retailers, most of which also sell clothes as well as household goods and food, are also sensitive to the impact that failures of detergent products in the past have had for their own reputation for clothes quality:

'The reason for [leading retailer] being interested in detergents came from the reformulation of detergents with an aggressive action that damaged clothes. This resulted in garments being returned to us as being faulty.'

(Email response from Sustainability Manager, UK retailer, June, 2014)

Businesses seek feedback assiduously in order to understand their reputation with their customers:

"Practically every minute of every day, somebody in our business is asking shoppers and customers what they think against a number of different measures. And how they respond to promotions, what they think of products...."

(Author interview with PR Manager, large UK retailer, July, 2014)

Of the other business case drivers, sales (or profit) was critical for respondents in commercial roles:

'In terms of those measures of success as a sales organisation; it's what it done for us in terms of the sales line.'

(Author interview with Marketing Manager, detergent manufacturer, April, 2015)

Individuals' personal success is linked to the short-term sales revenue generated from the area of business for which they are responsible. So, the strategies and tactics that generate growth in sales revenue and profits are repeated over time. We found also that commercial successes and failures are highly visible within, and across, the small number of large retail and detergent businesses in each country, with high awareness of successes and failures of competitors across and between both sets of businesses.

For respondents in technical or communications roles, however, there was frequent recognition that more senior managers in the company had to manage a balance between sales or profit and reputation:

'Senior management....playing the reputation about being a good corporate partner to government, to customers...and of course that directly leads into sales and profit because people think well of you and therefore they want to come and shop with you....'

(Author interview with PR Manager, large UK retailer, July, 2014)

' "I prefer 30" was a sustainable message, one that we had to support ... but in terms of its success at a very business level I'm not sure that we ever thought it would move the dial.'

(Author interview with Marketing Manager, detergent manufacturer, April, 2015)

Since all manufacturers' sales are made indirectly, through retailers, it is through retailers that they measure their success. Yet retailers do not see environmental messages as being sufficiently strong to deliver increased sales. It was explained that a major retailer did not take up IP30 because:

'they [retailers] have to free up what is very valuable space and to use that for a campaign that's not..... it's hard to justify, given that it's not really going to move the sales line itself versus a price promotion....'.

(Author interview with Marketing Manager, detergent manufacturer, April, 2015).

Therefore we have seen that manufacturers' strategies themselves are constrained or enabled by retailers' distribution, shelf allocation and promotional strategies.

Appendix D3 summarises the relative importance of business case drivers for consumer messages, according to respondents. Reputation (both corporate and brand) was seen as the most important driver, followed by 'sales and profit margin' and 'costs and cost reduction'. 'Innovative capabilities', 'Risk and risk reduction' and 'Attractiveness as an employer' were seen as less important drivers.

Businesses' managers do not see themselves as 'all knowing'. Even having done their own market research, they do not know beforehand how successful their deployed strategies are going to be until they are tested in the market against competitors. If a strategy damages sales, profit, corporate or brand reputation, it can be, and is, quickly changed. None of the other drivers (innovation, risk and employee attractiveness) were thought to be important, even when prompted.

4.5.2: The Demand System: How detergent manufacturers and retailers' perceive that laundry temperatures are influenced

From the Clothing Use Chain, there are two stages that result in detergent use. The first is that the detergent has to be selected by shopping through a retailer before the second stage, when it is selected for use at home, almost always in a washing machine, whose set of programmes limits washing temperature choices.

At the shopping stage, businesses perceive variation in purchasing of detergent products arising because of different, individual, consumer preferences for brand, or format (powder, tablet or gel), or fragrance, or price and other product attributes, which include environmental claims. According to respondents, shoppers' choices, from what is made available on the retailers' shelves, are made from habit (influenced by brand and format loyalty), from the product's price, and their perceptions of performance to achieve the desired cleaning results. Price is clearly set out on the shelves; perceived product performance information comes from advertising, shelf and pack claims and previous use experience. Respondents declared that consumers find shopping for detergents

uninteresting, to be done with speed, and want retailers to make it easy to find and choose quickly. For the majority of shopping decisions, products are selected from a small repertoire of previously used brands. However, a new, low-priced detergent, for instance a retailer's own brand, may provoke an experimental purchase.

From the early 2000s, messages about the environmental impact of detergents are said by respondents to have played a role in the shoppers' decision hierarchy. However, these aspects are not perceived by them to be the primary drivers of purchase. This may be self-fulfilling, in that firms choose not to communicate environmental benefit as a primary claim, and acknowledgement by them that the individual context for behaviour change is not effective. Nonetheless, it is noted that the campaign from A.I.S.E. (2015a) did include some social marketing and used opinion leaders, which shows an understanding of the social context of behaviour change.

The use stage, home laundering, is also seen by users as an uninteresting task. However, its material context has evolved over time; lower temperature washing has been seen to be increasingly acceptable as machines and clothing has changed. For most clothing, most of the time, laundering has become a freshening and hygiene-maintenance process, rather than a dirt-removal process. In automatic washing machines, boiling clothes at 90° was no longer possible, so lower temperatures became normalised as the machines became more widespread. EU Directives (2010) aiming to reduce energy use of appliances influenced this process and pre-set washing machine programmes using lower temperatures became universally available; consumer research indicated that this was a welcome development because fading and shrinkages were common at high temperatures. Also clothing has been made increasingly from fabrics that can be washed at lower temperatures; in light of this, clothing retailers have reduced the temperatures at which they test their garments, thus accepting new configurations of textiles and trimmings, which may not have passed retailers' earlier standards for clothing. Notwithstanding the known advantages of abandoning the very high temperature washing of the past, there is evidence of a widespread consumer view that higher temperature gives better

results in terms of both hygiene and cleaning performance; this gives rise to a tension between the desired, higher order, benefit of clean clothes, and the environmental or cost benefit of using lower temperatures.

Six types of benefits of washing at lower temperatures for individuals were identified from the research in the messages for consumers: saving money, improving cleaning performance, saving energy or emissions, benefitting the environment, improving convenience and ease of use, and improving clothing care. Appendix D4 summarises the relative importance of the benefits, according to the business respondents.

It is worth noting especially that saving money is considered least important as a motivating message by these business interviewees:

‘the amount of money that you would save, the consumer would save, in the year by washing at 30 degrees, is £38. There's all sorts of questions about £38; it's a night out; it's not very much money. And again it's not why you would buy a product.’

(Author interview with Former Sustainability Manager, UK retailer, March, 2014)

Furthermore, Unilever's Marketing Director has publicly stated that the competitor's (P&G) campaign for Ariel called 'Turn to 30', focused on energy saving benefits, did not change behaviour (Charles, 2010). This view was derived from market research carried out by the firm, in which consumers placed electronic chips in their washing machines to measure the temperature and length of washes.

The effect of EU appliance labelling legislation (European Commission, 2010) has been that it favoured appliance manufacturers who had more efficient programmes at 40° or below. Also, since 2010, newly installed machines have at least one programme that washes at temperatures of 20° or below. This exemplifies the context, in that the machines now enable low temperature washing. Before these machines were widely in use, there had been a fear amongst both clothing and grocery retailers that 'wash at 30' messages would limit their sales because consumers would text the message literally and not

buy clothing or detergents bearing this instruction if their machine did not have a suitable programme at 30 degrees.

4.5.3 Two mechanisms of coevolution between business strategies for consumer messages and consumer use practices in domestic laundering: 1996-2014

Having set out the evolutionary mechanisms within two populations, namely business strategies for consumer messages and user laundry practices, we now analyse the key events in the recent evolutionary histories of each of these populations, and interpret the linkages between changes in the two populations. Figure 4-3 provides a causal map of the coevolutionary dynamics between the two populations, showing a simplified timeline of key events and interactions between the business strategies for consumer messages and changes in laundry temperatures, following the template in Murmann (2013). There are important links between detergent availability through retailers, detergent selection and use, and the links with retailers' strategies that impact the availability of product sizes. Figure 4-3 also includes a snap shot of other coevolutionary influences arising from changes in technologies and institutions.

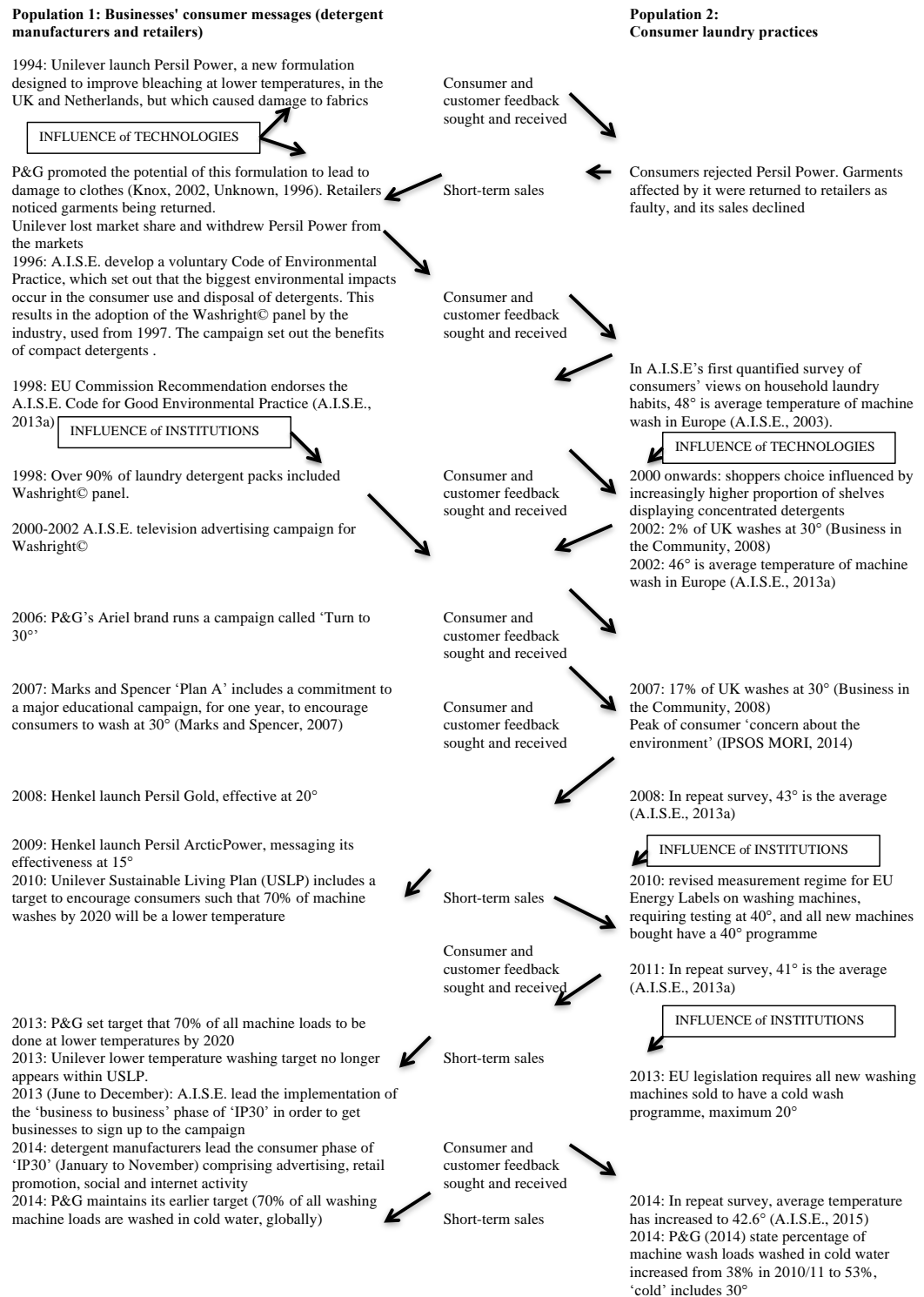


Figure 4-3: Map of coevolutionary dynamics, showing two linkage mechanisms, developed by authors, following Murmann (2013)

From the coding, we identify two linkage mechanisms identified as operating between the Supply and Demand evolutionary systems. These are short-term sales and consumer/customer feedback; together these drive the coevolutionary interactions between the two populations. Customers initiate short-term sales by purchasing at retailers; retailers and manufacturers measure those sales, and this is what forms the first linkage. Businesses (either detergent manufacturers or retailers) initiate consumer/customer feedback and subsequently analyse the results; this is what forms the second linkage. We now look at these each in more detail.

4.5.3.1 Short-term sales

Based on our evidence, and on businesses' consumer research, cleaning performance is seen by the businesses as the leading functional benefit in determining consumers' detergent choice, and is institutionally embedded as a major element of what they seek to communicate. Technological innovation has enabled detergent manufacturers to promote compact detergents' cleaning performance, and influenced their increased availability by retailers, in turn, influencing consumers to buy and use them. Over the same period, washing machine manufacturers developed and promoted washing machines designed to wash effectively at temperatures below 40°. Therefore lower temperature washing has occurred principally because both detergents and machines to do so were easily available, better advertised and price-promoted, and delivered good cleaning performance, rather than because consumers selected detergents primarily on the basis that they were effective at lower temperatures. The picture that emerges is that consumers' behaviour has been driven by perceived cleaning performance and value for money of detergents, not by lower environmental impact or saving money on energy. After P&G's 'Turn to 30' campaign' (Business in the Community, 2008), other brands have not led with the benefits of reduced washing temperature in their advertising, as also acknowledged also by Mylan (2017). This is in part because it would not be competitively distinctive, but also that firm's managers believed that this messaging would neither increase short-term sales, nor be effective in changing

behaviour. Nonetheless, the IP30 initiative was subsequently funded by the manufacturers (at European association level), but at lower expenditure than they would typically spend on their brands.

Mass-market grocery retailers stock conventional, well known branded products, measuring success by sales revenue and profitability per square metre of shelf space; there is less shopper demand for less well-known brands, including those for whom the consumer message is principally an environmental one. Large established detergent manufacturers seek to emphasise to retailers' buyers the benefits to retailers of their brands' high rate of sales and profitability, in turn benefitting retailers' short-term business performance. This discourages buyers from giving space to more niche alternatives in their stores. Therefore manufacturers of these smaller brands seek distribution through alternative channels; specialist 'natural' stores, upmarket department stores, or on-line sites, thus further marginalising their appeal and availability to mass-market consumers.

4.5.3.2 Consumer and customer feedback

An important example of consumer feedback is A.I.S.E.-commissioned consumer research, which included gathering self-reported temperature selection, in five quantitative surveys from 1997 to 2014. From these, average temperatures of a machine wash in Europe reduced from 48° (1997), to 46° (2002), to 43° (2008), to 41° (2011) and increased to 42.6°C (2014), due to a decline in the number of colder washes. Both these research results, and other qualitative consumer research surveys made available to the researcher (but not in the public domain), show that progressively lower temperatures are not being achieved more recently. This research has also indicated that consumers themselves do not perceive that their own behaviour has the potential to substantially reduce carbon emissions and it does not drive their brand choice, consistent with Young et al.'s (2010) findings.

4.5.4 The Linkage Mechanisms

We have defined the three evolutionary processes of selection, variation and transmission, in each of two populations, and identified inductively the two causal processes, namely 'short term sales' and 'consumer and customer feedback'. Following Murmann (2013), we have identified these two causal mechanisms with an effect on either the evolution of the consumer messages and on user practices, so there are a possible twelve causal effects on their variation, selection and transmission. These are shown in Table 4-4 and Figure 4-4, based on Murmann's 'Mechanisms of Coevolution' (ibid.) and illustrate where we have found evidence for eleven out of these twelve possible causal effects.

Table 4-4: Causal Mechanisms and Their Effects on the Evolution of Consumer Messages and User Practices

Short term sales		Consumer and customer feedback	
Consumer Messages	User Practices	Consumer Messages	User Practices
		Variation	
Sales arising from users' purchases and use patterns prompt sales and marketing managers to devise new consumer messages about environmentally friendly behaviour	Consumer messages generated by businesses give users ideas for new ways of using detergents	Feedback and suggestions from consumer and shopper market research leads to new messages being communicated	<i>Not observed</i>
		Selection	
Messages that are perceived to generate the best sales (in relation to competitors' sales performances) are likely to be used. Retailers select products for their shelves by judging which messages will generate most sales revenue in the space available	Users buy detergents based on the messages that they perceive will meet their needs, amongst all those on display	Types of consumer messages that are well perceived by retailers' buyers and in consumer and shopper market research are adopted in the limited space or resource available, on pack, on shelves and in advertising.	Users feedback to retailers and manufacturers which brands they consider to be in the repertoire of the ones they will buy
		Transmission	
Businesses' consumer messages that are thought to have contributed to generating sales are retained	Users who feel that the detergents' messages have been fulfilled in use will buy and use them again	Businesses' consumer messages that are replicated over time will more readily be fed back by users, through, for example, their loyalty to particular brands	Users retain loyalty to certain brands on the basis of their features and benefits, as they perceive them

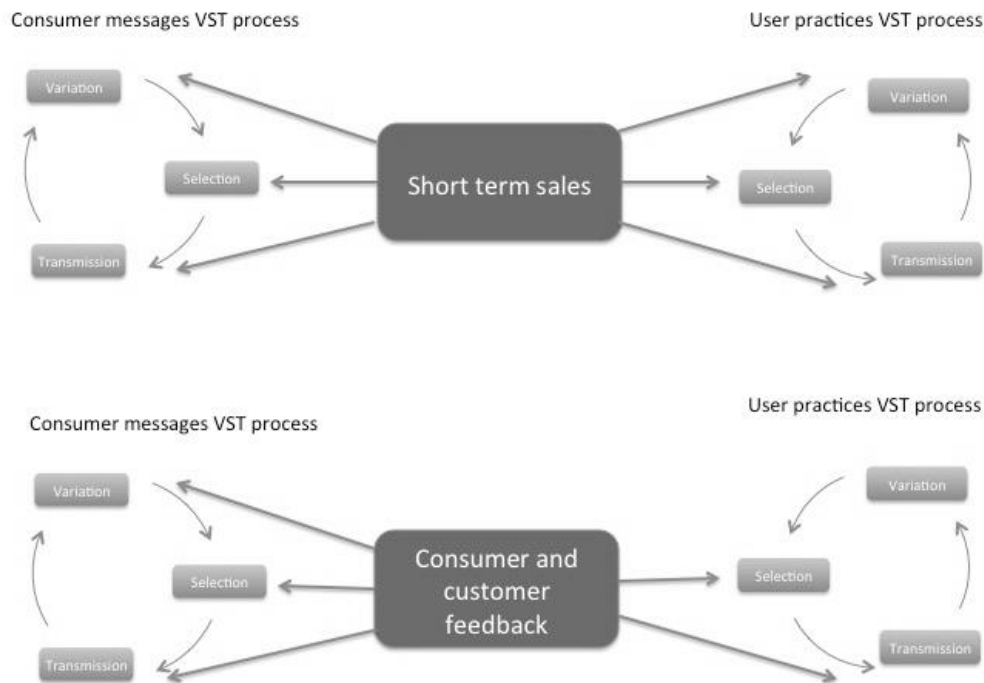


Figure 4-4: Two Mechanisms of Coevolution

4.5.5 Coevolutionary influences and the role of other processes

The focus here has been on businesses messages from detergent manufacturers and their impact on consumer practice. However, it is noted that there has been a linked, progressive reduction in the size of detergent cartons on shelf, due to technology, which has benefitted consumers because of convenience and the ability to wash at lower temperatures, but also offered cost reductions for manufacturers and retailers.

Also, the European Union and national governments have taken action to reduce carbon emissions through legislation on labelling of appliances. In addition, the research has identified that some governments have provided endorsement and encouragement for detergent manufacturers to promote low temperature washing. The data suggests that coevolutionary influences of at least equal importance to user practices have arisen from these institutional actions.

4.6. Discussion

We have found that this coevolutionary analysis of the supply and demand systems has challenged the simplistic narrative that detergent manufacturers have driven washing temperatures down in order to achieve environmental benefits. The benefits of washing temperature reduction do not feature as important aspects of selection for detergent manufacturers, retailers or their consumers. The requirement for ever-improving commercial performance, measured by sales and profit, inhibits radical diversion from conventional strategies, and is in tension with influencing consumer behaviour for environmental ends, unless there is a commercial advantage too. Furthermore, businesses' perception that cleaning performance is the key driver of consumer choice is continually reinforced in consumer messaging, and this has led to path dependency, serving to limit technological variation. This research therefore has added to Mylan's valuable findings in two ways; firstly by introducing the important drivers and barriers that emerge from taking account of the influence of retailers, and secondly by taking a wider, systematic, perspective of the reasons for the outcomes than those drawn from a case study of a single firm. The coevolutionary analysis presented here has also built upon Shove's work (2004a, 2004b). She showed how systemic processes, leading to the dominance of domestically installed washing machines and manufactured detergents, influence user practices. We have shown coevolutionary selection pressures arising from the system through which retailers interact with manufacturers, through a close examination of initiatives designed to reduce laundry temperatures, over a shorter and more recent time period, and that there are also both technological and institutional influences. This research suggests that progressive regulation for appliance energy use, leading to changes in machines and in washing programmes installed in them, has been a main reason for wash temperature reductions in Europe.

Detergent manufacturers and retailers have implemented strategies to present consumers with the benefits of low temperature laundering. Over the same period, EU directives on the labelling and design of washing machines have normalised lower temperature washing. This analysis suggests that commercial

selection pressures have limited the impact that consumer messages have had on consumer behaviour. This can be seen in the light of the two identified mechanisms. Firstly, manufacturers' and retailers' need for short term sales have led to the low temperature messages being weak in the context of other, more motivating, consumer messages. Secondly, feedback to manufacturers from both retail customers and consumers is that a lower washing temperature is not a compelling reason for selection, compared to other consumer benefits. Business respondents feel that they can influence environmental behaviour only within the realms of what is compelling for customers and consumers. Washing temperatures have, nevertheless, reduced to an extent over the whole period of analysis, consistent with the availability and promotion of technically improved appliances and detergents able to wash at low temperatures. This aligns with what has been described earlier as the material context for consumer behaviour change. It seems that further restructuring of physical characteristics, in tandem with establishing new cultural, social and emotional norms, will be necessary, to drive substantial behaviour change.

The research finds that, of Schaltegger et al.'s (2012) business case drivers, reputation and sales and profit are the most important here, the latter strongly influenced by cost reduction opportunities. This research suggests that corporate risk, innovative capabilities or employer attractiveness are much weaker drivers. It may be that fast moving consumer goods businesses, both manufacturing and retailing, are especially sensitive to reputation and short-term sales and profit. The two linkages that emerged inductively from the data can be seen as subsets of two of Schaltegger et al.'s (2012) six drivers; short-term sales being related to the driver of sales, and consumer feedback, which is linked to reputation and brand value, as perceived by decision-makers in both manufacturers and retailers.

Schaltegger et al.'s (2012) business case driver framework provided clear categorisation, to which it was easy for interviewees to respond, and from which relevant codes for analysis could be developed. The inclusion of the consumption outcomes, indicated by the washing temperature survey,

complemented it. The Clothing Use Chain was further validated, since clear influences across and between industries within it were identified.

A limitation of this research is that it examines the consumer behaviour change responses through the eyes of businesses' managers rather than direct evaluation of consumer campaigns. It could be well complemented by research amongst consumers to explore influencing factors for detergent choice and use. Further limitations of the research emerged with respect to data access. Firstly, it was difficult to gain access to information from the businesses in these sectors. The detergent manufacturer respondents are limited to those who agreed through A.I.S.E., having taken part in the IP30 activity. It is likely that the job roles of the respondents shaped their responses and may have influenced the results. It would have been valuable to have data from others who had chosen not to take part in AISE's initiative. There was also insufficient data by country to make valid comparisons between them about the ways in which A.I.S.E. campaigns influenced, and were influenced by, businesses, consumers and institutions. This would also have been of value, since significant differences were noted in both average laundry temperatures across countries and in the implementation activities and messages of the IP30 campaign, led by different A.I.S.E. organisations in different countries.

Other limitations arose because secondary data obtained from businesses had been selected by them and therefore may have excluded commercially sensitive aspects. Whilst the consumer market research studies made available to the researcher had been undertaken by professional market research agencies, they were designed by the detergent industry for their own purposes, have not been independently validated, and their qualitative conclusions may have been influenced by our respondents' own perspectives. Thus, the consumer data was partially independent and partially construed by interviewees. Nonetheless, there was a universal consistency from the data that neither emissions, nor energy, nor in-use cost reductions are a major driver for consumers' detergent purchasing.

4.7 Conclusions

We conclude that, in spite of good intentions and considerable efforts and resources, neither consumer nor business initiatives will drive sufficient change, either separately or together, to deliver the scale of reduction in carbon emissions across the multiple systems that make up domestic laundering that would be consistent with European aspirations to reduce emissions by 20% by 2020, and higher carbon emission reduction targets in future years. The narrative of progress and achievement from the detergent industry is by no means unwarranted. However, actions of policy makers and the 'win-win' advantages of new technologies have been seen to have been at least as influential as consumer communication initiatives of the detergent industry, although all these are linked in our coevolutionary explanation.

Our conclusion has implications for policy aiming to reduce consumption emissions at scale, where it relies on voluntary actions from businesses and consumers. This research suggests that policy could be developed that recognises system-level interactions: to include deeper encouragement for joint efforts between policymakers, industries and stakeholders to develop more effective drivers for consumer behaviour change and to link these to regulatory mechanisms, for example for washing machine appliances.

Through linking our analysis with business strategy literature, we have identified business case drivers relevant to consumer behaviour change, in the context of the commercial selection pressures that consumer businesses face. We have provided directional coevolutionary explanations for changes in the ways detergents have been presented to consumers over a 20-year period. Path dependencies arise across and between manufacturers and retailers and their consumers because of cross-industry narratives that serve to limit the variation of products created, because of selection pressures, and because of transmission of habits for products that do not hold the interest of consumers. We have shown also that retailers are highly influential within the system of what is made available to consumers.

Reflecting on the use of the theoretical frameworks, the use of a coevolutionary framework, together with theories of business model innovation and social practices, was able to shed new light on the two systems. The merit of the coevolutionary analysis is that we were able to inductively infer the process of change across the systems, by piecing together the story of that change, through combining documentary analysis with interviews, and identifying and mapping coevolutionary linkages. In addition, the coevolutionary approach, with the business case drivers for sustainability framework, has bridged intentional actions and ex post selection processes (Murmans, 2013) as explanations of firms' strategies in a market where manufacturers compete for retailers' space and consumer sales, and consumer practices are influenced by wider social, material and cultural factors, as well as directly by messages from businesses. It thus contributes to the field of sustainable consumption through bringing these frameworks together for analysis of whole systems of competing businesses' strategies in context with technologies, institutions and ecosystems.

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5. Chapter 5 Discussion and Conclusions

5.1 Introduction

This discussion and conclusions brings together the key cross-cutting themes and holistic insights from the three papers, focusing on the research questions, highlights lessons learned and the challenges found for businesses and for governance. This chapter also reflects on the research approach, limitations to the research conducted and possible future research directions. It summarises the findings, their relevance to the literature, identifies policy implications and further research opportunities.

Section 5.2 presents the main findings and insights in answering the research questions, reflecting on the research design, methodology and content of the three papers in the preceding chapters as a whole body of work, identifying and synthesising the overall theoretical and empirical findings. Section 5.3 reflects on the research strategy and methodological approach to answering the research questions. Section 5.4 sets out the contribution of this research to the advancement of knowledge, and identifies directions for future research. Section 5.5 provides the conclusion.

5.2 Synthesis of main findings of research

The research questions are:

What is the role that large consumer-facing businesses have played over time, through voluntary activities, to influence consumer behaviour to reduce product-related carbon emissions at home, and how has this role been influenced?

The sub-questions are:

- i. What activities have large consumer-facing businesses undertaken that have aimed to change consumer behaviour to reduce their emissions (other than that required of them by regulation)?
- ii. What were the businesses' motivations for these activities?

- iii. To what extent have these activities been effective, in both reducing emissions, and serving businesses' motivations?
- iv. What does this indicate for climate change mitigation governance and policy?

This section will demonstrate what has been answered for these research questions for two industry sectors, laundry detergent manufacturers and retailers, in Western Europe. Section 5.2.1 will summarise the research design and methods used, the rationale for their choice, and reflect on their strengths and limitations. Sections 5.2.2 to 5.2.5 revisit each of the four research sub-questions in turn to draw out the key findings from each of the empirical chapters, and 5.2.6 answers the main research question and discusses the extent to which this thesis has helped to advance understanding of the important influences on large consumer-facing businesses in relation to environmental sustainability.

5.2.1 Research Design and Methods

The research design considers what evidence needs to be collected in order to address the research questions (De Vaus, 2001), and to do so 'most directly and provide an answer that can be defended by reference to the evidence collected' (White, 2009, p99). Yin (2009, p18) expresses the critical features of a case study design as follows:

“1. A case study is an empirical inquiry that

- investigates a contemporary phenomenon in depth and within its real-life context, especially when
- the boundaries between phenomenon and context are not clearly evident

2. The case study inquiry

- copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result
- relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result

- benefits from the prior development of theoretical propositions to guide data collection and analysis.”

The chosen method was a qualitative case studies approach, adopted because the research question is explanatory, focusing on contemporary events, with no control over those events (as opposed to an experimental approach). Also the research sought to identify influences and links over time (Yin, 2009), rather than to prove them, and therefore the case study approach offered the most appropriate way of answering the questions.

A strength of this research method was that influences emerged across retailers, across manufacturers, and between retailers and manufacturers, and from the context in which they all operate. This context was explored through the Clothing Use Chain, shown in Figure 5-1, which provided an underlying platform for each of the three papers, and also shows the coevolutionary elements brought together in Chapter 4.

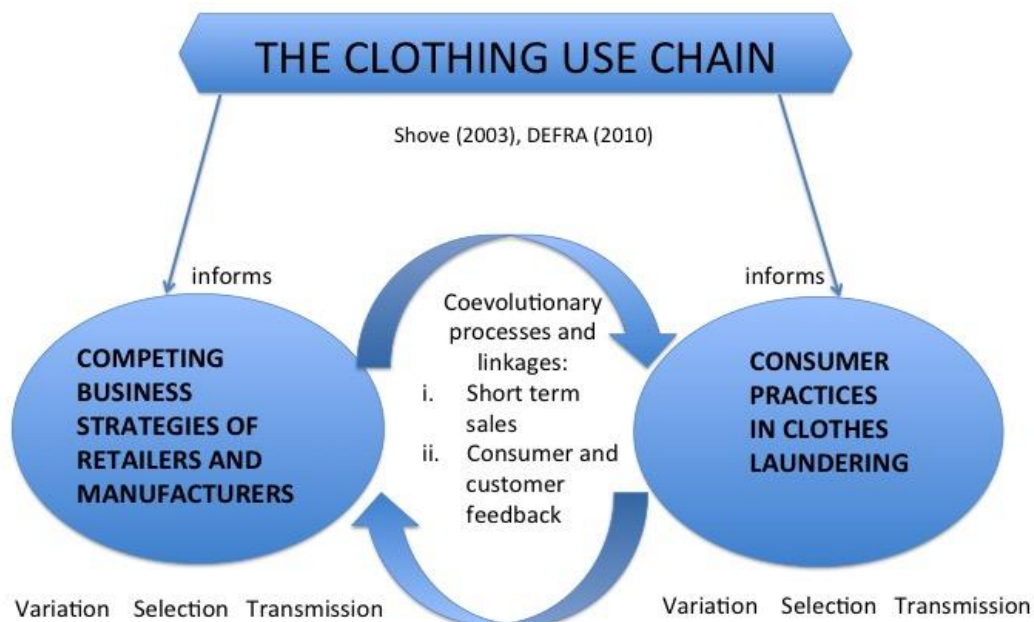


Figure 5-1: The Clothing Use Chain context and coevolutionary elements

The case study approach, using multiple-case designs (Yin, 2009), allowed for flexibility in boundaries, since the boundaries between the cases and their contexts were not sharply defined. The context was itself part of the research. The case study approach allowed for the context to be fully brought in as part of each case (Yin, 2009); the initiatives to influence consumer behaviour had multiple outcomes, because they impacted not only consumer behaviour, but also influenced future business strategies, including multi-business partnerships and approaches. As Figure 1-7 showed, there were different scales to the three case studies, Cases 1 and 2 were of a single, market-leading, UK retailer and for a group of eight leading UK retailers respectively, whereas Case 3 analysed businesses' strategies in two linked sectors, manufacturing and retailing, across Western Europe. The cases were chosen because the firms are good examples of established, consumer-facing, regime businesses, having the economic and governance power of big consumer brands (Dauvergne and Lister, 2012), but also the sectors in which they operate are representative of consumer goods sectors as a whole. A further strength was that triangulation was possible across the three sets of cases, by combining multiple observers, theoretical frameworks, and empirical materials, from different case studies.

Limitations of this case study approach, which would have been limitations for alternative approaches too, were that complete and comparable data from businesses was lacking. In general terms, it is often difficult to gain access to large businesses for independent academic research, because of the many requests they receive, and a lack of perceived benefit to the business, or potential sensitivity and confidentiality or a lack of trust in the competence of the researcher (Saunders et al., 2009). Networking through personal connections was important to make initial contact and gain the confidence of business people. This overall networking strategy may not be easily replicable by other researchers and may have introduced some bias. However, the choice of the case study methodology allowed for flexibility of data gathering and was added to by a degree of opportunism, as evidenced through the securing of the A.I.S.E. agreement.

Setting up and undertaking the interviews with business people also presented some challenges. Respondents were mid-level managers, as opposed to senior level managers or those with Board positions, described as 'elites' by, for instance, Harvey (2011). Nonetheless they shared some characteristics with his interviews amongst elites. Firstly, these managers have significant influence and decision-making autonomy in their areas of responsibility in their organisations, and had positions of power compared to the researcher, which made them ready to question the research itself, rather than take it at face value. Secondly, it was important to gain the trust of respondents, in order to get their agreement to undertake the interview and to its content. Thirdly, there was reluctance to arrange face-to-face meetings and a marked preference for telephone interviews. This seemed to be because of the increased flexibility for respondents to arrange their diaries, should their circumstances change, thus also having a secondary benefit to the time and costs of the researcher, because of the wide spread geographical locations of respondents. Whilst this researcher found it more difficult to 'read' the respondents when interviewing by phone, the alternative would often have been no interview at all. Fourthly, a number of respondents asked for detail about what the interviews would cover, wanting to plan ahead. Whilst Harvey (2011) argues that this is because elites saw the interview as a challenge or to justify themselves, in this instance, it seemed to be that the middle management respondents were simply used to preparing for meetings and saw planning ahead as good business practice. Finally, as Aberbach and Rockman (2002) found, respondents preferred to articulate their views openly in response to semi-structured questions, being able to explain themselves and their own reasoning, rather than to closed-ended questions. As an example of this, a final open-ended question that yielded particularly interesting responses was "is there anything else you thought I would ask about, which I haven't covered?".

5.2.2 What activities have large consumer-facing businesses undertaken?

Large businesses dominate the Clothing Use Chain, as powerful regime actors, who would impact and be impacted by any systemic changes to user practices.

In the Clothing Use Chain retailers and manufacturers are identified separately. This proved to be important. From Figure 1-2 in the Introduction Chapter, the distribution of consumer goods through retailing (including online) is the critical link between production and use. Arguably, it has been under-emphasised as a key stage in macro consumption since, if domestic consumer goods cannot be acquired, they cannot be used. Indeed, from each of the three papers that form this thesis, it can be seen that retailers are important intermediaries, as 'gatekeepers', not only in general consumption processes, as set out by Belz (2004), but also in shaping initiatives designed to encourage more sustainable consumption. Furthermore retailers commission 'own label' products directly from manufacturers, for both detergents and clothing, thus also instigating their own product design process. Retailers' choices about the design of features, benefits, labelling and costs of these own label products have an influence on the overall offer made available to shoppers.

The types of activities identified in the Chapters of this thesis as having been undertaken by large consumer businesses to reduce end consumption emissions are shown in Table 5.1, together with literature references to similar activities; as this shows the field has been described elsewhere, however, there is little evidence of substantial consumption emissions reductions within these examples.

Table 5-1: Retailers' and manufacturers' implementation activities for lower usage emissions in thesis.

Chapters (shown as Ch with chapter number)

Retailers	Selected examples from the case studies	Selected literature references for similar examples
Make environmentally beneficial products more available, in wider distribution, and give them more visible positioning on shelves	M&S Energy Efficient Electrical products (Ch 2), although not a sustained activity over time	Young et al. (2010)
Provide information on their own retailer brand product labels, and on shelf edge displays, and on websites, to explain how products can be used to produce fewer emissions	Tesco Carbon Labelling Scheme: up to 2012, 525 individual products were labelled (Ch 3) M&S Clothing Care Labels stating 'Wash at 30° save up to 40% energy' (Ch 2) John Lewis's information provision of appliance lifetime running costs (Ch 3)	Hornibrook et al. (2015), McKinnon (2010), Shewmake et al.(2015), Upham and Bleda (2009)
Collaborate with other retailers, manufacturers and NGOs to promote emissions reduction activities	M&S Carbon Footprint campaign with WWF (Ch 2) Together Campaign coalition of 15 businesses and NGO's (Ch 3)	Dauvergne and Lister (2012)
Communicate emissions	Asda employee	

reduction activities to employees	sustainability plan and its reporting (Ch 3)	
Only one example found of a retailer voluntarily and systematically, editing the choice available in order to eliminate high consumption-emission products	B&Q's 'Range Sustainability Buying Standard' in the UK (Ch3)	Quelch and Harding (1996)
Manufacturers		
Pay for consumer advertising and public relations campaigns to promote emission reduction methods in use	P&G and Ariel (Ch 4) P&G, Unilever and Henkel as part of A.I.S.E. 'I Prefer 30°' campaign (Ch 4)	Business in the Community (2008), Mylan (2017)
Provide information on their brand product labels, and on websites, to explain how products can be used to produce fewer emissions.	A.I.S.E. 'I Prefer 30°' campaign (Ch 4)	Carrero and Valor (2012), Bocken and Allwood (2012), Lingard (2012)
Work with retailers to provide information in stores and on shelf edge displays.	A.I.S.E. campaign with retailers such as Carrefour and Auchan (France), Sainsbury (UK), Coop (Denmark) (Ch 4 and in A.I.S.E. Close Out Report, written partly by thesis author (A.I.S.E., 2015a))	
Work with civil society organisations for endorsement of initiatives	A.I.S.E. campaign with partners such as Global Action Plan and the National Union of Students (Ch 4 and in A.I.S.E. Close Out Report, written partly by thesis author (A.I.S.E.,	Ruggie (2008)

	2015a))	
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The types of activities identified to reduce end consumption initiatives were quite similar for retailers and manufacturers, although there was more emphasis given by retailers to display mechanics and given by manufacturers to external advertising. Choice editing of higher usage emissions products is a retailer strategy that could have been employed, but only very limited evidence of this was been found.

The activities were selected for research because they were voluntary choices by manufacturers and retailers, rather than those required of them by regulation. However, a number were influenced either by forthcoming legislation (restrictions on light bulb varieties in Chapters 2 and 3), by national sectoral agreements (a multi-sector agreement with the Belgian government in Chapter 4) or by industry-wide agreements (the A.I.S.E. Codes and other voluntary projects and campaigns in Chapter 4). The full list of initiatives can be found in Table 2-2 in Chapter 2, 3-3 in Chapter 3, and Figure 4-3 in Chapter 4.

5.2.3 Overarching conclusions about businesses' motivations for the activities⁴

Schaltegger et al.'s framework (2012), which links pillars of business model innovation and drivers of business cases for sustainability, was used in Chapters 2 and 4, to assess firms' declared motivations and benefits for the activities they undertook. This approach was taken because it enabled a matrix of possible business rationales to be used systematically to examine the reasons given for the activities over time. This is an instrumental framework as defined by Garriga and Melé (2004), which takes as its basis that businesses' motivations are to improve their economic performance. Indeed, this research has found that manufacturing and retailing businesses chose to undertake some activities for consumption emissions reduction that gave them profitable market opportunities and legitimised these, in the same way that Clapp (2003) found for the agricultural biotechnology industry. Taking an evolutionary

⁴ This Section has been developed independently of A.I.S.E. and does not necessarily reflect the perspectives of any organisations or companies cited in the report.

perspective, it can be seen that the varying initiatives undertaken by regime companies, that have been repeated over time, and on which they have focused their efforts, have been those through which there are 'win-win-win' elements for their own commercial benefit, as well as benefits they could communicate to consumers, as Bocken and Allwood (2012, p124) have also found for washing detergents.

However, the results from these Chapters suggest that there are additional, complex and subtle aspects to these motivations. This has emerged from the extent to which aspects of businesses' reputation, one of Schaltegger et al.'s (2012) drivers, were seen to be important, and the multi-year scope of some firms' sustainability strategies, which indicate that they also have an underlying need for long-term social approval of their use of power, as Bansal (2005) stated. As such, instrumental theories of CSR (Garriga and Melé, 2004) do not fully explain the findings for these large well-known consumer brand companies. It appears that the description of 'reputation and brand value' as a business case driver in Schaltegger et al.'s (2012, p101) framework can be assessed in a number of ways, depending on who the reputation driving is aimed at. As Dauvergne and Lister (2012) indicate, large branded companies are more vulnerable to the effects of a damaged reputation than smaller, less well-known companies. The motivations can be to protect or enhance brand reputation with consumers, or corporate reputation with customers, with policy makers, or with other stakeholders, such as non-governmental organisations. These latter two are congruent with the political theories for CSR of Garriga and Melé (2004), in which the power of the business in its relationship with society is emphasised, leading to the firm accepting socially-orientated duties. For instance, the Unilever Sustainable Living Plan seeks to increase positive social impact with goals such as 'Improving Health and Well-Being for more than 1 billion by 2020' and 'By 2013.... To halve the environmental impact of the making and use of our products...' (opening page, Unilever, 2017b). Therefore, for at least some regime businesses, activities aimed at changing consumer behaviour, are justified, not only on an instrumental, but also on a political basis. For large global multinationals declaring long-term social legitimacy as a strategy, this can be seen as a form of reputation, in Schaltegger et al.'s (2012) terms,

particularly as their interplay with civil society has expanded, as described by Ruggie (2008). It appears that they perceive their corporate reputation with policy makers as being enhanced by having undertaken substantive long-term action to influence user practices, sometimes in collaboration with NGOs, examples of which are shown in each of the three case studies.

Understanding of reputation as a business driver has been deepened through the use of the second, coevolutionary, framework (Foxon, 2011) and related coevolutionary analysis (Murmman, 2013) in Chapter 4. This framework has also enabled consideration of the nature of motivation, power and roles of regime actors, individually and in concert, and the ways in which consumer goods' uses are configured by wider systems of provision. This answers the call set out by Fuchs et al. (2016) for research to understand explicitly the nature of the power relationships for more sustainable consumption. Through this approach, mutual influences on motivations for businesses' strategies in connection with user practices, technologies and institutions have been found. At both European and country level, the research found positive feedbacks to firms through a number of institutional endorsements and partnerships in connection with their actions, including by Oxfam and WWF (Chapter 2), DEFRA and DECC in the UK (Chapter 2 and Chapter 3 respectively), by the European Commission for low temperature washing and through a cross-sectoral agreement promoted by the Belgian government (both in Chapter 4). The self-regulation analysed in this research through the coevolutionary framework suggests agreement with Banerjee's (2010) findings that corporate power has influenced institutional policy-making through mutually influenced positive feedbacks, making regulation less likely, and the coevolutionary process mapping has enabled these influences to be identified operationally (Figure 4-3 of Chapter 4).

Thus, turning from reputation as a driver to economic benefits as a driver, the actions of the detergent manufacturers and their association for emissions reduction have been entirely those of self-regulation, which may have been designed to pre-empt costly and inconvenient regulation. The worldwide detergent industry has had experience of being impacted by regulation, in relation to chemicals in the recent past, having been put under pressure on

environmental and health and safety grounds from the 1970s, notably from progressive bans on phosphates in the 1980s and 1990s, and this had led to extensive product innovation requirements (Johnson et al., 1996). This was followed by the effect on the industry of the European Union REACH legislation for all chemicals (Williams et al., 2009). The self-regulation for emissions reduction is in contrast with the washing machine manufacturers and retailers who have been subject to regulation, through a mandatory labelling scheme (European Commission, 2010) that has combined aspects of legal, informational and economic incentives (Steurer, 2013) to encourage product innovation [defined as the development of new goods (Leitner et al., 2010)]. For the detergent manufacturers' activities, by contrast, this research finds no independent disciplinary oversight and no monitoring or measurement of absolute emissions saved. It also finds that there were no sanctions (even for manufacturers that are members of A.I.S.E.) for choosing not to take full part in the industry-wide initiatives, even where the same manufacturer took part in one European country, but not in others (Chapter 4). Co-regulation, which describes the integration of private governance structures within a framework of broad public oversight (Balleisen and Eisner, 2009), has not taken place here. Effective co-regulation would have ensured that the self-regulation activities of trade associations or individual firms were well designed, well monitored, consistently measured and maintained consequences for non-compliance; this has not happened in these cases, as evidenced in Chapters 3 and 4.

A third business case driver from the Schaltegger et al. (2012) framework is innovation. The research has shown that technological product innovations have both influenced, and been influenced by, manufacturers' and retailers' motivation to achieve increasing sales and profits, and to reduce costs. The interplay between manufacturers' and retailers' motivations has been shown to have resulted in certain consumer marketing and promotions strategies being adopted across both sectors, because they are in their common economic interest.

However the coevolutionary analysis shows washing machine manufacturers' responses to the regulations have also influenced the detergent manufacturers,

in what may have been an unforeseen consequence, to develop product and process innovation [the development of goods produced with less input (Leitner et al., 2010)] . On the other hand, Mylan (2017) suggests that it was initially one of the detergent manufacturers that influenced regulators to develop EU appliances regulations. Either way, the result was that detergents were developed to be effective at the lower temperatures that washing machines needed to operate at, whilst also benefitting manufacturers' and retailers' profits through reducing pack sizes.

In Chapter 3, the research examined the ways in which eight consumer-facing businesses sought to influence consumer behaviour using a third framework, 'Individual, Social, Material' (ISM) (Southerton et al., 2011, Darnton and Evans, 2013). It analysed their declared, or assumed, consumer behaviour change context, in other words, how they apparently expected their interventions to change consumer behaviour. This was important because, as consumer-facing businesses, dependent on consumer behaviour for their commercial success, businesses' motivations for changing underlying consumer behaviour needed to be understood. The majority of initiatives used the Individual context, in that they merely imparted information to consumers in order to encourage behaviour change. This suggests that there were limitations to businesses' motivation to achieve that change, given that it is known that these businesses have substantial expertise in influencing consumers more generally by managing consumers' perceptions of their brands' attributes, advantages, benefits and ideals, and investing in their brands with high advertising to sales ratios (Kapferer, 2012), and it could be expected that they would use this expertise and expenditure for these activities too.

Reflecting further on the ISM (Individual, Social, Material) framework, it became apparent that the behaviour of individual actors employed by businesses in roles relating to sustainability and corporate responsibility can be analysed by applying the ISM framework to them as actors too. Individual business managers are motivated by their individual targets and this leads to prioritisation of actions that they expect will contribute most to meeting them. However, they also are influenced socially, particularly from meeting their peers in networking

organisations such as A.I.S.E. and WRAP. Finally, business managers are subject to pressure to change through material, industry-wide targets, for instance those in the A.I.S.E. consumer campaigns, and the cross-sectoral agreement in Belgium. This research provides some answers to Smith et al.'s questions (2005, p1503):

‘.....about incentives and constraints on regime actors to bring about pressure, deploy resources, and collaborate in processes of system innovation.’

‘..... of trust, partnership and coalition building in processes of change...’

Each of the three papers in Chapters 2, 3 and 4, and Appendix E, has shown the different perspectives of actors who are managers of regime businesses (members of the retailing regime or members of the detergent manufacturing regime) and how both competition and cooperation can shape individual businesses’ actors and their sectors’ responses to societal demands for emissions reductions. These findings could be used to develop strategies that would be more effective for future governance of sustainable consumption through consumer goods and retailing regime businesses. This is taken up in Section 5.2.5.

5.2.4 Overarching conclusions about the extent to which these activities been effective, in both reducing emissions, and serving businesses’ motivations⁵

In considering emissions reduction targeting, objectives and monitoring across the three papers in Chapters 2, 3 and 4, the research supports Sullivan and Gouldson’s (2013) findings that there is room for improvement in the ways businesses have set, and monitored, absolute reductions in GHG consumption emissions. They (ibid.) find a particularly wide divergence for Scope 3 emissions, which are firms’ indirect emissions, including those arising from consumer use of products sold by them. Taking each of the papers in turn, Chapter 2 concludes that there was low specificity on measures in the first years of initiatives declared by Marks and Spencer, consistent with Dooley’s (2017) findings. These first initiatives seemed to act as ‘pilot’ projects, in

⁵ This Section has been developed independently of A.I.S.E. and does not necessarily reflect the perspectives of any organisations or companies cited in the report

retrospect. Over time, more specificity was introduced, and this research has found that a number of initiatives relating to consumption emissions were dropped from the overall programme over this same time. Dooley (2017) finds that the majority of the firm's initiatives were principally pollution prevention. Together, these findings suggest that, as the firm became better organised over time to measure outcomes systematically, it became clear that consumption emissions reductions were going to be difficult both to achieve, and to measure.

Chapter 3 concludes that there was inadequate definition of objectives, lack of measurement and monitoring tools for majority of retailers' initiatives, using the five levels of the Framework for Strategic Sustainable Development (FSSD) based on Bratt et al. (2011). Only two of the eight retailers demonstrated deployment of appropriate tools for measurement. The majority of these initiatives too had the characteristics of pilot projects rather than being full scale, fully worked out, long-term plans. Chapter 4 concludes that the emissions reduction outcomes were not achieved for a one-year multi-stakeholder campaign, using the proxy of average laundering temperatures declared in a self-reported survey of the five European countries in which the campaign took place. Nonetheless, over the longer period of five such surveys, and multiple communication campaigns, there was an average temperature reduction from 48°C to 43°C from 1998 to 2014⁶. The Chapter's coevolutionary analysis leads to its conclusion that the European Commission requirements for design and labelling of washing machines were a key influence on this, but it is plausible that detergent manufacturing industry leaders contributed towards the temperature reductions over this period. This research suggests that their actions could have been planned more rigorously, in order for their initiatives to generate larger success. For the future, two large individual detergent firms have each, independently, set long-term behavioural goals that 70% of washes

⁶ Every 3-5 years starting in 1998 and up to 2014, A.I.S.E. commissioned five consistently designed, consumer research studies about household laundry and cleaning habits. The sample sizes of each of these studies were 4740 respondents with an average of 200 respondents in each of the 23 countries, nationally representative in terms of age (18-65 year old) and gender. Comparing the last two surveys in the five countries that had the 'I Prefer 30°' campaign, one before the campaign in 2011 and one after the campaign in 2014, average reported laundry temperatures actually increased in the UK and Italy, were not significantly changed in Denmark, Netherlands and France.

will be done at low temperatures by a named year in the future (Mylan, 2017). If achieved, this consumer behaviour change is likely to lead to emissions reduction. However, from Chapter 4, goals are not set up to be measured directly and there are rebound effects, such as increased frequency of washing (Mylan, 2015) which are likely to increase, rather than reduce, overall emissions.

Across all three papers, businesses' achievements in emissions reduction have been described by them in terms of money spent on campaigns, or in terms of the numbers of website hits, or advertising, or labelling impressions given to consumers, or in terms of process measures, with relatively little comment on the end results. Where end results have been evaluated, it is through claimed behaviour change, measured by washing temperatures and based on self-reported consumer surveys. Yet, this research finds an absence of a chain of evidence that particular campaigns have directly led to behaviour change, at least from the data that has been evaluated for this research.

In summary, then, there is very little direct evidence that any of the initiatives led to successful, continuous reduction in emissions at the consumption stage. Whilst some businesses have, at some times, declared that they seek to drive consumption emissions reductions, these initiatives have not been sustained over the period of this research. The research suggests that the lack of society-wide, systematic data on 'bottom up' consumption emissions, as set out in the Introduction Section 1.2.2.1, may be a contributory factor to businesses' unsystematic approach to measurement of Scope 3 consumption emissions.

This leads to discussion and conclusions about the results, based on what businesses stated had been their motivations. From analysis using Schaltegger et al.'s (2012) framework, it has been shown that large consumer goods manufacturers and retailers require sales and profits to be grown, and the reputations of company, brand, and even individual Chief Executives to be maintained or enhanced. With regard to the latter, the example in Appendix E brings to life both the aspect of commercial rivalry between Chief Executives and their visionary statements. It shows the details of the reputational personal

rivalry between Sir Philip Rose, Chief Executive of Marks & Spencer, and Sir Terry Leahy, Chief Executive of Tesco, in January 2007, and an interpretation of it from one of this research's respondents, as an example of their competing to manage the news agenda for themselves and their companies, based on what appeared to be new expectations from society in the UK at the time. Gouldson et al. (2013) find that Marks & Spencer and Tesco's leadership of this agenda were quoted by many other retailers as the basis for their own actions on climate change.

Businesses' managers stated that they were wishing to be seen as leaders in taking action on environmental issues and wanted to be seen as making environmentally beneficial choices easier for their customers. For retailers in particular, respondents have said that it is in their interests to be proactive about helping consumers understand environmentally-led legislation, because retailers' customers were said to contact retailers in their thousands with questions and complaints about environmental product issues. Therefore the need to deal with these consumer questions becomes a practical cost issue for retailers, if environmental legislation prompts consumer concerns, as it did when light bulb technologies were replaced, for instance. Detergent manufacturers were also keen to be seen as socially and environmentally responsible. Over the period of the study, there were no substantial threats of regulation for consumption emissions that were perceived to be threatening these businesses' freedom to act. Avoiding such regulation was perhaps an undeclared motive for businesses deciding on some of the initiatives.

Data concerning businesses' motivations with regard to technology strategies and actions was available through data made public by the businesses and through the interviews that were undertaken for the case studies presented here; therefore there is an incomplete picture. Nonetheless, from analysis of the products made available by regime businesses to consumers over the period covered in each of the three papers, technological innovations associated with in-use emissions reductions were incremental, rather than radical, being based on incremental improvements to known and established user practices. The results of Chapter 2, based on Marks & Spencer, are similar to Dooley's (2017)

findings from that firm, in that they did not pursue radical technical solutions, or radical new business models, but their activities provided a 'win-win' opportunity to reduce the firm's costs whilst promoting its sustainability reputation. Dooley (2017) asserts that this is likely to be true of retailers in general, and this is borne out from the analysis in Chapter 3. In Chapter 4, technology innovation in detergents was a factor in seeking to drive consumer behaviour change to lower temperature washing (Mylan, 2017). This research suggests that it was adopted at least as much to reduce businesses' costs as to benefit the user or reduce consumption emissions. It was also firmly based on a status quo regime view of how clothing gets laundered. However, innovative technologies have been made available by other businesses over this period in laundering; one start up business based in the UK⁷ has developed innovative washing machine technology that cleans using polymer beads and mechanical action rather than the conventional regime business technologies that use large amounts of heated water, detergent and mechanical action. This firm has chosen to target its products to the business-to-business market of hotels and commercial laundries, rather than the consumer market, perhaps reflecting the barriers to the consumer market represented by the dominant system design that benefits the status quo of the regime firms. In sum, therefore, there has been no selection pressure to change the prevailing system, using Smith et al.'s (2005) model of regime transformation, and no evidence has been found that regime businesses have set up parallel organisations to pursue new technologies to explore system change, as suggested by Berggren et al. (2015). Thus, the system of user practices within the Clothing Use Chain have not substantially changed over the period of research, as new approaches to how consumers might launder clothes have not been made available to them in mass markets by regime manufacturers or retailers.

It seems that consumption emissions reduction, as a subset of sustainability, has provided a particular challenge to consumer goods manufacturers and retailers. Whilst there is good evidence of reduction in emissions through successful interventions within a number of businesses, where it can be aligned

⁷ Xeros at <http://www.xeroscleaning.com>

to internal cost reduction (Dooley, 2017, Bocken and Allwood, 2012), there is very little evidence of voluntary initiatives that have led to successful, continuous reduction in emissions at the consumption stage. This may be because there is no enhancement for the businesses through a direct business cost saving or profit benefit to reducing consumption emissions. With regard to the particular initiatives that have been the focus of this thesis, there is no evidence that any of the actions taken by businesses damaged their sales, profits or reputations. However, none of the initiatives could be said to have challenged the status quo of their business models, based as they are on the integrated systems of provision and usage shown in the Clothing Use Chain and which are the established platform for growth in their businesses' sales revenues.

5.2.5 What does this indicate for climate change mitigation governance and policy?

The research results have shown that governance bodies cannot rely on consistent monitoring of the effectiveness and outcomes of the initiatives, even for large companies with well-established and structured reporting. This is in part because there has been no overarching governance requirement to monitor emissions results, or to report them with consistency across businesses. This is similar to Gouldson and Sullivan's (2013) finding that suggests that UK retailers' actions to reduce emissions, whilst significant, cannot be relied upon by governance bodies because of inconsistent and patchy reporting of outcomes.

However, the research has found evidence of the benefits of long-term initiatives arising from businesses working together in self-regulation in networks, between businesses in each sector, and across sectors. The role of multi-stakeholder partnerships has been to provide a platform for practical discussion about implementation activities, and to promote a higher degree of transparency of reporting across multinational firms seeking social legitimacy, as Abdelal and Ruggie (2009) suggest. Multi-stakeholder collaborations also enable second tier businesses to build on the steps of the leading businesses, for instance, through membership of A.I.S.E. and engagement in its European

campaigns, analysed in Chapter 4. Such partnerships can provide a legitimate vehicle for competitors to work together on sectoral initiatives, which may overcome perceived barriers arising from Competition Law. This is legislation to prevent collusion, which can discourage firms discussing collaboration on consumer sustainability issues; in the European Union this can be seen as a restrictive business practice under Article 101 (European Commission, 2018a). The role of multi-stakeholder networks to look at whole systems approaches to sustainability is under researched, as Whiteman et al. (2012) indicate. This thesis provides insights into the role and the complex influences within multi-stakeholder partnerships through its analysis of the A.I.S.E. campaigns in Chapter 4.

However, in spite of the benefits to sector reputation from network activities, there are tensions between these and unilateral initiatives by individual competitive firms in the same sectors, which limit the impact and effectiveness of cross-sector actions, because the sales and profit drivers push firms to maintain and capitalise on firm specific competitive advantages, for instance for Marks & Spencer in Chapter 2. For the A.I.S.E. campaign in Chapter 4, some companies did not join the industry campaign because it contravened their own branding policy, which proscribes including a non-company logo in their communication materials. These aspects are a limit to the effectiveness of self-regulation without public governing oversight.

In most research, CSR is seen as only ever a potential positive driver for increased competitiveness, for instance by Porter and Van der Linde (1995), Bansal and Roth (2000) and McWilliams and Siegel (2011). Whilst on the one hand, business actors are subject to social approval expectations (Bansal, 2005), on the other hand, this research has found that commercial competitive rivalry and confidentiality amongst competitors can also have a limiting influence on actors' decision-making, which can prevent active collaboration. In addition, the research has found that retailers' and manufacturers' plans for forthcoming consumer activities are regarded as extremely commercially sensitive. Furthermore, if one brand has claimed an area of expertise in consumer communications, for instance, that their brand is good for washing at

low temperatures, as described by Mylan (2017) for P&G, then other branded manufacturers can be unwilling to be seen to be merely following them. This thesis contributes a new perspective to the CSR literature, in that competitiveness can undermine collaboration for CSR in a sector.

It has been shown that the role of these types of regime businesses is limited to driving action within a bounded set of expectations. Nonetheless, individual actors are social creatures, influenced by their peers and networks and this is particularly the case for brand and corporate reputation. This implies that there are real possibilities to engage with large consumer businesses through networks and associations of individual managers and by managing social approval and normative pressure within their networks, building on Bansal (2005), to match the best performers. To an extent, this has happened through the leadership of Marks & Spencer in the UK (Chapter 2), through B&Q, also in the UK (Chapter 3) and, via networks such as A.I.S.E and WRAP (In Chapter 4). This finding contributes to knowledge by taking the ideas of 'I will if you will' report (Sustainable Consumption Roundtable, 2006) to a further level, and implies that thoughtful regulators and governing bodies can use social approval amongst individual businesses' actors, perhaps especially their leaders (who have the most freedom to act), to laud the best performers and encourage others to seek to match them. Governments have been interested in supporting collaborative approaches across industries. This research shows that not only can no one business actor be responsible for the actions of others, but also that competition can be a barrier for each of them to collaborate for sustainable consumption.

Therefore, on the one hand, competition can be used to spur creativity and investment within leading businesses and incentives be constructed for them to compete to solve the problem. If individual companies then get a return on their investment, including through social approval, this can be a spur to raise the minimum standard for the industry as a whole. On the other hand, policy makers can provide legitimate vehicles for cross-industry collaboration, which could eliminate a barrier.

This research suggests that this approach is more likely to lead to substantive change than exhortations to consumers to change their behaviour via advertising, packaging or other communications; many of these mechanisms feature in both the examples and the literature set out in Table 5-1. This is also because consumers do not devote time to think about changing their behaviour for mundane domestic tasks, as Young et al. (2010) found. As Shove (2004a) indicated, they are locked into systems of usage, and this research shows also they are into locked into buying patterns, in interrelated retail systems.

In consideration of the 'Individual' context from the ISM (Darnton and Evans, 2013) framework, the research has found explanations for the lack of effectiveness of exhortations through labelling and other communication techniques for behaviour change for these everyday buying and using practices. However, consideration of the 'Social' and 'Material' contexts from this framework for behaviour change could be useful for policy makers and businesses for sustainable consumption initiatives. In relation to the material context, identification of a related system, appliance manufacture and design, and the empirical evidence from both this research and Mylan (2017) that detergent manufacturers recognised the importance of washing machine programmes for behaviour change, indicate that consideration of wider, related material systems could be applied to other settings for more sustainable consumption.

5.2.6 What role have large consumer-facing businesses have played over time, through voluntary activities, to influence consumer behaviour to reduce product-related carbon emissions at home, and how has this role been influenced?

Loorbach and Wijsman (2013), taking a coevolutionary perspective, assert that individual businesses can move beyond CSR to shape and transform their markets, and, indeed that they must do so if the systems of which they are part are to transform. Some of the businesses analysed in this thesis have been perceived as system changers for sustainability; Unilever, one of the manufacturers that features in Chapter 4, is seen as a business that has indeed repositioned itself to relate to broad societal issues (Loorbach and Wijsman, 2013) and as a 'recognized front runner in corporate sustainability' by Whiteman

et al. (2012, p22). One of the leading retailers featured in Chapter 2 and 3, Marks & Spencer, has been included in academic research as one of the leading sustainability companies, for instance, by Dauvergne and Lister (2012) and as a potential exemplar by Adderley et al. (2014).

Indeed, the analysis has shown that all the businesses have taken climate change caused by man made greenhouse gas emissions at face value over the time period examined, and, unlike fossil fuel industries (Dunlap and McCright, 2010), these consumer orientated companies have not sought to undermine the science, or play down the importance of the issue (see also Sullivan and Gouldson (2013) for UK retailers and Bocken and Allwood (2012) for consumer goods manufacturers). These researchers and the research in this thesis demonstrate that many of them have undertaken voluntary activities to reduce their carbon emissions, and some of these have included the consumer use phase. They may well have improved consumer awareness of the role of carbon emissions in climate change and normalised the scientific facts about climate change, but this is not likely itself to have led to behaviour change, without change to macro-level factors that shape domestic energy use, particularly in the material context, and as Abrahamse et al. (2005) also identify. This research has contributed to this field of study by showing that even these sorts of market-leading businesses, seeking to lead business sustainability, are also constrained by the selection pressures arising from retailing norms, from corporate and brand reputation expectations, and from consumers' habits, and these limit their freedom both to introduce radically transformative products for consumer use and to transform their business models to match their stated repositioning.

Whilst the role of large consumer facing businesses is hugely significant in maintaining habits of how consumers get laundering done, as Shove (2004a) identified, this research has also identified the hitherto overlooked role of retailers in maintaining the systems that represent the status quo, because of their power to control what is made available to consumers. Bocken and Allwood (2012) find little in the literature about the potential for retailers to move ahead of legislation or consumer preferences to influence consumption

emissions. This research endorses this, and goes further, in its finding that retailers' demands on manufacturers to work with them for ever-increasing incremental profit performance per unit of shelf space can represent a barrier to the transformative thinking of manufacturers and to innovative business models. Individual retail buyers, making decisions about what to stock and how to promote products, and rewarded for sales or profit improvements in their areas of responsibility, are organisationally very distant from the visions of their Chief Executives. Therefore status quo regime business models, and the usage emissions associated with them, have persisted.

This research suggest that consumer-facing voluntary initiatives to reduce emissions will be undertaken with more serious intent by businesses in circumstances in which there is also a commercial benefit for them, and large consumer businesses' desire for reputation enhancement is not sufficient in its own right to overcome conventional sales and profit objectives.

The research has served to emphasise that large consumer facing businesses are made up of individual actors, each of whom are subject to performance expectations, norms and customs, which influence their own behaviour. Each of their individual decisions and prioritisations build together, to determine the role of large consumer facing businesses, as they seek to change consumption. This research finds that, in general, individual actors are not rewarded for stepping out of the boundaries of their regimes' norms and expectations. This raises the question that there would seem to be little incentive for individual actors in large regime firms to engage in the vision creation of transition processes, as envisaged by transitions researchers (Loorbach and Wijsman, 2013), because of performance expectations and norms of what constitutes success for them as individuals. Performance expectations are commercially driven. In this research, sales growth and cost reduction are the primary business drivers, along with avoidance of risk to reputation at both consumer brand and company levels. Nonetheless, over the time period on which this research focuses, there have been periods, for instance in early 2007, in which individual actors at the top of some of the leading businesses have made bold, overarching carbon consumption statements, which became competitively

charged, but which proved not to have been followed up by thorough planning (as shown in Chapter 3) and in Appendix E. In summary, then, this research has shown that actors' behaviour in social groups can lead to them coordinating within a group, competing within the group and also following the initiatives of leaders in the group.

It is beyond the scope of this research to examine how expectations changed once the economic crisis took centre stage in media discourse, and the perceived failure of the UNFCCC Copenhagen conference in December 2009, but this research finds many corporate ambitions and explicit, detailed steps to implement carbon consumption initiatives were initiated in the UK from 2005 to 2007, consistent with Gouldson et al.'s (2013) findings for UK retailers. These were increasingly narrowed down, in scale and scope, from 2010 onwards, as shown in Appendix C. Over the whole period, the competition for reputation between retailers and between manufacturers has been important in influencing the role of individual large companies; this has previously been underestimated.

However, the overarching picture of how consumer-facing businesses were motivated to act towards reducing consumption emissions, and then stopped doing so, can be explained using the co-evolutionary framework. At the start of the period of analysis, institutional changes, such as the IPCC Fourth Assessment Report in 2007 and the UK Climate Change Act passed in 2008, meant that climate change had become a critically important context for consumer-facing businesses. Furthermore, up to the financial crash in 2008, there was progressive public debate on climate change (Happer et al., 2012), 'An Inconvenient Truth' (Gore, 2006) having been published, and climate change coverage in general media reached a peak with the Copenhagen UNFCCC climate change summit in December 2009 (Happer, 2017). These influences from the institutional and consumer perspective became part of the selection environment over that period and thus influenced businesses' motivations to act, and their choice of strategies for doing so. However the financial crash, the resulting European governments' priorities to deal with their debt, and the politicisation of the discourse about climate change led to a sharp

decline in the volume of coverage about it thereafter, in contrast with the growing certainty about the science (Happer, 2017).

This research in total describes case studies of initiatives undertaken by businesses to encourage consumer behaviour change, to reduce consumption emissions, up to 2014. The individual papers in chapters 2, 3 and 4 demonstrate that relatively few of these initiatives were successful over the time period, either in reducing emissions, or in satisfying businesses' motivations. A number of them could be seen, in retrospect, as micro-scale pilot projects, although not described as such at the time. Chapter 2 shows that some of them were short term, one-off actions to explore possibilities for the future. Chapter 3 shows that the majority of initiatives from UK leading retailers were not strategically planned, which would have limited their success in achieving their objectives, in any event. However, and in contrast, pilot projects would have value in themselves, because they enable experiments (new variations) to take place. Chapter 4 shows a coherent, longer-term approach from the whole sector of European detergent manufacturers, through their industry association, which has shown positive results, taking the analysis period as a whole.

In evolutionary terms, most of these initiatives were not subsequently selected for development of future generations of sustainability projects. The majority of the initiatives analysed for this thesis were stopped in the period from 2012 to 2014. This was even the case where well-known Chief Executives personally led the climate change directed ambition for the company, for instance, Sir Stuart Rose at Marks & Spencer, Paul Polman at Unilever and Sir Terry Leahy at Tesco. The research indicates that initiatives were not maintained into a second generation because the primary business case benefits for selection are sales (or profit) increases, cost reductions and enhanced reputation, and these benefits were not generated by the initiatives in general. It could also be that firms learnt over time that meaningful, material-scale results at the consumption end of the Use Chain were not easy to achieve and this dampened enthusiasm for emissions reduction in consumption. One exception is that of lower temperature washing initiatives from detergent manufacturers and retailers, in part because they provided a consumer benefit arising from technological

advances, which enabled lower costs in distribution, on shelf space, and in packaging, and in part because they allowed the detergent industry to build its reputation through its long term commitment to emissions reduction.

From 2012, climate change seemed to be replaced as a social and environmental business priority by other issues, such as modern slavery, factory employment conditions, and food waste. It could be said that the selection environment has changed, as the political context changed through tragedies like the Rana Plaza disaster (April 2013), a series of influential reports about food waste in the UK from WRAP (2012 to 2104), and the pressing needs for adaptation in crop selection and technology and water management, in response to climate change-led water shortages (Long et al., 2016). These events served to influence the business case driver of reputation, because it became relatively more important for businesses to focus attention on other aspects of sustainability as these factors dominated news, rather than climate change mitigation, which had become less salient in the news cycle. Furthermore there has been recognition of the need for proactive business strategies that seek to address the tensions in sustainability in an integrated, strategic manner, rather than single aspects of it (Hahn et al., 2015).

5.3 Reflections on the research strategy and approach

5.3.1 Reflections on the Clothing Use Chain

The selection of the sectors to be examined was developed through the construction of the Clothing Use Chain (Figure 5-1) and this led to the focus on retailing and detergent sectors, and the firms within them as the systems of interest. These are large consumer-facing businesses that influence consumers to buy products in the Use Chain. The strategy was to apply a systemic focus to these businesses in order to develop understanding of system relationships in the Chain, through careful and iterative qualitative data collection.

The research questions could have been answered through other means, which would have included a number of in-depth case studies of individual large consumer-facing businesses combined with quantitative analysis of Scope 3 consumption emissions, either from those firms, or from a third party data base. This would have given more in-depth understanding of each individual business, but would have required a number of businesses to have agreed, to gain a whole system view. Each would have required access to firm employees and data, for the whole set of research questions to have been answered. Two large detergent manufacturing businesses were approached to request access to data in order to undertake single company studies about low temperature laundering, but neither agreed, citing commercial confidentiality. Data access also would have required management time, and it is likely that they saw no benefit from any time investment. It is noted that other researchers have been successful in gaining access to these two firms; for instance, Shove (2004a) had access to Unilever data related to similar questions and Mylan (2017) to Procter and Gamble data and their employees for a similar enquiry. However, neither of these studies include explicit answering of the effectiveness of the firm's actions in reducing emissions, nor their motivations for seeking to do so. The success of these researchers perhaps is a result of their reputations and networking skills, and their Institutes, in comparison to a single researcher working alone. It might have been more successful for the researcher to have established a working relationship with existing academic partners of these companies, in order to facilitate access.

5.3.2 Case study approach and time horizons

Extended case studies were chosen for this research, so that the development of firms' strategies and initiatives, and their impact, could be assessed over periods of up to 20 years. This is in contrast to most companies' CSR reports, which refer to the current year, and the previous year, and therefore neglect the longer-term perspective. The twenty year period covers the majority of time since the UNFCCC entered into force on 21 March 1994 (United Nations, 2018) and the IPCC Second Assessment Report on Climate Change, published in 1995 (IPCC, 2018).

Both the methodology and analytical approach for these case studies could be used in other studies about fast moving consumer goods industries and retail sectors because, in selling and communicating directly to consumers, these types of firms put certain aspects of their strategies in the public domain. However, caution is needed, firstly because individual firms are not necessarily consistent over time in the way they describe and derive the public data. Secondly, firms vary in the ways they chose to present their strategies, as well as to report emissions, as raised through the systematic analysis of the FSSD in Chapter 3. Nonetheless, the linked case studies presented here produced insights across and between the retailer and manufacturer systems.

5.3.3 Reflections on relationships of power between researcher and informants

The research has shown that members of established regimes can exercise power over researchers in the field of sustainable consumption by limiting the framing of consumer behaviour change in what they make available publicly, and, from a practical viewpoint, choosing not to make evidence, or their employees, accessible to researchers. Research institutions that secure contracts, or agreements for access, with large consumer goods firms may need to be aware of the asymmetric power relationship for these framing and access issues, as Fuchs et al. (2016) indicate.

5.3.4 Research strategy summary

Taking a critical realist approach allowed for consideration of mechanisms at regime and individual levels of the businesses involved and the interactions between them at systems level. This was appropriate because the research identified causal mechanisms that would not have been uncovered by examining the causes at event level, which would have been a positivist approach.

5.4 Contributions to the Literature

5.4.1 The Clothing Use Chain

Building on DEFRA's (2010b) map of the environmental impact of clothing and Shove's (2004a) user practice approach led to the development of a novel 'Clothing Use Chain' originally for Chapter 2, and used also in Chapter 4. It brings out the pivotal role of retailers in the systems of clothing use; the interrelationships between consumer goods manufacturers and retailers represent two interdependent systems whose dynamics can act to preserve regime businesses. Its novelty arises also from its building in closed loops of production and reuse (McDonough and Braungart, 2002), as set out by the European Commission (2018c) in 'Towards a Circular Economy', intended to draw attention to opportunities to boost recycling and prevent waste of valuable materials. Thus it has allowed for analysis of system-level innovation for sustainable consumption.

Taking a subset of the environmental impacts identified within the sustainable clothing roadmap (DEFRA, 2010b), the high consumption levels influence, and are influenced by, the businesses whose make their sales and profit from providing products and retailing products within the Use Chain. One of Shove's (2004a) findings was that appliance manufacturers configured the design and use of domestic kitchens. The Use Chain in this research expands this finding further for domestic clothes management, extending it to manufacturers and retailers of both clothing and detergents. It serves to highlight the interrelationships between different sorts of businesses as well as activities in both shopping and using clothes, which influence, and are influenced by, the businesses in the chain.

5.4.2 Novel use of FSSD, ISM and coevolutionary frameworks together

Schaltegger et al.'s (2012) business case driver model for sustainability was used in Chapters 2 and 4, to categorise the declared aims and business case drivers for firms' sustainable consumption initiatives. The use of the FSSD (Holmberg and Robèrt, 2000) in Chapter 3 allowed for a systematic, integrated approach to analysis of the scope and coherence of initiatives over time. This was uniquely combined with use of the ISM framework (Darnton and Evans,

2013), in which actors are described as being influenced by individual, social and material contexts, to analyse the contexts that firms had been influenced by, in designing their mechanisms for shaping consumer behaviour towards more sustainable consumption. Using these two frameworks together enabled gaps to be identified arising from the way the initiatives were framed with respect to consumer behaviours, and the way they were planned, organised, implemented and evaluated. This led to questioning of the priority, scale and scope that these initiatives have had against other business objectives, particularly for sales and profit growth.

The application of the coevolutionary framework in Chapter 4 built on the findings of both previous Chapters to identify the system level barriers to more substantive approaches for improving sustainable consumption through businesses' initiatives. In considering these frameworks together, it was shown that the ISM framework, designed for consumer behaviour choices, can also be used to analyse how the three contexts in which the choices of business managers are influenced and how these coevolve with institutions, user practices and technologies in Foxon's (2011) framework. This is illustrated in Figure 5-2. The research found that leading firms influence other firms in pursuit of sustainable consumption, but seek to get competitive advantage from their leading, for a period, first. This was the case for both Marks & Spencer in Chapter 2, and Procter & Gamble in Chapter 4. There is an important role for associations of businesses, working with government bodies, to provide a normalising body for sustainability, and to communicate and demonstrate leading sustainability practice to all their members, in line with competition law.

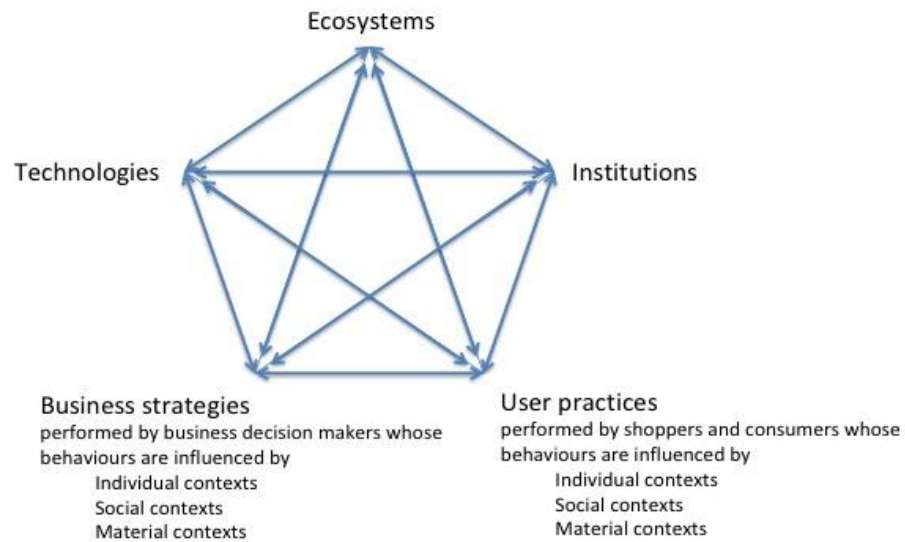


Figure 5-2: Integration of Foxon's (2011) coevolutionary framework with Darnton and Evan's (2013) ISM model of three contexts in which behaviours are influenced

For business decision makers in this set of cases, a 'Social' element to the way in which they have developed businesses' strategies for sustainable consumption was identified, in that some choices cannot be explained purely by evaluating business actors' 'Individual' benefits. There are also patterns of practices and interconnected sets of norms and conventions, by which business actors are influenced (Chatterton, 2011) that can be seen as being the 'Material' context, influencing and being influenced by both 'Institutions' and 'Technologies' within the Foxon (2011) framework. This conclusion links also to Garriga and Melé's (2004) categorisation of CSR theories: instrumental theories, which relate to wealth creation benefits as the business case, cannot explain all of the choices made by business actors. Political theories, relating to businesses' power and responsibility in society, seem to be relevant too. The expectations placed on businesses by stakeholders, and society as a whole (Carroll and Shabana, 2010), surface in this research through individual

business leaders and managers seeking to enhance their reputation, one of Schaltegger et al.'s (2012) business case drivers for sustainability. There is evidence that these business actors are influenced by each other, and by both their individual and group needs to be seen to use their social power responsibly.

5.4.3 The methodological approach to engaging business entities with the research

For Chapters 2 and 3, it proved to be difficult to gain agreement from business managers to be interviewed for academic research. Therefore publicly available information was used as data. The same obstacle was initially also apparent for the empirical elements of Chapter 4, but this was overcome through approaching the detergent manufacturers' association (A.I.S.E.) and offering to assist with the report on the campaign that it was obliged to make public. Access to business managers was facilitated by this approach, although there remained some refusals from potential respondents. It was important to negotiate a legal agreement between A.I.S.E. and the University of Leeds setting out that the research conclusions were to be independent of A.I.S.E., regardless of its facilitation of data gathering access. It was also helpful for the researcher to have the agreement, in approaching prospective individual respondents and to be able to be clear that the researcher had been trusted by A.I.S.E., but also the researcher's objectivity would be maintained in the process.

5.5 Conclusion

5.5.1 Future research directions

There are three key areas recommended for further research. The research has identified that within companies individual actors can have varying business case drivers, using Schaltegger and al.'s (2012) framework. For instance, retailers' buyers appear to be primarily motivated by sales and profit achievements, whereas chief executives and business associations appear to be more motivated by their company and their own reputations; these intra-company differences would be worthy of further research since the visibility of

senior business leaders' public sustainability statements may not cohere with employees' role priorities.

The use of the ISM framework (Darnton and Evans, 2013) has identified gaps in the ways businesses' messages to consumers for increased sustainability in consumption have been designed, using the three ISM contexts for behaviour change. Whilst there is Mylan's (2017) research using P&G's approach to low-temperature laundry as a case study, and the small-scale research project on loft insulation with B&Q (Department of Energy and Climate Change, 2013), and very many such messages put out into the public domain, with prospective benefits of them cited in research (Bocken and Allwood, 2012), there are large gaps in terms of published, academically rigorous, evidence of their effectiveness in changing behaviour (Carrero and Valor, 2012). This would be worthy of further research, using the ISM framework, or an alternative multi-disciplinary integrating model of energy behaviour such as the 'energy cultures' framework of Stephenson et al. (2010).

This research has uncovered new findings about sector level influences on corporate responsibility through the use of the coevolutionary framework (Foxon, 2011), in particular the multi-directional influences along the Clothing Use chain of consumer goods manufacturers, retailers, shoppers and users. This framework and type of analysis could be used for other sectors for which increasing the sustainability of consumption is a challenge, and this could be of interest to policymakers in the field, for instance, in sector-level analysis of housing stock renovation for low energy use (Killip et al., 2018).

Finally, the use of these frameworks (for coevolution, business case drivers and ISM) in combination has brought disparate academic areas together; the coevolutionary framework enabling different disciplines to be encompassed. Theories about coevolutionary interlinkages between business strategies and consumer behaviour at sector level could be further developed from this basis.

5.5.2 Concluding thoughts

Emissions reductions in consumption remain a key requirement if the goals of the United Nations Paris Climate Agreement to reduce emissions to keep global temperature rise this century to below 2°C are to be met. Whilst the progress consumer-facing businesses have made to embrace a consumption reduction agenda is to be welcomed, this thesis demonstrates that the scale and scope of the impact they have had must be considerably enlarged if they are to play a material role in achieving vital consumption emissions reduction.

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Appendix A Supporting information to Chapter 1

A1 Cases in the literature that review businesses' initiatives designed to influence consumers to reduce consumption emissions in use of their products or services

Literature was searched through four separate combinations of topic searches in Web of Science (Clarivate Analytics, 2017):

- i. Topic=(end-use) AND Topic=(emissions)
- ii. Topic=(Sustainable consumption) AND Topic=(business)
- iii. Topic=(climate change) AND Topic=(consumer goods), refined to exclude papers from Computer Science
- iv. Topic=(business) AND Topic=(innovation) AND Topic=(consumption) AND Topic=(emission)

Papers identified were then individually searched for evidence of the mechanism of action, through key words from the ISM terminology, and for evidence of a strategic approach, by identifying elements that would correspond to one or more of the five steps of the FSSD.

Case study and business activity	Evidence given of the mechanism (ISM) and of successful outcome. Mention of consumer practice influencing the strategy development and technological innovation, if any	FSSD lens: defined system, success principles, strategic guidelines, specified actions and tools for monitoring and measurement

<p>Appliance labelling to influence consumers to buy more efficient appliances. Bocken and Allwood (2012) quote the Sustainable Consumption Roundtable (2006); despite mandatory refrigerator labelling, market share of A rated appliances was only 3%; an EU ban of below-C-rated appliances increased market share to 10%, but incentives by retailers ensured a market share of 70%. Horne et al. (2009) find labelling will not be sufficient to induce behaviour change.</p>	<p>Individual mechanism, through provision of labelling information and incentives. Also possible choice editing by retailers, details not specified.</p>	<p>No</p>
<p>Marks and Spencer elect to choice editing to influence consumers to buy more efficient appliances. Bocken and Allwood (2012) refer positively to this, but give no detailed evidence.</p>	<p>Choice editing, material context. No numerical evidence given.</p>	<p>No, although this was one of the 'Plan A; commitments, reported on as part of the whole plan, but no measurement detail given for this.</p>

<p>Tesco promotion to influence consumers to prematurely replace incandescent bulbs with</p> <ul style="list-style-type: none">a. compact fluorescent orb. LED light bulbs (Chitnis et al., 2013, Munasinghe et al., 2009)	<p>Individual mechanism based on price; Tesco cut price of energy efficient light bulbs by half and 'sold more in one week in 2009 than in the whole of 2006 and have now sold 20 million worldwide'. Chitnis et al. (2013) estimate annual savings energy-related GHG emissions were 1.2% and 1.4% respectively from applying the measures to an 'average' UK dwelling in 2009 (before estimating rebound effects), but did not directly evaluate retailers' initiatives</p>	
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<p>Labelling to influence consumers to buy lower carbon in use products, as implemented by Tesco from 2007 to 2012</p> <p>Carbon footprint of individual products broken down into lifecycle stages, including consumer use</p>	<p>Individual mechanism based on information provision; Upham and Bleda (2009) and Upham et al. (2011) find that it is not plausible to rely on consumer choice to achieve substantial behaviour change, based on information provision, because of the competing demands on shoppers' attention at the point of purchase.</p> <p>Individual mechanism.</p>	
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<p>Advertising, promotion and labelling of detergents and clothing to influence consumers to washing clothes at lower temperatures</p> <p>Bocken and Allwood (2012) quote as one of Marks & Spencer's 'success stories'.</p> <p>Munasinghe et al. (2009) quote a Unilever pilot consumer research programme and a network campaign to reduce laundry temperatures.</p> <p>Also Procter and Gamble (P&G) 'Turn to 30' campaign (Business in the Community, 2008)</p>	<p>Individual mechanism based on information provision; Enzymes allow for more concentrated detergents, which also enable washing at lower temperatures, which in turn make clothes look good for longer. This represents a win-win (Bocken and Allwood, 2012) because compact detergents are more commercially attractive for manufacturers and retailers.</p>	<p>Success of strategy not peer reviewed, nor data substantiated. Results attributed to the P&G campaigns based on IPSOS surveys in 2002 and 2007. For Marks and Spencer this was one of 100 Plan A initiatives, each of which included time-bound targets and measurement criteria (Grayson et al., 2011).</p>
<p>The 'Together' campaign; a group of large businesses working together on a consumer engagement campaign designed to help UK households reduce emissions by one tonne over three years from 2007 (Munasinghe et al., 2009)</p>	<p>Information provision</p>	<p>A clear target was set and monitored for the first year, using estimates. No further data available.</p>

<p>Promotion of shorter showers to reduce emissions Unilever; Bocken and Allwood (2012) refer in positive terms to this, but no detailed evidence is given. Newson et al. (2013) give the example of lathering hair in shower to reduce hot water use (one example of a number connected with the use of Unilever products)</p>	<p>Information provision. Consumers are not passive, but their needs and wants drive change in how businesses deliver products and services</p>	<p>At system level, analysis of Unilever products across their lifecycle indicates that consumer use is responsible for almost 70% of the sustainability footprint.</p>
<p>Two large UK retail chains have decided to delist patio heaters entirely from what is available for sale (Peattie and Belz, 2010).</p>	<p>Choice editing, material context. No data given.</p>	<p>No evidence of the system specification, success criteria, strategic guidelines, measurements or timescales.</p>

A2.1 Example first contact letter

Dear *named individual*,

I hope you can advise me. I am a PhD researcher at the University of Leeds, in the UK. I am working on innovation in clothing and laundering, with a focus on the use of new approaches for a climate changing world. I have had some relevant experience working in large international businesses in the past, in marketing and product development for Carlsberg-Tetley and for Boots.

Impressed with *named firm's* record and achievements in setting and driving this agenda through *firm's specific activities or initiatives*, I would like to develop a case study on the strategy and marketing of the reduction of emissions through lower wash temperatures enabled by laundry detergents. The benefits to *named firm* could be provision of well-researched and academically credible material suitable for publication in external reports and conferences.

I would be very grateful if you could recommend how I might make a successful approach within *named firm* to enable me to undertake this study?

I look forward to hearing from you.

With kind regards

Elizabeth Morgan

A2.2 Email sent to A.I.S.E to request access for a case study

> -----Original Message-----

> From: Liz Morgan [<mailto:ee09lm@leeds.ac.uk>]

> Sent: mercredi 17 juillet 2013 14:44

> To: xxxxxxxx

> Subject: Research request

>

> Dear xxxxxx

> I am a PhD researcher at the University of Leeds, looking at

> businesses initiatives for sustainability in the laundry and

> clothing markets. I am very pleased to see and interested in the 'I

> prefer 30'

> campaign that has recently been announced and would very much like to

> undertake academic research on it as a case study.

> Would it be possible, please, to speak to someone informally about

> how this might be undertaken?

> The advantages to the industry would be a credible, objective, case

> study that could be used externally, to raise the profile of AISE

> and its participating members and perhaps to recruit more partners

> and supporters for the scheme.

>

> Thank you in advance

>

> Elizabeth Morgan

>

> <http://www.see.leeds.ac.uk/people/e.morgan>

A3i Email recruitment wording

XXXX [person's name]

I am Liz Morgan, a PhD researcher at the University of Leeds and I am contacting you as a result of [*named individual known to recipient*]'s suggestion. I am undertaking a case study on the initiative by [*company name*] to reduce carbon emissions arising from domestic clothes laundering. The research will take place over the next 24 months.

[*Named individual*] has suggested to me that you would be a good person to talk to for this research, and I very much hope you will be able to help me, but there is no obligation on you to take part. If you do agree to take part, you may withdraw from the research at any later point, if you wish, without any need to give a reason.

I would like to phone you to explain what participation in the research would mean and then I will give you an information sheet about it and some time to think if you would like to take part.

Would you give me the best number to reach you and a convenient time for you, please?

Thank you for taking the time to consider my request

With regards

Liz Morgan

This research has been approved by the University of Leeds Faculty of Environment Ethics Committee on 24th September 2013

A3ii (a) Participant Information Sheet (A.I.S.E working meeting attendees)

Carbon emissions reduction in consumption

You are being invited to take part in a research project. Before you decide if you would like to do so, it's important that you understand why the research is being done and what it will involve. Please take time to read the following information and discuss it with others if you wish. Please ask if there is anything that is not clear or you would like more information and take time to decide whether or not you wish to take part.

The Purpose of the Project

The research intends to find out what innovations and actions manufacturers and retailers of consumer goods have undertaken to reduce domestic emissions arising from use of their products, and to understand, over time, their objectives, motivations and barriers in taking these steps and the effectiveness and impact of them. The A.I.S.E.'s Pan-European sustainable laundry campaign ('I prefer 30') launched in June 2013, in partnership with DG Climate's 'a world you like' campaign, is one of the initiatives which will be the focus of the research. The research intends to track this campaign in three phases over time, from its launch phase, through its implementation to consumers in 5 countries, through to its conclusion. An important source of data for this research is observation at the working meetings, facilitated by A.I.S.E., across the campaign's stakeholders across its three phases.

Who has been chosen and why?

As an attendee of one or more of A.I.S.E.'s working meetings, you are being asked to agree to the meetings being observed.

Do you have to take part?

It is up to you to decide whether or not to take part. If you decide not to take part, there will be no consequences for you; it's entirely your decision.

What do you do as a participant?

Liz Morgan will attend a number of working meetings, as a silent observer, across the 3 phases of the research, to be agreed with A.I.S.E. and each of the individual company representatives attending those meetings. The content of the meetings will be unaffected by Liz being there.

There are no immediate benefits to you in taking part in this project. However it is hoped that this research will lead to an improved understanding of how and why an industry association's campaign for sustainability might help to stimulate change in patterns of consumption to become more sustainable. The potential benefits to A.I.S.E. and its members could be a case history for use either internally or externally. Internally, there might be insights uncovered during the research that will provide useful learning for future campaigns. Externally, there could be opportunities to use some of the material to benefit the industry's reputation.

The questions will be open-ended and they may be audio recorded, for research purposes only. Only Liz will have access to these recordings and

written notes from the meetings and all the material gathered will be destroyed 3 years after the completion of the final phase.

Will your taking part in this project be confidential and what will happen to the results?

As an attendee at the working meeting your presence will be anonymised for the purposes of the research.

This is a part of long-term project. There may be an academic paper or conference presentation on the results from 2015 or later. If there is, a copy of the written material will be made available to you at that time. The full results will not be published within the PhD until at least 2019. On this publication, a copy of the full thesis will be available to those who have taken part, on request to Liz Morgan.

What type of information will be sought from me?

No information is being sought from you directly as an attendee at one or more of the working meetings. A number of participants, from both A.I.S.E. and its stakeholders, are also being asked separately to take part in an individual interview about the campaign. If you are one of these, you will be asked separately if you would like to agree to this.

Who is organising the research?

The research is being led by Elizabeth (Liz) Morgan, a PhD researcher at the University of Leeds in the UK. Liz is funding her own research: it is not funded from any other source.

Contact for further information

Liz Morgan

Phone 0044 (0)7798 675149

Email ee09lm@leeds.ac.uk

A3ii (b) Participant Information Sheet (A.I.S.E.)

Carbon emissions reduction in consumption

You are being invited to take part in a research project. Before you decide if you would like to do so, it's important that you understand why the research is being done and what it will involve. Please take time to read the following information and discuss it with others if you wish. Please ask if there is anything that is not clear, or you would like more information, and take time to decide whether or not you wish to take part.

The Purpose of the Project

The research intends to find out what innovations and actions manufacturers and retailers of consumer goods have undertaken to reduce domestic emissions arising from use of their products, and to understand, over time, their objectives, motivations and barriers in taking these steps and the effectiveness and impact of them. The A.I.S.E.'s Pan-European sustainable laundry campaign ('I prefer 30') launched in June 2013, in partnership with DG Climate's 'a world you like' campaign, is one of the initiatives which will be the focus of the research. The research intends to track this campaign in three phases over time, from its launch phase, through its implementation to consumers in 5 countries, through to its conclusion.

Who has been chosen and why?

Employees of A.I.S.E. have been invited to take part based on the suggestions of others within A.I.S.E., on the basis of their knowledge of the development of the campaign.

Do you have to take part?

It is up to you to decide whether or not to take part. If you decide not to take part, there will be no consequences for you; it's entirely your decision.

What do you do as a participant?

Liz Morgan will interview you for up to 30 minutes in your usual place of work, or by telephone or Skype, at a time convenient to you, three times over the course of a 24-month period, once for each of the three phases of the research. On each occasion, Liz will ask you for your views and opinions about the 'I prefer 30' campaign. [Include also if appropriate: 'Liz will be attending a number of working meetings of A.I.S.E. and if you are a participant at one of these meetings, you will be asked to agree to this separately.']

The questions will be open-ended and they may be recorded, for research purposes only. Only Liz will have access to these recordings and written notes from the interview and all the material gathered will be destroyed 3 years after the completion of the final phase.

There are no immediate benefits to you in taking part in this project. However it is hoped that this research will lead to an improved understanding of how and why an industry association's campaign for sustainability might help to stimulate change in patterns of consumption to become more sustainable. The potential benefits to A.I.S.E. and its members could be a case history for use either internally or externally. Internally, there might be insights uncovered during the

research that will provide useful learning for future campaigns. Externally, there could be opportunities to use some of the material to benefit the industry's reputation.

Will your taking part in this project be confidential and what will happen to the results?

All the information collected about you and your views and opinions will be kept strictly confidential and attributed only to an employee of A.I.S.E. You will not be identified in any reports or publications, and you will be anonymous within the research process. No direct quotes from you will be used.

This is a part of long-term project. There may be an academic paper or conference presentation on the results from 2015 or later. If there is, a copy of the written material will be made available to you before publication, and any suggested amendments you make will be carefully considered. The full results will not be published within the PhD until at least 2019. On this publication, a copy of the full thesis will be available to those who have taken part, on request to Liz Morgan.

What type of information will be sought from me and why is the collection of this information relevant for achieving the research project objectives?

Liz will be seeking your description and views about [the particular A.I.S.E. initiative to reduce emissions in consumption], how it has come about and what have been the objectives, drivers and barriers and its outcomes.

The questions will be open-ended and they may be audio recorded, for research purposes only. Only Liz will have access to these recordings and written notes from the interview and all the material gathered will be destroyed 3 years after the completion of the final phase.

Who is organising the research?

The research is being led by Elizabeth (Liz) Morgan, a PhD researcher at the University of Leeds in the UK. Liz is funding her own research: it is not funded from any other source.

Contact for further information
Liz Morgan
Phone 0044 (0)7798 675149
Email ee09lm@leeds.ac.uk

A3ii (c) Participant Information Sheet (A.I.S.E study; non-A.I.S.E. stakeholders)

Carbon emissions reduction in consumption

You are being invited to take part in a research project. Before you decide if you would like to do so, it's important that you understand why the research is being done and what it will involve. Please take time to read the following information and discuss it with others if you wish. Please ask if there is anything that is not clear, or you would like more information, and take time to decide whether or not you wish to take part.

The Purpose of the Project

The research intends to find out what innovations and actions manufacturers and retailers of consumer goods have undertaken to reduce domestic emissions arising from use of their products, and to understand, over time, their objectives, motivations and barriers in taking these steps and the effectiveness and impact of them. The A.I.S.E.'s Pan-European sustainable laundry campaign ('I prefer 30') launched in June 2013, in partnership with DG Climate's 'a world you like' campaign, is one of the initiatives which will be the focus of the research. The research intends to track this campaign in three phases over time, from its launch phase, through its implementation to consumers in 5 countries, through to its conclusion.

Who has been chosen and why?

A.I.S.E. have suggested Liz contacts a number of individuals who have been connected with, or influenced, the campaign, who might be prepared to give their views and opinions.

Do you have to take part?

It is up to you to decide whether or not to take part. If you decide not to take part, there will be no consequences for you; it's entirely your decision.

What do you do as a participant?

Liz Morgan will interview you for up to 30 minutes in your usual place of work, or by telephone or Skype, at a time convenient to you, three times over the course of an 18-month period, once for each of the three phases of the research. On each occasion, Liz will ask you for your views and opinions about the 'I prefer 30' campaign. [Include also if appropriate: 'Liz will be attending a number of working meetings of A.I.S.E. and if you are a participant at one of these meetings, you will be asked to agree to this separately.']

The questions will be open-ended and they may be audio recorded, for research purposes only. Only Liz will have access to these recordings and written notes from the interview and all the material gathered will be destroyed 3 years after the completion of the final phase.

There are no immediate benefits to you in taking part in this project. However it is hoped that this research will lead to an improved understanding of how and why an industry association's campaign for sustainability might help to stimulate change in patterns of consumption to become more sustainable. The potential benefits to A.I.S.E. and its members could be a case history for use either

internally or externally. Internally, there might be insights uncovered during the research that will provide useful learning for future campaigns. Externally, there could be opportunities to use some of the material to benefit the industry's reputation.

Will your taking part in this project be confidential and what will happen to the results?

All the information collected about you and your views and opinions will be kept strictly confidential and attributed only to a stakeholder in the campaign. You will not be identified in any reports or publications, and you will be anonymous within the research process. Any quotes used from your responses will be anonymous.

This is a part of long-term project. There may be an academic paper or conference presentation on the results from 2015 or later. If there is, a copy of the written material will be made available to you at that time. The full results will not be published within the PhD until at least 2019. On this publication, a copy of the full thesis will be available to those who have taken part, on request to Liz Morgan.

What type of information will be sought from me and why is the collection of this information relevant for achieving the research project objectives?

Liz will be seeking your description and views about [the particular A.I.S.E. initiative to reduce emissions in consumption], how it has come about and what have been the objectives, drivers and barriers and its outcomes.

The questions will be open-ended and they may be audio recorded, for research purposes only. Only Liz will have access to these recordings and written notes from the interview and all the material gathered will be destroyed 3 years after the completion of the final phase.

Who is organising the research?

The research is being led by Elizabeth (Liz) Morgan, a PhD researcher at the University of Leeds in the UK. Liz is funding her own research: it is not funded from any other source.

Contact for further information

Liz Morgan

Phone 0044 (0)7798 675149

Email ee09lm@leeds.ac.uk

A3ii (d) Participant Information Sheet (individual business case study)

Carbon emissions reduction in consumption

You are being invited to take part in a research project. Before you decide if you would like to do so, it's important that you understand why the research is being done and what it will involve. Please take time to read the following information and discuss it with others if you wish. Please ask if there is anything that is not clear, or you would like more information, and take time to decide whether or not you wish to take part.

The Purpose of the Project

The research intends to find out what innovations and actions manufacturers and retailers of consumer goods have undertaken to reduce domestic emissions arising from use of their products, and to understand, over time, their objectives, motivations and barriers in taking these steps and the effectiveness and impact of them. A number of companies whose products are involved in the clothes laundering process are the focus of this research, as well as the European detergent industry association (A.I.S.E.).

Who has been chosen and why?

Employees within companies, A.I.S.E. and other knowledgeable individuals have been invited to take part based on the suggestions of others within these organisations, on the basis of their knowledge of the innovations and actions that have been undertaken.

Do you have to take part?

It is up to you to decide whether or not to take part. If you decide not to take part, there will be no consequences for you; it's entirely your decision.

What do you do as a participant?

Liz Morgan will interview you for up to 60 minutes in your usual place of work, or by telephone or Skype, at a time convenient to you. Liz will ask you for your views and opinions about [company]'s innovations and actions to reduce domestic emissions, the objectives, motivations and barriers for the company taking these steps over time and the effectiveness and impact of them and how these have developed over time. Your views and opinions will be asked also about A.I.S.E.'s campaigns on behalf of the industry as a whole. [Include also if appropriate: 'Liz will be attending a number of working meetings of A.I.S.E. and if you are a participant at one of these meetings, you will be asked to agree to this separately.']

The questions will be open-ended and they may be recorded, for research purposes only. Only Liz will have access to these recordings and written notes from the interview and all the material gathered will be destroyed after 36 months.

There are no immediate benefits to you in taking part in this project. However it is hoped that this research will lead to an improved understanding of how and why large consumer companies' individual operational commitments for sustainability might help to stimulate change to more sustainable consumption.

The potential benefits to [company] [and A.I.S.E] could be a case history for use either internally or externally. Internally, there might be insights uncovered during the research that will provide useful learning for future initiatives. Externally, there could be opportunities to use some of the material to benefit the company's reputation.

Will your taking part in this project be confidential and what will happen to the results?

All the information collected about you and your views and opinions will be kept strictly confidential. You will not be identified in any reports or publications, and you will be anonymous within the research process and its electronic data storage. No direct quotes from you will be used.

This is a part of long-term project. There may be an academic paper or conference presentation on the results from 2015 or later. If there is, a copy of the written material will be made available to you before publication, and any suggested amendments you make will be carefully considered. The full results will not be published within the PhD until at least 2019. On this publication, a copy of the full thesis will be available to those who have taken part, on request to Liz Morgan.

What type of information will be sought from me and why is the collection of this information relevant for achieving the research project objectives?

Liz will be seeking your description and views about [the particular company initiative to reduce emissions in consumption], how it has come about and what have been the objectives, drivers and barriers and its outcomes, as you see them.

The questions will be open-ended and they may be audio recorded, for research purposes only. Only Liz will have access to these recordings and written notes from the interview and all the material gathered will be destroyed 3 years after the completion of the final phase.

Who is organising the research?

The research is being led by Elizabeth (Liz) Morgan, a PhD researcher at the University of Leeds in the UK. Liz is funding her own research: it is not funded from any other source.

Contact for further information

Liz Morgan

Phone 0044 (0)7798 675149

Email ee09lm@leeds.ac.uk

Appendix B Supporting information to Chapter 2

Mapping seven selected initiatives from Marks and Spencer Plan A

Mapping seven selected initiatives from Marks and Spencer Plan A (Marks and Spencer, 2007, 2010, 2013b, 2012a) on Schaltegger et al.'s (2012) framework

Note. Numbering shown in brackets refers to the 2007 report (Marks and Spencer, 2007)

Generic Business Model Pillars				
Core drivers of business cases for sustainability	Value Proposition	Customer relationships	Business infrastructure	Financial aspects
Costs and cost reduction	Lower energy costs for consumers (26 and 28). The 'Wash at 30°' campaign was repositioned in 2009 to emphasise the money saving opportunity rather than the CO ₂ emissions saving.	Clothes recycling enabled customers to get £5 voucher redeemable against a future purchase of over £35 and enabled M&S to sell a low cost wool coat (44).	Waste wool from donated and faulty garments reprocessed within the supply chain (44).	Use of recycled wool in a new design of women's coat enabled cost reduction in raw materials (44).
Sales and profit margin	Increase sales encouraged by voucher redemption having recycled clothes via M&S stores and Oxfam (44).	M&S benefitted from increased numbers of customers on clothing return days (44).	Low carbon products, services for energy supply, other services through M&S Energy, a new business set up in October 2008 in partnership with Scottish and Southern Energy (26).	Cross selling the new M&S Energy service generated new profits and diversified M&S's revenue stream (26). New sales revenue

Risk and risk reduction		Risk-free recycling	M&S predict raw material supply issues under climate change therefore Plan A helps to ensure future raw material supplies (54)(55).	from additional customer visits on clothing return days (44)
Reputation brand value	<p>Being seen to encourage recycling of clothes through the Shwopping initiative (44)</p> <p>Being seen to reward consumers for their household energy reduction (26).</p> <p>Footprint campaign (27).</p>	<p>Footprint campaign (27).</p> <p>The Climate Group campaign to wash at 30° (28).</p>	<p>Footprint campaign (WWF and WI) (27). Increased visibility for Plan A through network of Oxfam stores (44) and for WWF through the linked website (WWF, 2013) (27).</p> <p>Further communication benefits for Oxfam on clothing care labels (60) and £2.6m raised for Oxfam from the scheme from launch to 2012.</p> <p>Contribution to DEFRA's Sustainable Clothing Action Plan (54).</p>	

Attractiveness as employer			Use of recycled polyester from bottles instead of oil, for polyester garments, and fill (60).	
			Footprint campaign (27) and free home insulation (26) for employees both enhance the effectiveness of Plan A itself.	
Innovative capabilities	<p>The initial Clothing Exchange days with Oxfam were innovative (44).</p> <p>The second phase of clothes recycling has led M&S to create a social network for like-minded customers (44).</p>	<ol style="list-style-type: none"> 1. New service for customers (44) (convenient to take clothes back to Oxfam). 2. £5 M&S vouchers from energy and energy-related services increase customer retention (26). 	<p>The Oxfam partnership served to simplify the logistics for M&S in taking clothes back (44) whilst increasing the service access points for customers.</p> <p>New partnership with WWF (27) (55) and with Scottish and Southern Electricity (26).</p> <p>Closed loop system for wool and cashmere when included in new garments (44).</p> <p>Trialling new textile fibres (54).</p>	M&S Energy was set up as a separate financial entity (26).

Appendix C Supporting information to Chapter 3

Retailers initiatives 2007-2013

Retailer (in alphabetical order) and rationale for selection	Data sources	Initiatives identified (where no year is shown, applies across the years)
Asda, second largest grocery retailer, the UK subsidiary of Walmart	Sustainability and Responsibility Reports, Walmart (2008, 2009, 2010, 2011, 2012, 2013) Asda website (2014)	<ol style="list-style-type: none"> 1. In 2012 four employees took part in a sustainability plan to reduce their own carbon footprints. It is reported that they reduced their carbon footprint by between 14% and 37% as a result. The process and results were promoted widely to other employees. 2. In 2007 a trial reported that Asda's electronics team to remove standby options on Asda brand televisions. No subsequent information given. 3. In 2007 two shampoo products underwent a trial with the Carbon Trust footprint label, following a detailed study having been done with the Carbon Trust. Benefits of using cooler wash water were described in-store as reduction in energy bills and emissions and in improved hair health.
Boots, the largest health and beauty retailer, owned by Alliance Boots	Corporate Social Responsibility Reports, Alliance Boots (2013, 2014) Corporate Social Responsibility Reports, Alliance Boots (2007, 2009, 2010, 2011, 2012) These reports were sourced in hard copy, directly from the company archive by request. Product Carbon Footprinting, The Carbon Trust (2014)	<ol style="list-style-type: none"> 4. From 2009, consumers have been able to buy a large number of affordable B&Q-defined 'eco products'. Eco products are defined through detailed verification criteria developed by external experts, defined in terms of the most important energy-using products. Their number, and the proportion they represent of all products sold, are measured.
B&Q, UK home improvement retail market leader, the UK subsidiary of Kingfisher plc	Corporate Responsibility Reports, Net Positive Reports, Kingfisher plc (2007, 2008, 2009, 2010, 2011, 2012, 2013b) One Planet Home Action Plan, B&Q (2012, 2013b) Loft Clearance Trial (Department of Energy and Climate Change, 2013)	

	<p>Being Responsible (B&Q, 2014) Kingfisher Net Positive data collection methodology (2013a) B&Q Range Sustainability Buying Standard (2013a)</p>	<p>5. A 'Range Sustainability Buying Standard' exists, which leads to less sustainable products being withdrawn from sale, over time. Thus, choice editing is employed such that consumers' behaviour is constrained by what B&Q make available for sale.</p>
<p>John Lewis Partnership, UK department store market leader</p>	<p>Corporate Social Responsibility and Sustainability Reports, John Lewis Partnership (2007, 2008, 2009, 2010, 2011, 2012, 2013b) 'Bringing Quality to Life' (2013a) 'Energy efficiency ratings explained' (2014a) (John Lewis Partnership, 2014a) 'Lightening the energy load' (2014b) 'A-rated appliances for energy efficiency' (2014c) Department of Energy and Climate Change (2014)</p>	<p>6. From 2011, trials were undertaken to make it easier for consumers to undergo loft insulation with a loft clearance service. This was described as a behavioural trial (Department of Energy and Climate Change, 2013) but had a very low consumer response rate.</p> <p>7. A range of energy efficient appliances is sold and promoted in stores. No detail about how they have qualified to be described as such. The initiative relies largely on information provision together with some, unspecified, choice editing.</p> <p>A trial with the UK Government Department of Energy and Climate Change ran from Sept 2013 and June 2014, to test the impact of presenting customers with information on lifetime running costs on appliance point-of-sale materials in store.</p>
<p>Marks and Spencer, the largest clothing retailer</p>	<p>How We Do Business Reports, Marks & Spencer (2007, 2008, 2009, 2010a, 2011, 2012a, 2013a) Plan A Commitments, Marks & Spencer (2010b) The Key Lessons from the Plan A Business Case (2012b) 'Together' campaign (The Climate Group, 2007) 'Plan A' website (Marks and Spencer, 2013b)</p>	<p>8. Low carbon products and services: the M&S Energy business incentivised reduction (at launch in 2008) by offering vouchers to households who achieved year on year energy reductions. In 2012 a 'My Plan A' website sought to generate public consumer pledges to environmentally beneficial behaviours.</p> <p>Another statement was made about editing choice of electrical items. However, in 2012 M&S stopped selling electrical items entirely.</p> <p>9. A multi-year campaign in stores and on clothing labels to promote washing clothes at 30°. The stated</p>

Morrisons, fourth largest grocery retailer	Corporate Responsibility Review reports (2013, 2014) Corporate Social Responsibility Reports, Morrisons (2007, 2008, 2010, 2011, 2012) . These reports were sourced directly in digital format, from the company by request.	benefits were originally the electricity and CO ₂ emissions saving. Later, communication material emphasised the potential to save money. 10. In 2007, supported the work of the Carbon Trust to develop a carbon labelling scheme, not subsequently implemented. 11. In 2007, a 'Carbon Footprint' communication campaign was run with WWF and the Women's Institute. 12. In 2007 and 2008, it was stated that they were exploring product carbon labelling with a view to contributing to an agreed methodology 13. In 2007, sales of energy efficient light bulbs were promoted and the stated aim was to end sale of incandescent light bulbs by 2010, one year before legislation required
Sainsbury, third largest grocery retailer	Corporate Responsibility Reports, J Sainsbury plc (2007, 2008, 2009, 2010, 2011, 2012, 2013) Consumer Futures (Forum for the Future, 2011)	14. From 2008 to 2010 there were intermittent statements and actions on the intention to develop their range, and on provision of information and advice for energy efficient own brand household electrical goods. 15. From 2010 to 2013 an Energy Shop offered advice about insulation and energy provision services 16. In 2007 an own brand detergent was reformulated to work at lower wash temperatures.
Tesco, UK grocery retail market leader	Corporate Responsibility Reports, Tesco (2007, 2008, 2009, 2010a, 2011, 2012, 2013b) Sir Terry Leahy speech (Tesco plc, 2010b) 'Carbon Footprinting our UK products' (Tesco plc, 2013a)	17. Help consumers to halve their carbon footprints by 2020; carbon labelling on large range of affordable products (up to 2012). At its maximum, 525 individual products were carbon labelled.

B&Q, Marks & Spencer and Tesco, as part of a coalition of 15 businesses and NGOs

The Climate Group (2007, 2009), Marks and Spencer (2008)

18. 'Together' campaign from 2007 to 2010; a consumer engagement campaign designed to help every UK household reduce carbon dioxide emissions by one tonne over three years by demonstrating that many small actions add up to make a difference. Public communication to consumers was supported by statements from large consumer businesses, to encourage individual consumers' carbon saving pledges.

Appendix D Supporting information to Chapter 4

D1 Possible reductions in greenhouse gas emissions available from reduced laundry temperatures, selected figures

Geographical scope	Scenario	Outcome
UK (Bain et al., 2009)	If all UK citizens washing clothes at 40°C washed them instead at 30°C	UK would save 12% of energy currently consumed on clothes washing, equivalent to 0.22 MtCO ₂ per annum
UK (Thomas et al., 2012)	If the weighted average wash temperature became 39.3°C instead of 46°C	There would be a reduction of 0.55 MtCO ₂ per annum
EU27 (Beton et al., 2014)	If the average washing temperature became 32.9°C instead of 45.8°C	There would be a reduction of 10.9%, or 20 MtCO _{2e}

D2.1 Summary of respondents by type and country

	Respondent code name and date	Form of response	Country of residence at time of response	Respondent role, generalised title in order to maintain anonymity
1	Apricot March 2014	Face to face	UK	Former Sustainability Manager, large UK retailer
2	Banana June 2014	Email response to questionnaire	UK	Sustainability Manager, large UK retailer
3	Chilli	Face to face	UK	Sustainability Manager, large UK retailer
4	Damson July 2014	Face to face and email follow up for further clarification	UK	Consultant who worked with one major international detergent manufacturer on sustainable consumption over ten years
5	Eggplant July 2014	Face to face	UK	Consultant who worked with major UK retailer on carbon labelling scheme
6	Fig July 2014	Phone	UK	PR manager, major UK retailer
7	Greengage July 2014	Phone	UK	Consultant who worked with both detergent industry companies and DEFRA
8	Hop July 2014	Phone	UK	Consultant who worked with international detergent companies on their sustainable consumption initiatives
9	Jalapeno August 2014	Phone	UK	Consultant who worked with both detergent industry companies and DEFRA
10	Kale April 2015	Phone	UK	Marketing manager, large international detergent company
11	Lemon March 2015	Phone	France	Marketing manager, large international detergent company
12	Mango March 2015	Phone	Netherlands	Corporate Responsibility Manager, A.I.S.E. partner company
13	Neem July 2015	Phone	Belgium	Corporate Responsibility

				Manager, A.I.S.E. partner company
14	Orange March 2015	Phone	UK	Corporate Responsibility Manager, A.I.S.E. partner company
15	Pear March 2015	Phone	Italy	Corporate Responsibility Manager, A.I.S.E. partner company
16	Quince March 2015	Phone	Belgium	Corporate Responsibility Manager, A.I.S.E. partner company
17	Radish March 2015	Face to face	UK	International Corporate Responsibility manager, A.I.S.E. partner company
18	Saffron March 2015	Phone	France	Corporate Responsibility Manager, A.I.S.E. partner company
19	Thyme March 2015	Phone	Denmark	Corporate Responsibility Manager, A.I.S.E. partner company
20	Ugli May 2015	Phone and email response to questionnaire	Belgium	Corporate Responsibility Manager, A.I.S.E. partner company
21	Vine March 2015	Face to face	UK	Corporate Responsibility Manager, large retailer
22	Wasabi March 2015	Phone	UK	Manager, consultancy working with detergent manufacturers and large retailers on sustainable consumption of clothing
23	Zig Zag March 2015	Phone	UK	Corporate Responsibility Manager, A.I.S.E. partner company
24	Apple August 2015	Phone	UK	Advertising agency account manager, working on large detergent company brands
25	Catnip March 2016	Phone	UK	Retired Corporate Responsibility Manager, large international detergent manufacturer

D2.2 Interview guide for semi-structured interviews

The use of square brackets identifies minor additions that were used for interviewees when introduction had been made through A.I.S.E.

The Use Chain. I'm interested in initiatives that seek to reduce carbon emissions when consumers use products, [either] from companies done directly [or through an association such as A.I.S.E.,] so I would like to discuss [the 'I Prefer 30'] work done recently.

Questionnaire

1. Can you tell me, please, the actual period of time you would say that you were either involved in this work, or this initiative, or heard about it?
2. What do you think the desired impact of it is? ... in terms of targets *prompt: specific, measureable, time bound and within a clear boundary in the product lifecycle?* in relation to carbon emissions?
3. Can you tell me about the factors that influenced the development of this initiative, as you see them? (*Prompt*) External? Internal to the association?
4. Some years before this, AISE and the national associations developed Cleanright. What do you know about the Cleanright initiative; what did it aim to do? *Prompt, if necessary, from the AISE website copy: The initiative aims at promoting more sustainable use of household laundry detergents. The objective is to focus on energy saving through low temperature washing (which is the biggest area of potential environmental savings) by raising consumer awareness on the benefits of washing at low temperatures.*). How would you describe the factors that influenced their development of this initiative? (*Prompt*) External? Internal?
5. How do you see either of these initiatives in terms of what the companies who are members of AISE or national associations are trying to do? What is the impact of competition on the initiatives, as you see it?
6. How do you see either of these initiatives having related to the public debate about carbon emissions? If at all?

since 1997 (the year of the European Union signing up to the Kyoto protocol to reduce emissions by 8% by 2012 from 1990 levels) (if at all) since 2007 (the year of the UK Govt Energy White Paper and of the fourth IPCC report?) (if at all) *or equivalent for other country* since 2009 (the year of the IPCC meeting in Copenhagen) (if at all) How do you see these having related to any legislation or policy recommendations? (if at all) (*Prompt*) EU level? Country level?

7. How do you see these as having been influenced by membership of any networks that you, your company (or organisation) participates in? [By membership of A.I.S.E. or the national associations?] Can you describe these networks to me?
8. What do you think it is about the [IP30] initiative that will get consumers to make a change? *Prompt using 'individual', 'social' and 'material' (Southerton et al., 2011).*

9. I'm going to read out 7 [6] sources of trends that could have influenced the [IP30] campaign initiative and I'd like you to tell me which of them, if any, have influenced it, in your opinion:

They are:

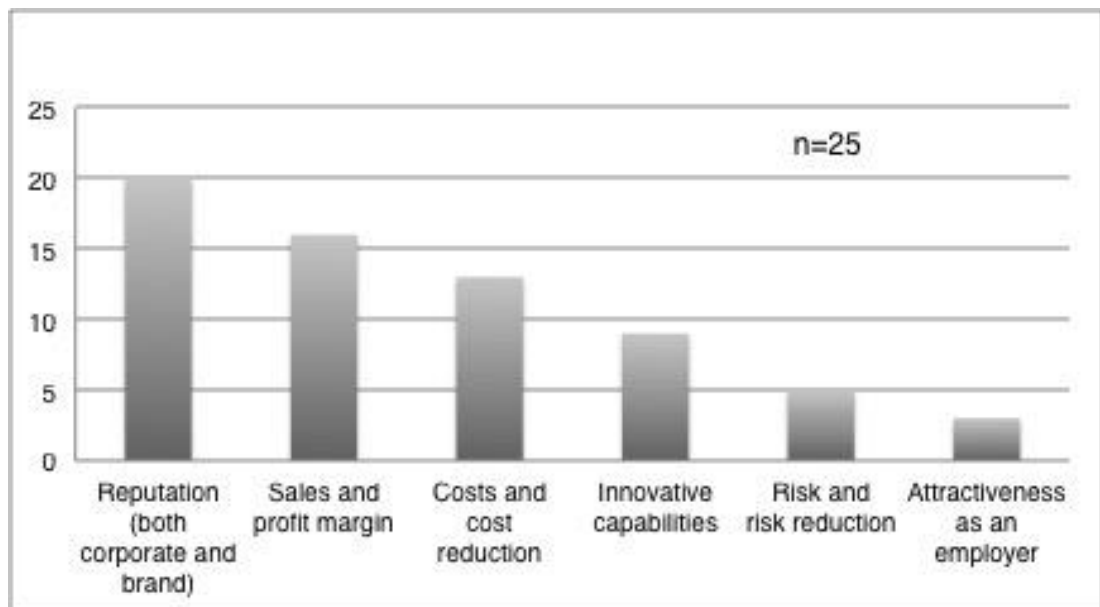
technological product or service innovation
 consumers' use of products and other social factors
 your competitors' activities [not included for A.I.S.E. interviewees]
 retailers' activities
 government policies
 other political factors
 environmental factors
 any others I've not mentioned?

10. What do you think your company (or organisation) [or signed up partners] sought to achieve through this initiative?
- 1) for your consumers? (Or 'for the public') (*ie end users for detergent or appliance companies*)
 - 2) for your retail customers? (or 'for retailers') (*ie retailers for a manufacturing business, this question for branded manufacturers only*)
 - 3) for the business(or organisation) itself?
11. How do you think has success been measured for each of these? Have there been any explicitly declared quantified objectives that you can share with me? (or can you broadly describe any that you can't share)
12. How would you describe the motivators and barriers that there were for this initiative? *Prompt using the six core drivers from the Schaltegger et al. (2011) framework.*
13. What have been the outcomes? Any more?
14. How do you relate what has happened for this initiative in relation to carbon emissions?
15. Having done this initiative, what do you think its influence has been on each of the following, if any?:
- technological product innovation
 - the ways consumers use products and other social factors
 - government policies or other political factors
 - environmental factors
 - your company's (or organisation's) strategy
 - the way in which the association and the businesses work together
16. What do you expect to happen regarding this initiative in the next two years?

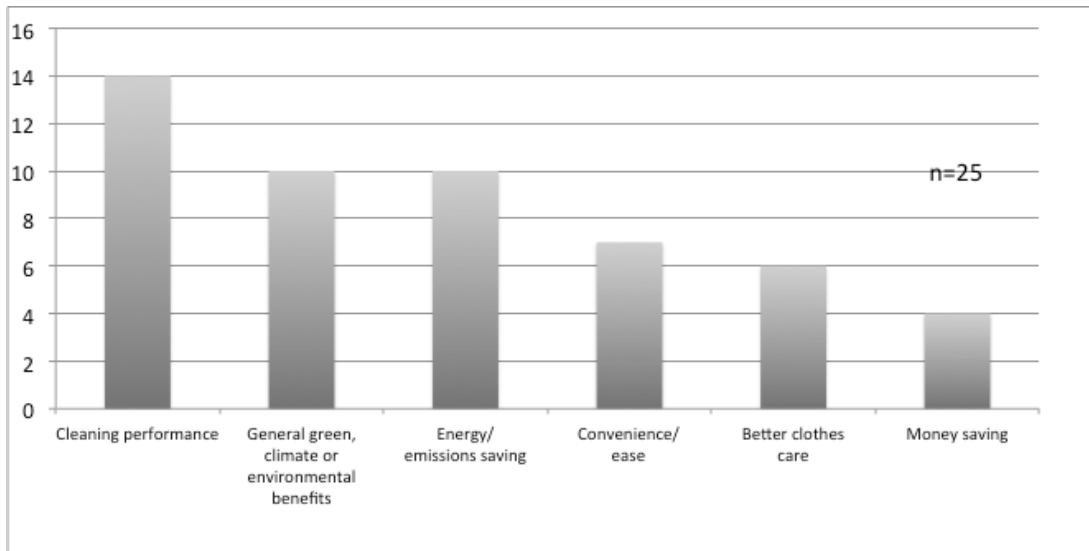
Thank you for your time and responses. Just before we finish, do you think that there is anyone else that I should speak to?

Is there anything else you expected me to ask you, which I haven't covered?

D3 Business case drivers for consumer messages, as assigned by respondents



D4 Number of business respondents stating that the benefit is a consumer motivator



Appendix E Supporting information to Chapter 5

Climate change corporate reputation management: a selective timeline from the perspective of two leading UK retailers 2006-2008

	The political context and timeline
April 2006	David Cameron, the leader of the Conservative opposition, traditionally the party of business leaders, made a trip to the Arctic, which led to strong visual imagery in the press (O'Neill, 2013) and during which he declared he would put environment at the top of the Conservative party's political agenda. This commitment to climate change action took many commentators and members of his own party by surprise (Jones and Clover, 2006).
October 2006	The Stern Review (2007) was published, a comprehensive review of the economics of climate change, which had been commissioned by the Labour Government, and received huge amount of coverage and comment. It talked in business language about the possibility of damages arising from climate change amounting to as much as 20 per cent of GDP.
Jan 2007	Stuart Rose (Chief Executive of Marks & Spencer) announced Plan A 'a 100-point five-year plan' (Peston, 2007) on 15 th January Terry Leahy (Chief Executive of Tesco) appeared at a joint Forum for the Future/Tesco special event on 18 th January, at which he announced Tesco was looking at carbon labelling on all 70,000 products it sells (FRCN, 2007)
October 2008	UK Climate Change Act was enacted, having received very broad cross-party support and mandated an 80% cut overall in six greenhouse gases by 2050

A respondent to the research questionnaire gave this story about the events of January 2007:

Philip Rose, chief executive of Marks & Spencer's (M&S) (the UK's leading clothes retailer), heard that Terry Leahy, chief executive of Tesco (the UK's leading grocery retailer) was preparing to make a big climate change commitment at a joint event between Tesco and Forum for the Future on Thursday, January 18th. Determined not to give away Marks & Spencer's perceived long term leadership of the business agenda on sustainability strategy (initiated by founder Michael Mark's original commitment to improving the quality of life for both customers and employees (Worth, 2007)), he hurriedly arranged a press conference for Monday January 15th and urgently demanded of his internal teams to know all the commitments that Marks & Spencer could make at that conference about sustainability. This set of initiatives became the first version of Plan A ('Because there is no Plan B' (Marks and Spencer,

2007)), originally a five-year commitment of 100 initiatives, which has continued to be the vehicle through which M&S publish their corporate responsibility progress. However, it came about in the way it did because of what was perceived by Stuart Rose as a competitive, pre-emptive move to combat the threat to M&S's reputation for leadership on sustainability, arising from Terry Leahy's initiative that then took place three days later.