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An evaluation of the potential for wider use of recycled synthetic materials in the UK high street clothing markets:
its drivers and barriers.

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Abstract

This thesis focuses on the potential to expand the markets for recycled synthetic materials, specifically focusing on the uptake of polyester recycling technologies and materials from the perspective of UK high street clothing retailers and Japanese recycled polyester textile manufacturers.

Historically, textile waste or 'shoddy' has been 'downcycled' and used in products such as blankets, rugs or wipers. During the 1990s technological developments enabled the production of thinner and longer fibres from recycled polyester for clothing, particularly in outdoor wear, sportswear and uniforms. Advances in chemical recycling systems which return the fibre to its original raw materials state have led to the production of fibres of a quality equal to those produced from virgin material. Polyester is currently the only viable material which can be 'upcycled' and used in 'closed loop recycling systems'.

This research investigated the barriers and drivers affecting the adoption of recycled polyester in high street clothing markets, from the perspectives of UK high street clothing retailers, UK consumers, and world leading Japanese recycled polyester textile manufacturers.

The study is exploratory in nature, and comprises a literature review, a street survey and industry surveys. The literature review was carried out in order to understand current thinking in the areas of sustainable fashion and technological development, particularly with regards to the production of recycled polyester. A street survey conducted in Newcastle gathered information from the general public in order to evaluate consumer attitudes towards clothes with recycled content, what affects their purchasing decisions when buying clothes, and their awareness of recycled clothing products in the market. The industry surveys were adopted to examine the views of five major recycled polyester fibre and fabric manufacturers in Japan and evaluate their perspectives on the potential for recycled polyester outside their current niche markets. Four major UK high street clothing retailers were interviewed in order to gain insights into their current practices for product development (in particular the materials selection process), to evaluate the level of environmental consideration they have when they develop products, and to test their readiness to use recycled materials.

The findings are derived from previously unscrutinised barriers and drivers for the wider use of recycled synthetic materials in high street clothing retailers. Two key factors are identified: Japanese manufacturers need to create 'closed loop' recyclable synthetic fabrics that have excellent tactile and design qualities to appeal to the teams that source fabrics for clothing development. Clothing retailers need to recognise that it is possible to specify 'closed loop' fabrics but they need to connect this to clear design, business and sustainable development strategies.

The contribution of this thesis based on the findings shows the potential to extend the recycled polyester market, based on advanced technology and socio-economical issues, the outlook of recycled textile producers, and public opinion towards clothes with recycled content. The key recommendation concerns the need to establish a long term commitment between clothing retailers and recycled fabric producers in order to develop desirable recycled fabrics for general and fashion markets. Further research is suggested on this basis.

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Acknowledgement

Declaration

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work.

Name:

Signature:

Date:

Published Papers and Works Presented at Conferences

The published papers and other works presented at various conferences are listed below.

Published Papers

Nakano, Yukie. (2007) *Perceptions Towards Clothes with Recycled Content and Environmental Awareness: the Development of End Market.*
Ecotextiles - The way forward for sustainable development in textiles. Miraftab and Horrocks (ed.) Woodhead. pp.3-14.

Nakano,Yukie (2004) *Perceptions Towards Clothes with Recycled Content and Environmental Awareness: the Development of End Market.*
ECOTEXTILE04 "The Way forward for Sustainable Development in Textiles" Conference proceedings. Bolton Institute.

Nakano,Yukie (2001) *Eco-Clothing:The potential market application for recycled plastic materials as fashion clothing.* d3 desire designum design. 4th European Academy of Design. Conference proceedings. Universidade de Aveiro. 2001. pp.518-522

Presentation
 "Integrating Differences: Theories and Applications of Universal Design"
A symposium sponsored by The FIT Teaching Institute and the FIT College
– Wide Committee on Diversity

Poster Session
At IFFTI 3rd Annual Conference, Fashion Directions: Visioning the Future
London College of Fashion

Abbreviation

ANOVA	Analysis of Variance
A/W	Autumn and Winter
BPF	British Plastics Federation
CfDR	The Centre for Design Research at Northumbria University
CJD	Creutzfeldt-Jakob disease
CSR	Corporate Social Responsibility
DEFRA	Department for Environment, Food & Rural Affairs
EIA	Energy Information Administration
EU	European Union
FoE	Friends of the Earth
GM	Genetically modified
H&M	Hennes & Mauritz
I.V.	Intrinsic Viscosity
KH	Katharine Hamnett
LC	Life Cycle
LCA	Life Cycle Assessment
LFW	London Fashion Week
M&S	Marks & Spencer
MBDC	McDonough Braungart Design Chemistry
NGOs	Non-Governmental Organisations
OPEC	The Organisation of Petroleum Exporting Countries
PCR	Post Consumer Recycled
PLA	Polylactic Acid
PET	Polyethylene Terephalate
R&D	Research and Development
SCP	Sustainable Cotton Project
SMEs	Small to Medium Enterprises
SPSS	Statistical Package for the Social Sciences
S/S	Spring and Summer
STS	Sustainable Textile Standard
SWAP	Save Waste and Prosper Ltd
TEN	Textiles Environment Network
UN	United Nations
UNEP	United Nations Environment Programme
WEN	The Women's Environmental Network
WRAP	The Waste and Resources Action Programme
WWF	World Wildlife Fund

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<u>CHAPTER ONE</u>

INTRODUCTION

1.1 Introduction

It is a largely understood fact that current human consumption rates are harmful to our environment and are not sustainable in the long term. We are facing global issues such as resource depletion and climate change resulting in political and social instability. These issues have been picked up by most industries if hesitantly at first, and the increase in public awareness has made it gradually more difficult for industries to ignore. As a result, certain issues and certain industries have received more attention and seen more change than others. In the electronic or automobile sector for example sustainability and environmental impact assessment is an integral part of product development. The clothing sector however has been lagging behind in terms of dealing with its environmental impact. Although ethical malpractices such as child-labour have been recently picked up by the media, the waste created by an industry that relies on ever faster consumption rates to facilitate its growth has escaped broader public attention and therefore has not been tackled efficiently.

1.2 Rationale for study

Fashion cycles are ever faster, with new trends being released on a monthly basis to allow for a steady growth in the clothing industry. Fast moving trends mean shorter lifespan of clothes, more waste and increased use of raw materials. Growth in the clothing market in recent years has largely been concentrated in the area of synthetic materials and has had less impact on natural material production. With the shortened lifespan of garments and increased consumption of clothing in terms of quantity the amount of synthetic waste has increased. This research investigates opportunities for reuse of the waste produced by the clothing industry as well as opportunities for recycled synthetic materials from other sources by considering the potential of recycled PET (Polyethylene Terephalate) as the basis for fibre use in the fashion industry.

1.2.1 Ecological footprint

Figure 1.1 shows the world footprint. 'The biosphere needs about one year and four months to renew humanity's annual consumption and waste production.' according to the Global Footprint Network.

At the beginning of the nineteen sixties humanity used only half of the planet's resources. However the resource demand has increased to 1.3 times (exceeding 30%)

Figure 1.1 World footprint
Source: Global Footprint Network 2008
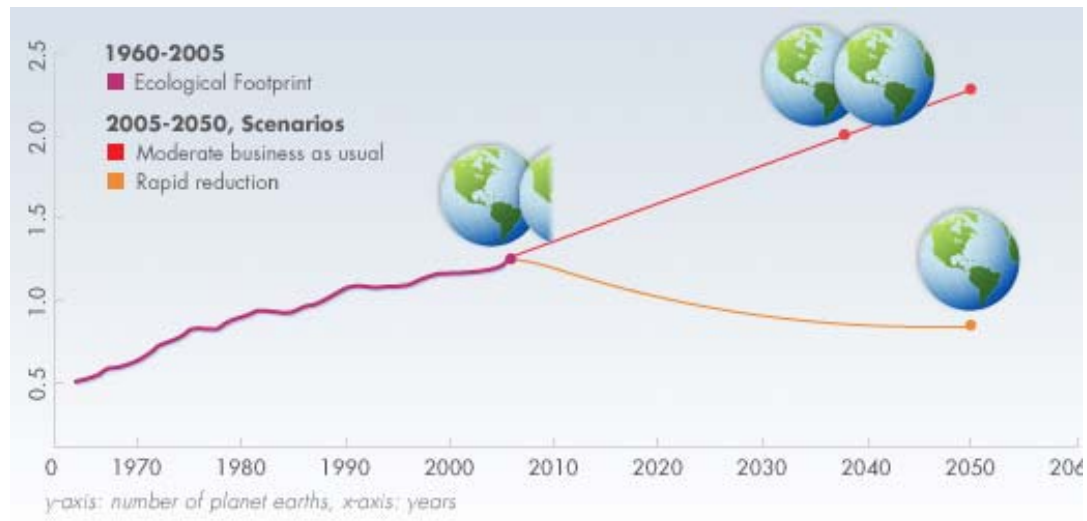
that of the planetary biocapacity in 2008. Consequently we are reducing the Earth's capability to sustain future generations. We are in ecological overshoot which means that we are depleting life dependent vital resources. If we keep up our current pace of resource consumption we will need two planets by 2035 (GFN 2008). The most significant challenge for research, business and politics is to determine how humanity can obtain a pleasant way of life without exceeding the world's biocapacity (UNEP 2002: pp.5-6).

Figure 1.2 UK Ecological footprint and biocapacity
Source: Global Footprint Network 2008
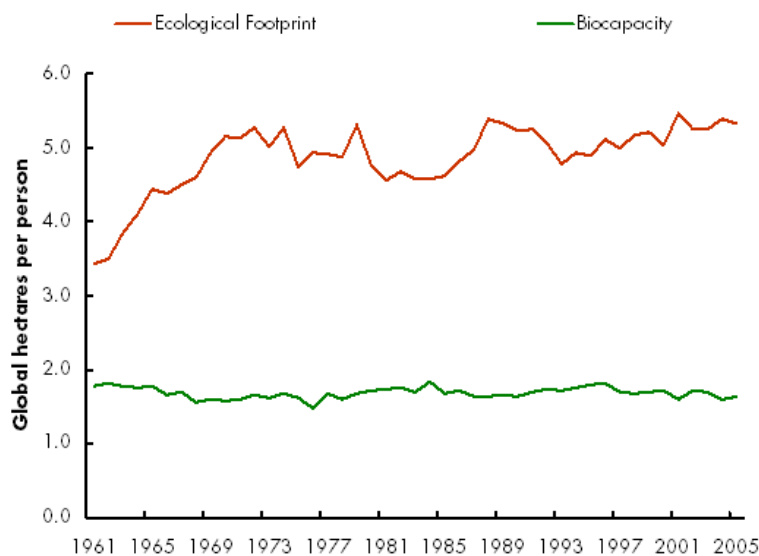
Figure 1.2 shows the ecological footprint (resource demand) per person and biocapacity (available resource supply) per person in the UK since 1961 to 2005.

It clearly shows that UK is in ecological overshoot and the UK is ranked at twelfth position in the highest group of ecological

footprints (WWF 2002: pp.4-5). Slater (2003) stated that depletion of resources and pollution are the two major sources of strain that need to be tackled (Slater 2003:p.178)

1.2.2 Waste and available landfill sites in the UK

Figure 1.3 UK landfill
Source: Dept. of Environment, Transport and the Regions 2001

In the UK the ecological footprint is greater than the biocapacity and yet our waste has increased by 14 per cent between 1995/6 and 2005/6, producing just over half a tonne per person per year in England and Wales (DEFRA: 2007). It is clear that the available biocapacity cannot sustain our resource demand if consumption continues at the current rate. Diverting our waste to recycling rather than landfill is the most effective way of converting our waste into valuable resources as well as preventing more landfill sites that could be a cause of methane gas, which is a 21 times more potent greenhouse gas than CO_2 (ibid.), carbon dioxide emissions and land contamination.

In England and Wales, we are currently producing more than 100 million tonnes of waste together with industry/commerce and households annually. Within that approximately 27 million tonnes are derived from households in 2005/06. In May 2000 the Government enforced the national waste strategy 'Waste Strategy 2000' and set out the target of achieving a recycling rate of 25% by 2005/06, which DEFRA announced recently has successfully been achieved. The recycling rate in 2005/06 was 27% which DEFRA claims is equivalent to 3.5 million cars being taken off the roads, in terms of greenhouse gas emissions. Recycling in the UK has been improving noticeably, considering it was just 6% in 1995/96 (see Figure 1.4/Table 1.1).

Figure 1.4 Household waste and recycling: 1983/4-2005/6 (Source:Defra 2007)
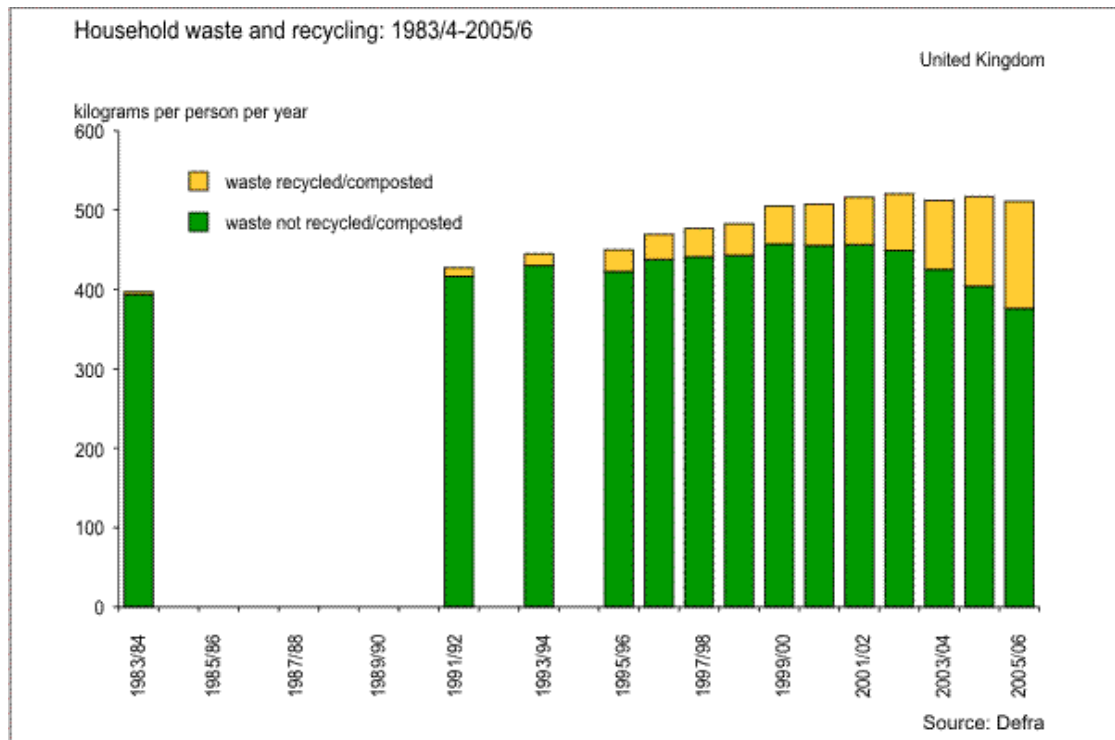
Table 1.1 Household waste and recycling: 1983/4-2005/6 (Source: Defra 2007)

kilograms per person per year									
	1983/4	1991/2	1995/6	2000/1	2001/2	2002/3	2003/4	2004/5	2005/6
Waste not recycled	394	417	423	455	456	449	425	404	376
Waste recycled/ composted	3	11	27	52	60	71	87	113	135
Total waste	397	428	450	507	516	521	512	517	511
Recycling rate	0.8%	3%	6%	10%	12%	14%	17%	22%	27%

The government published 'Waste Strategy for England 2007' and they set new targets much higher than they had set originally in Waste Strategy 2000. The new target for household waste is to recycle or compost at least 40% by 2010, 45% by 2015 and 50% by 2020 (Ibid.) They state the reason to set new targets as 'landfill is the worst option

for the environment. It is a waste of valuable resources and produces methane gas.'
(Ibid.). Raising landfill tax is on the way. In 2007 the standard rate of landfill tax was £24
per tonne and it will increase to £48 per tonne in 2010/11 (Ibid.).

Figure1.5 The incinerator
Source: Greenpeace 2002

The UK government is also planning to burn three times
(27%) more waste (currently 9%) by 2020 in order to avoid
a landfill crisis. The government calls this strategy 'Energy
from Waste (EfW)' and conveniently includes the amount of
burnt waste in the recycling rate. There are plans to build
22 more incinerators, doubling the current count.
Incinerators are known to produce harmful emissions.
Their claims that burning waste would reduce methane gas
from landfill sites and thus also reduce CO_2 emissions, that
burning waste is better than burning crude oil and that
effects from the incinerator plants on human health and the
environment are minimal, are questionable. There are also
fears that once the incinerators are built, the local authorities will have to divert a certain
amount of waste to run the plant (Weaver 2006). That reduces the opportunities for
non-renewable resources to be used in a sustainable way and there is no doubt that
there would be resistance from environmental groups as well as the general public
worried about the side effects of incinerators.

1.2.3 Plastic (PET) bottles waste

According to RECOUP, plastic makes up 11 per cent of household waste and within
that, 40 per cent is plastic bottles that would remain more than 200 years in the landfill
site.

In the UK 108,000 tonnes of plastic bottles (2,700 million bottles/volume of 5,400,000
cubic metres) were collected during 2006 and saved approximately 162,000 tonnes of
carbon. The amount of collected plastic bottles was twice as much as the amount
collected during 2004 (RECOUP 2007).

That is a recycling rate of 20% as the total amount of plastic bottle waste is estimated to
be approximately 520,000 tonnes (13 billion bottles/volume of 26,000,000 cubic metres),
which is equal to 10,400 Olympic size swimming pools* per year. In 2006 alone
approximately £50 million worth of plastic bottles were discarded at a cost of £100
million (ibid.). *An Olympic swimming pool size is 25m x 2m x 50m, 2500 cubic meters.

Figure 1.6 Plastic bottles waste
Source: Ken Kerbs, Dot Pictures
- National Geographic August 1991

Recently the rate of recycling plastic bottles has increased significantly (see Figure 1.7) due to the development of both 'bring' and 'kerbside' collection schemes. Approximately 60 per cent of the UK households can access a plastic bottles kerbside recycling collection (Ibid.).

Figure 1.7 Household plastic bottle recovery in the UK (Source: Recoup 2006)
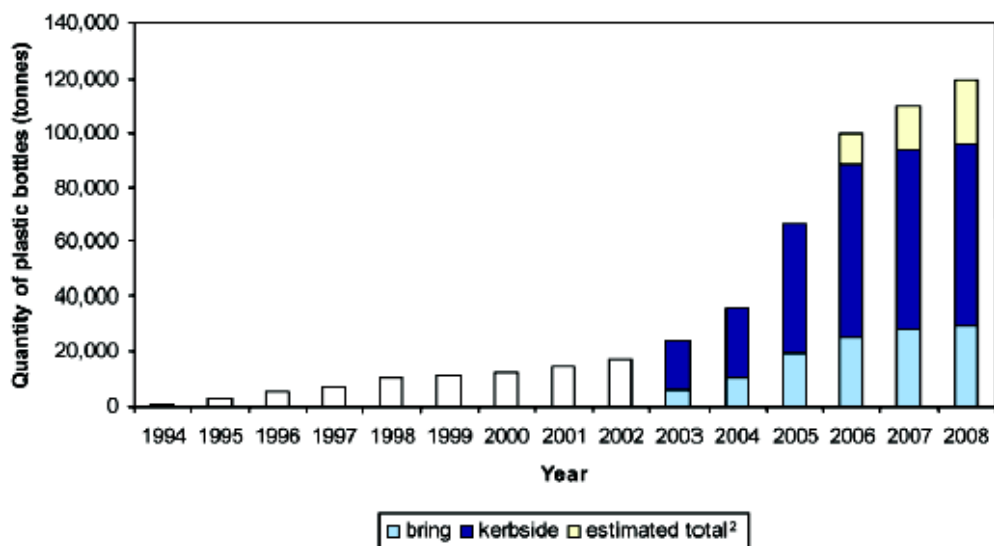
An effective plastic bottles collection infrastructure is necessary due to the rapid growth of the PET bottle market (Euromonitor predicts annual growth of 28% in the UK) as cans containing carbonated drinks continue to be replaced with PET bottles, a trend fuelled by consumer awareness of healthier diets which encourage them to drink bottled water rather than drinking soft drinks or alcohol (Elamin: 2005). Mintel reported a 50% increase in the volume of the bottled water market in the UK between 1994 and 2004 and they also forecasted a future rise in volume (Mercer: 2005).

The Recoup survey in 2006 revealed that increased confidence in markets for collected plastic bottles was one of the reasons local authorities are collecting more bottles (Recoup 2006: p.2). The demand for collected plastic bottles, of which there is a

particularly strong demand from China, was created by the recent increase in oil prices. More than a third of the collected waste is shipped to China and this figure is proportionate to the growth of the recycling rate in the UK. The implementation of EU legislation and higher UK landfill taxes, coupled with the high price paid for the collected materials by Chinese industry (they pay £120 per tonne in comparison to £50 per tonne by UK industry) made it more sensible to export the materials. One could question the environmental impact of exporting plastic bottles waste. According to Dr Liz Goodwin, CEO of WRAP, exporting waste abroad for recycling has less impact on the environment (produces less carbon emissions) than sending them to landfill sites and producing virgin plastic from crude oil (WRAP 2009).

This phenomena was confirmed by Japanese recycled fibre manufacturers through interviews. Recent (but no longer) high oil prices increased the demand for recycled plastic bottles making them highly desirable as raw materials instead of oil. Some of the Japanese recycled fibre manufacturers expressed their concern that exporting vast amounts of recycled plastic bottles may threaten the recycling infrastructure within Japan due to the shortage of raw recycled materials within the country (see Appendix 5.3). The same concern was shared by John Vidal, the Guardian's environment editor who was concerned that valuable raw materials are taken away from UK based recyclers (Vidal 2004). That implies that the best possible scenario is that collected

Figure 1.8 The average sale price of post consumer PET bottles
Source: Container and Packaging Recycling Association/The Mainichi Shinbun 2009
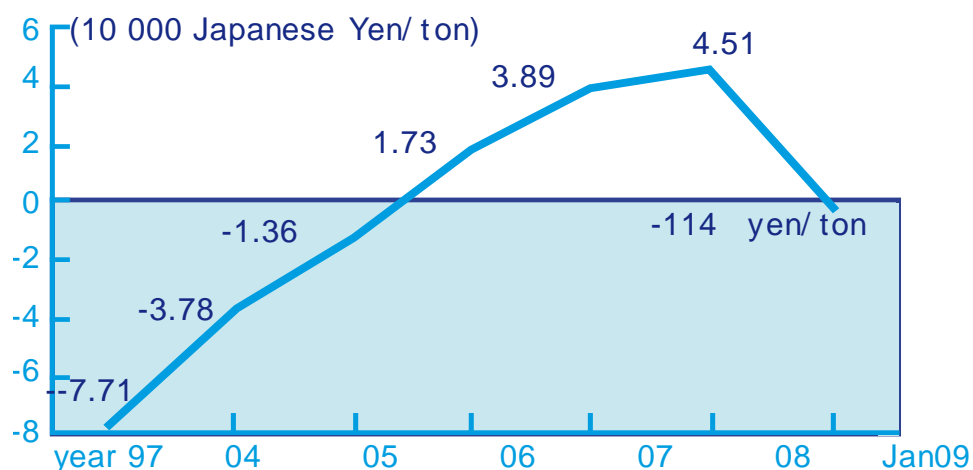
waste would be recycled not too far away from where it was produced (ideally within the nation).

At the time of this study's interviews with Japanese recycled fibre manufacturers some mentioned that the demand from the Chinese market has seen a decline recently due to the economic downturn (see Appendix 5.3). Indeed the price of used plastic bottles fell dramatically in January 2009, from £336 per tonne to -£8.53 per tonne (Adachi 2009) (see Figure 1.8).

Figure 1.9 Flow of PET bottle recycling in Japan
Source: Container and Packaging Recycling Association/The Mainichi Shinbun 2009
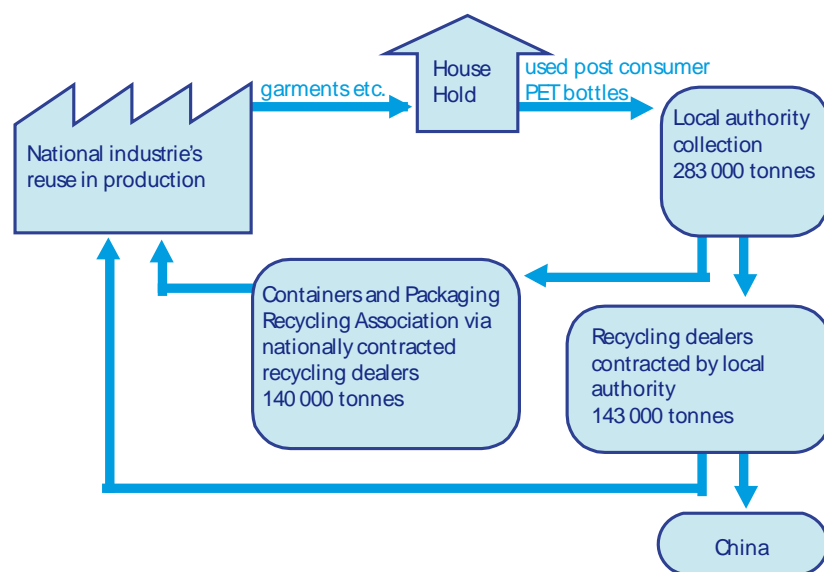
Figure 1.9 shows the flow of plastic bottle recycling in Japan, where more than half of the collected plastic bottles were exported to China in 2007. A high demand from China pushed the price for the recycled plastic bottles up so much that some of the Japanese local authorities started to sell directly to recycling dealers rather than pass the waste on to the Containers and Packaging Recycling Association that contract recycling dealers nationally. The Association was set up by national government to take the packaging waste off local authorities for recycling. Profits made by the association through sales are passed on to the local authorities, while deficits as they have occurred since the slump in demand (see Figure 1.9) are passed on to the product and packaging manufacturers. Now demand from China has slumped a vast amount of collected bottles are piling up and the Containers and Packaging Recycling Association have to pay the contracted recycling dealers to take them away. Adachi reports that this is the result of depending upon exporting waste abroad rather than expanding the

market for recycled plastic bottles within Japan as well as attempts to make larger profits from the recycled plastic bottles even if that threatens the recycling infrastructure within the country. In the past, some recycling businesses needed to be closed down as a result of difficulties in securing the raw materials (Adachi 2009).

In the UK, plastic waste is also exported to China. There is a risk this may create a similar situation where markets and applications for collected plastic bottles are suddenly lost.

Figure 1.10 The current recycling plastic bottles infrastructure in the UK (data source DEFRA 2008)
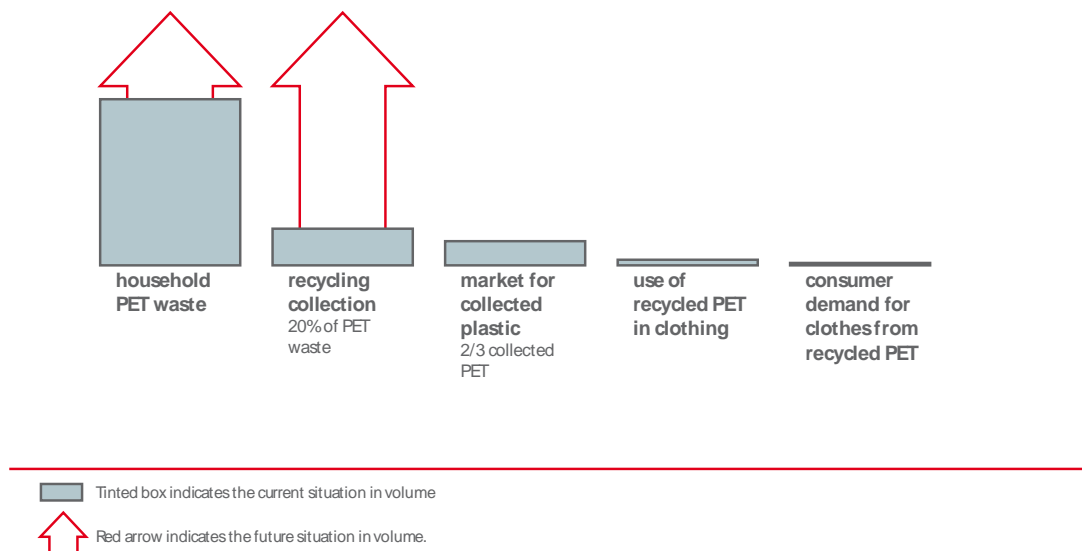
If plastic bottle consumption grows in volume as predicted and local authorities keep pace with collected bottles by increasing the recycling rate, there will be plenty of raw materials for recycling available. However, this clearly indicates the weakness of the current situation within the recycling infrastructure: developing end markets for recycled materials (Wood 1996: pp.84-85). In order for recycling to continue to grow, developing end markets is critical. The vital key for successful market development is the consumer demand for the products with recycled contents (Sutherland 2001: pp.1,8). Figure 1.10 shows the current plastic bottle recycling infrastructure in the UK. It is apparent by looking at the figure that product development of recycled materials is not significant, nor is consumer demand. The WRAP study also identified the negative perception that

recycled materials are of inferior quality as one of the barriers to market development in the plastic industry (Cundy 2003: p.4).

In the next section, the situation of clothing waste (particularly polyester) is discussed.

1.2.4 Clothing waste

Polyester fibre is derived from the same materials as plastic bottles, oil. Oil based synthetic fibres such as polyester are considered to take 200 years to decompose (Black 2008: p.110).

In 2006, two million tonnes (value £38 billion) of clothing was discarded and 63% (1.2 million tonnes) of this was landfilled. 16% (300,000 tonnes) was recovered and often exported abroad or downcycled to wipers, fillings and so on. Furthermore, alongside the predicted increase in bottle waste, a high increase in the volume of clothes waste is predicted due to the rise of new garments sales (DEFRA 2007).

Resource depletion caused by humans is evident and the earth cannot sustain our levels of consumption if we do not change our consumption patterns (Global Footprint Network 2008). As a result, the UK government is encouraging industries, including the clothing sector and the general public, to take action by using resources effectively and thereby reducing waste (DEFRA: 2007). In the UK there is an increasing amount of waste clothing and PET plastic bottles going to landfill and incinerators which could instead be turned into valuable raw materials for synthetic polyester fibre production, instead of contaminating land, air and water.

1.3 Research aims and objectives

This research has identified the potential for wider use of recycled synthetic materials in UK high street clothing markets.

It scrutinizes several important factors:

• current developments in technological synthetic material recycling,

• the materials sourcing process used by UK high street clothing retailers in particular with regards to recycled synthetic fabrics, and

• consumer attitudes towards environmentally friendly clothing and clothing with recycled content.

It leads to a clear understanding of the current opportunities and challenges in utilizing recycled synthetic fibres in the UK high street clothing market.

The study investigates three key aspects:

Firstly, this study investigates recycling technology in the textiles and clothing sector. Recycling in this sector has existed for many years in the form of 'downcycling', (or 'shoddy'). Downcycling means to recycle materials into lower grade products (for example, from clothes to fibrefill) following the 'cradle to grave' model as the material will eventually go to landfill or an incinerator (McDonough and Braungart 2002: pp.27,72,91). While recycling technology in the early 1990's merely transformed used plastic bottles into fleece jackets, more recent developments in 'high advanced chemical recycling' have made it possible to endlessly 'upcycle' used plastic bottles as well as used garments with synthetic fibre content into high quality products, for example producing new garments from old garments('fibre to fibre' recycling). Upcycling follows the 'cradle to cradle' model (Ibid.) where materials are kept in a high quality state through an industrial loop and recycled endlessly, thus closing the loop.

Secondly, attitudes and reactions in the clothing sector in terms of sustainability, including environmental and ethical issues, are closely scrutinised. Awareness among UK high street clothing retailers towards corporate social responsibility (particularly ethical issues) has increased in recent years due to several campaigns and initiatives such as the Cleaner Cotton Campaign/SCP (1998), the Green Cotton campaign/Novotex & KH (2000), Labour behind the Label (2000) and Marks & Spencer's Plan A (see Chapter Two, section 2.3.2).

The LFW 'Estethica' started in 2007 as a place where designers could exhibit their collections that demonstrate ethical trading, slow clothes, eco fabrics, organic processes or recycling credentials. It has changed the perception among the clothing industry and the general public that eco-clothes are non-stylish and difficult to source to one of eco-clothes being highly stylish and colourful, and the participating number of designers is increasing every year.

The LCA (Life Cycle Assessment) studies of garments are well documented, such as 'streamlined' LCA by Marks & Spencer (Collins and Aumônier 2002) and Patagonia (Brown and Wilmanns 1997), and the LCA studies carried out by the University of Cambridge Institute for Manufacturing (Allwood et al. 2006).

The results of these studies revealed that the most significant environmental impact was caused by consumers during use, and that there is no perfect fibre; moreover as long as there is production energy used, it makes no difference if it is a natural or synthetic fibre. However, the studies also revealed that the environmental impact ratio varies depending on garment type (for example production methods, frequency of wash and the length of use). It seems more logical to recycle synthetic fabrics as their initial production involves high energy consumption. It suggests that selecting the right materials for different types of garments at the beginning of product development will play a significant role in reducing energy consumption.

Thirdly, consumption patterns for clothing of the UK consumers are scrutinized. Between 2001 and 2005, UK consumers purchased one third more clothing (2.15 million tonnes) and within that 13 per cent were reused and 86 per cent were disposed of (Allwood et al.2006: pp.2, 11-12). The popularity of purchasing clothes at value clothing retailers and supermarkets (fast fashion retailers) contributed to a sales volume increase of 37 percent while prices decreased by 14 per cent (Ibid.).

UK consumers are aware of ethical issues such as child labour and unfair wages in clothing production. According to The YouGov survey commissioned by Marks & Spencer (2007), 78% of customers wanted to know about how clothes were made. In 2008 40% responded that they had decided not to buy clothes because they were not sure how they were made, as recent media coverage had shed light on what was going on behind the scenes of fast fashion. Many studies regarding ethical shopping and consumer surveys are readily available, but studies such as this concerning the use of recycled materials in clothing applications have not been well documented.

A major contribution to reducing energy use could be achieved if recycled materials were used in high street clothing through the high volume turnover of this market. However, recycled polyester (PET) materials have not been used widely yet by UK clothing retailers except in the sports apparel and school uniform markets.

This study therefore closely investigates the possibility of wider uses for recycled polyester material in the UK high street clothing retailers, from the perspectives of the major retail players, the UK high street clothing industry and the UK general public. It also looks at the views of Japanese recycled fibre manufacturers aiming to break into UK markets as suppliers. In recent years major technological innovation in the area of

synthetic fibre recycling by Japanese manufacturers means that Japan is currently the most advanced country in this area.

The objectives of this research are:

- To identify the barriers and drivers of the recycling technology influencing the introduction of clothes with recycled content into the UK market, and recycled fibre manufacturer's views with regards to recycled synthetic fibre development and its markets in the future.

- To identify attitudes of fabric sourcing personnel towards recycled materials and their materials sourcing procedures in the UK high street clothing industry.

- To identify levels of consumer awareness, their attitudes towards recycled materials in clothing and their clothes shopping behaviours.

- To synthesise findings from these objectives into a set of recommendations to inform manufacturers and retailers about the most effective actions to promote the wider use of recycled synthetic materials in UK high street clothing markets.

1.4 Research design

This study consisted of an exploratory phase and a main phase.

Figure 1.11 The research design
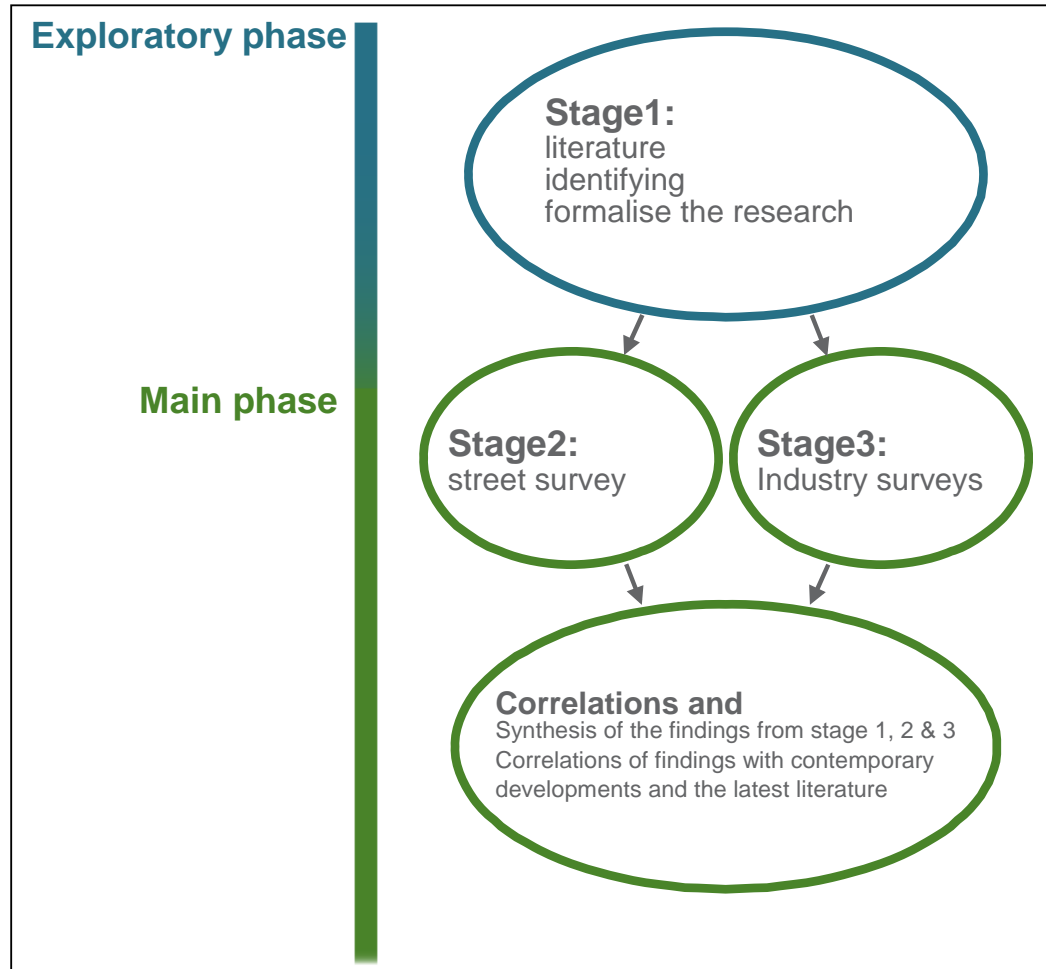
Exploratory phase

The exploratory phase identified the significant issues and problems by reviewing secondary data. It covered the following areas:

- Technological developments in recycling PET bottles and synthetic fibre to fibre recycling for clothing applications.
- Previous examples of eco-clothes
- High street clothing retailers' attitudes towards and understanding of environmental issues
- High street clothing retailers' awareness and initiatives undertaken to promote awareness
- Consumer consumption and purchasing patterns, and
- Consumer awareness and attitudes towards environmental issues and eco-clothes.

Main phase

The main phase investigated the key players' views (UK consumers, Japanese recycled fibre manufacturers and UK high street clothing retailers) with regards to recycled synthetic materials through collecting and analysing primary data.

The street survey aimed to identify consumer's reactions and attitudes towards recycled materials in clothing, awareness of eco-clothes, their drivers for purchasing decisions and the potential market for clothes with recycled content.

The industry surveys with Japanese recycled textile manufacturers investigate the potential for recycled synthetic materials based on technological developments, their current position of quality, their cost, and current markets and manufacturers' views with regards to the development and expansion of markets for recycled synthetic materials in future.

The industry surveys with UK high street clothing retailers scrutinise their strategies for materials sourcing and product development, awareness of and reaction to recycled synthetic materials and whether or not they see a future for the use of recycled materials in the clothing sector.

This study, the resulting information and future recommendations are intended as a guide to expanding the use of recycled synthetic materials in the clothing sector.

1.5 Limitations of the research

This research is focused on recycled synthetic materials, in particular polyester, due to its high potential for reducing waste as well as the closed loop possibilities (see Chapter Two, section 2.2). It was considered more useful to carry out the study on such a specific material for examining in depth the potential environmental benefit, and therefore it does not   analyse other recycled fabrics that are available in the market.

Additionally it concentrates on the process of materials selection rather than other stages of the product life cycle, for example during use and transportation, as this study recognises the importance of the initial stages of product development in order to reduce the environmental impact.

The Japanese recycled synthetic fibre and fabric manufacturers were selected as participants for this study due to their leading technology position in the field. However, the outcomes derived from this study are their points of view and they may not be true reflections of recycled fibre manufacturers in other countries (such as the USA, Taiwan or China).

Due to their potentially huge volume of sales, significant energy reductions can be expected if recycled materials are widely used by high street clothing retailers (see Chapter Two, section 2.3.3). Therefore it was considered most suitable to select UK high street clothing retailers for this study. The study thus omits to cover other types of clothing retailers and might have made different findings if other types of clothing companies had participated.

1.6 Structure of the thesis

The thesis consists of six chapters.

Chapter One provides the introduction to the study. It sets out the rationale for study, aims and objectives, research questions and research design.

Chapter Two presents the literature review. It includes current environmental issues facing the UK and available options for recycled synthetic materials in clothing applications. Views of the key players such as manufacturers, clothing retailers and consumers regarding wider use of recycled synthetic materials are the focus of the discussion.

Chapter Three describes and discusses the research methods used in this study. It provides the theoretical background for constructing the street survey and case studies including document analysis, direct observation and semi-structured interview methods.

Chapters Four and Five present the results. Chapter Four presents the results of the in-street public survey. Chapter Five presents the results of the industry surveys.

Finally, Chapter Six correlates and synthesises all of the previous stages of the research, draws conclusions and establishes its contributions to knowledge. Recommendations for UK high street clothing retailers, Japanese recycled fibre manufacturers and researchers in the field of study are made.

1.7 Contribution to knowledge

The thesis pinpoints synthetic recycled materials as a vital part of an overall strategy to develop sustainable UK clothing.

It highlights the barriers and drivers for the expansion of the material into the general clothing markets through revealing Japanese recycled fibre and fabric manufacturer's roles in expanding the market for recycled synthetic material. The motivation of the UK public for purchasing clothes with recycled content and the UK high street retailers' readiness to source and adopt new sustainable materials in clothing production are also revealed.

This contributes to knowledge in ways that will assist these two clothing industry interest groups in their attempts to reduce the environmental impact of the clothing industry as a whole.

First, UK high street clothing retailers need to understand UK consumers' behaviour and identify potential markets for clothes with recycled content. Secondly, Japanese recycled fibre manufacturers need to identify the needs of UK high street clothing retailers for their products and their expectations of recycled synthetic materials, in order for them to expand into UK general and fashion clothing markets.

2
CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, the outcomes of the literature review are described and discussed. Firstly, the rationale for focusing on recycled PET is discussed from the view point of technological developments in advanced chemical recycling by Teijin that enabled the upcycling of recycled PET. Secondly, the attitude of the UK high-street clothing retailers towards taking the initiative and responsibility for their products as well as the paradox of fast and slow fashion within the sector. Thirdly, shopping behaviour, attitude and awareness towards eco-clothes by the general public are discussed.

2.2 Rationale for uses of recycled PET

In this section, the rationale of focusing on a particular material - recycled PET - is discussed. Furthermore, it puts forward technologically advanced options currently available as well as examples of products derived from using these technologies. PET is derived from a non-renewable resource (oil) and is non-biodegradable and it is used to produce plastic beverage drink bottles as well as clothing in the form of the synthetic fibre polyester.

Slater clearly states that in terms of end of use of garments, throwing away a non-worn out garment has the largest detrimental impact on the environment and yet this is not widely recognized (Slater 2003: pp.179-180). He also expresses concern over the environmental impact of water and air contamination and degrading soil quality due to the chemical substances within clothing products (Ibid.:p.15). Polyester is non-biodegradable therefore it will remain in the soil for 200 years while cotton or wool will produce methane gas (a greenhouse gas).

Textile recyclers contribute significantly in diverting clothes away from landfill. London's leading textile recyclers explained that good quality garments are given a second life as a garment. They are sold at second hand shops and charity shops or exported abroad usually to Africa and South Asia. Cotton and wool fabrics are re-spun to produce new products or become wipers.

However they have no use for synthetic fabric at all. They cannot export them as garments to export destinations that are often warm climate countries where consumers do not want to wear fabrics without breathability. Polyester fabrics cannot be used as wipers due to poor absorbance. They must send them to landfill or incinerators at a loss to the recycling company which buys in clothes in containers (see section 5.4.1).

Polyester mixed fabric also causes difficulties for textile recyclers. For example, Hawley (2006) states that the introduction of synthetic fibres introduces problems to textile recyclers; their durability makes them harder to shred than fabrics with natural fibres, while the blend of fabrics complicates the process of sorting (Hawley 2006: p.9). The textile recyclers mentioned above commented that the clothing industry should stick to natural rather than synthetic fibres. However, McDonough and Braungart, the authors of 'Cradle to Cradle' argue that going back to producing only natural fabrics is not the way forward. Taking into account population growth and food shortage. There is simply not enough land to grow fibre plants. (McDonough and Braungart 2002: p.42). They also expressed their concern towards synthetic and mixed fibres since polyester fibre cannot be disposed of in the same way cotton fibre can, as one is biodegradable and the other is not. They refer to this blended fabric as the 'monstrous hybrid' (Ibid.: p.106).
On the other hand, blending synthetic and natural fibres bring to consumers more beneficial and desirable characteristics such as high durability and easy care (Watson 1991: p.10).

Another UK textile recycler interviewed for this study expressed her concern that using synthetic fibre in garments without considering regaining the original polymer is short sighted as vast amounts of materials end up in landfill. She also mentioned that improving polymer reclaiming technology is necessary (see section 5.4.1).
Currently, producer responsibility policy in the UK follows the 'polluter pays' principle which applies to the packaging, automobile, electronics and batteries industries. However, DEFRA has carried out a pilot study for the textile and clothing sector through the Sustainable Clothing Roadmap project (DEFRA 2007) and implementation of the European Union's Landfill Directive means that all textiles should be collected separately and banned from going to landfill by 2015 (Fletcher 2008: p.99).

Both PET (polyethylene terephthalate) bottles and polyester fibres are made from ethylene glycol and terephthalic acid extracted from crude oil (Hatch 1993: p. 219). We are consuming crude oil steadily as if it were an infinite resource. Synthetic fibre production consumes only 4% of the world's oil production, therefore it has escaped criticism so far (Mackenzie 1997:138). However, sooner or later the synthetic fibre industry needs to seek other alternative resources (Heeley 1997: p.116).

How can we improve the situation we have? Do we have the technology to reduce the amount of plastic bottles, clothing waste or synthetic fabrics going to landfills or incinerators?

In the next section available options to challenge this issue are discussed.

2.2.1 Available options

In this section two alternative options for synthetic fibre production are discussed. One option is using biodegradable polyester derived from a plant base so that non-renewable and non-biodegradable resources will not be used. Another option discussed here is using recycling technology so that valuable oil-based polyester will be reclaimed and reused for new products. Another technology that is being developed is landfill mining, as there are huge amounts of valuable materials buried in landfills. However, Chris Dow, managing director of Closed Loop London, argues that we should reduce waste going to landfill rather than developing technology to mine them in the future (Kelland 2008). Therefore the latter option is not discussed here.

2.2.1.1 Biodegradable polyester

Ingeo is a brand name for the product commonly known as biodegradable polyester derived from corn. Extracted sugar from corn is fermented to produce PLA (polylactic acid). Ingeo was developed by Cargill Dow and marketed by NatureWorks LLC,a joint venture between Cargill and Teijin Limited of Japan. They claim that Ingeo is made from 100% renewable resources and able to compete with oil based polyester as it uses '65% less fossil fuel resources in production than usual polyester and   reduces greenhouse gas emissions by 80-90%' compared to oil based polyester (NatureWorks LLC 2009).

Recently there seems to be many enthusiastic supporters for biodegradable polymers derived from plant bases.

Matilda Lee, the author of 'Eco Chic', mentioned that 'replacing synthetics with renewable raw materials to make 'compostable synthetics' is the way forwards to sustainability' (Lee 2007:p.129). Dr Kate Fletcher, a consultant and Reader in sustainable fashion at London College of Fashion in her publication 'Sustainable Fashion & Textiles, Design Journeys' also suggested that moving away from oil based polyester to renewable and biodegradable fibres such wool and PLA is beneficial (Fletcher 2008: pp4-5,7,12).

However Lee (Lee 2007:pp.129-130) Fletcher (Fletcher 2008: pp27-30) and Keith Slater, the author of 'Environmental impact of textiles' expressed their concern towards

this material and also commented on the downside of biodegradable polyester as they are often derived from GM corn. This means that there is a risk of cross pollination (Slater 2003: p.24). There is little information about what exactly happens once the material is composted or about what impact genetically modified material has on the landfill.

Furthermore, corn is a food stock which raises the ethical question of whether it is ethical to use corn for polyester production.

Ingeo requires a certain environment to be biodegrade, hence it has to be collected and delivered to designated facilities. Currently biodegradable plastic is used mainly for plastic shopping bags for supermarkets (Black 2008: p.148). Julia Hailes raised her concerns about using biodegradable plastics for shopping bags. She suggests biodegradable plastic bags are not as good as they sound as they will cause harmful methane gas when they rot in landfills (Hailes 2007:p.36). Slater questions the biodegradability of this material. He believes that it will leave traces and even worse it will create toxins that are the result of the breaking down process that leads to soil and water contamination. He suggested that the environmental cure lies in recycling (Slater 2003: p.34).

Despite certain environmental benefits over production in comparison to oil based polyester, 'Ingeo has a long way to go' according to an independent textile consultant who works with NaturalWorks LLC. 'The production capacity of PLA is currently a small amount (approximately 150,000 tons per year) opposed to 30 million tons of synthetic polyester. Therefore PLA cannot take over synthetic polyester,' he explained. He also mentioned the unsuitability of Ingeo's low melting point of 170 °C for clothing applications. As Ingeo has a similar feel to it as cotton there is a risk that consumers may easily mistake an Ingeo garment for a cotton garment that has a much higher heat resistance (Researcher's interview, see Appendix 5.2). A recent article in Ecotextile News talked about the improvement of PLA polymer. NaturalWorks LLC announced that they now can produce PLA polymer with a higher melting point of 210°C which could expand to the clothing market (Annon 2009, Ecotextile News: pp34-35). However, Japanese recycled fibre manufacturers including Teijin, Toray, Mitshibishi, Asahi Kasei, and Kurabo in interviews for this study all commented that it is impossible for PLA to replace synthetic polyester due to the high volume demand for polyester fibre (researcher's interviews, see section 5.4.2/Appendix 5.3). More than 60 per cent of world fibre production is synthetic and within that more than 70 per cent is polyester (Allwood et al. 2006: p.2). Furthermore world fibre production increased by 6.0% in

2007, which was directly influenced by the volume increase in polyester production (Textiles Intelligence 2009).

Slater pointed out that any type of fibre production will result in damage to the environment (Slater 2003:p.37). However, a constant endeavour to conserve the environment is necessary, whether it is to seek alternative materials or to improve recycling systems. Ingeo fibre clearly demonstrates that it has environmental benefits over oil based polyester but there are barriers this material needs to overcome to be widely used. Whether it is a plant or oil based polyester, we should aim for the maximum use of valuable resources.

The closed loop recycling system based on the cradle-to-cradle model offers the option for synthetic fibres such as polyester and nylon to be 'upcycled' endlessly.

In the next section, this recycling technology is discussed in detail.

2.2.1.2 Recycling technology

The focus of this study lies on upcycling recycling technology. However, firstly upcycling is discussed in relation to downcycling and how they have developed.

There are two types of recycling models which are the 'cradle to cradle' model (upcycling) and the 'cradle to grave' model (downcycling). Upcycling means that material quality will be retained within the industrial loop so that material will be used to produce high quality products. It means that this material could be recycled endlessly; the 'cradle to cradle' model, thus resources will be kept in an industrial closed loop system as 'technical nutrient'. Downcycling means that recycled materials will be used to produce lower grade products that will eventually see the materials going to landfill or incinerator thus following the 'cradle to grave' model (McDonough and Braungart 2002: pp.27,72,91).

Figure 2.1 Different types of recycling methods

McDonough and Braungart state that 'most of recycling is downcycling.' (Ibid: p.56). Indeed this is the case in textile as well as plastic bottles recycling. Figure 2.1 shows three different recycling methods: chemical recycling, material recycling and reprocessing. Reprocessing uses manufacturing
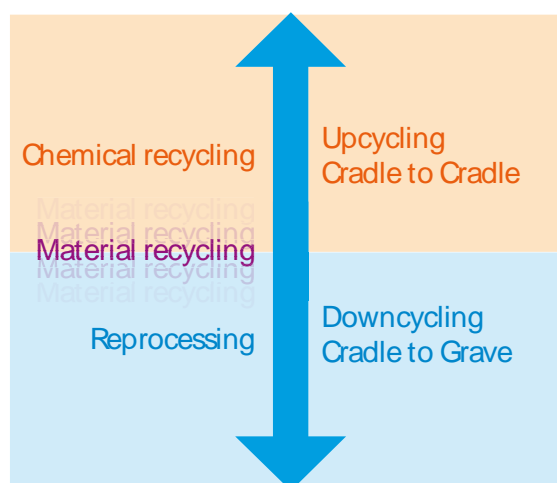
Figure 2.2 Reprocessing
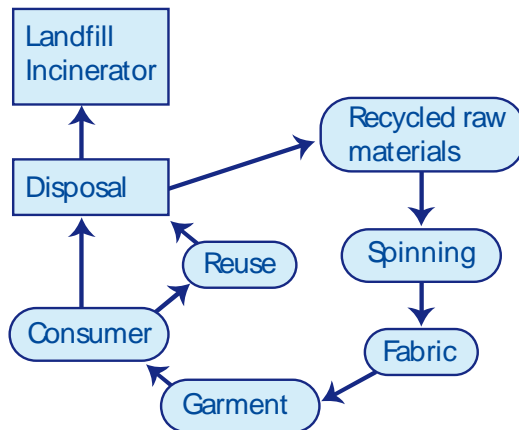
waste produced during various manufacturing processes (e.g. odd quantities left over, offcuts of fabrics) rather than PCR PET bottles. The technique used is that of tearing and shredding, the same technique that is used for natural fibre recycling. The end products are fibre fill or needle punched fabric (like a felt) that is produced for carpet backing and liquid filter applications (Nadkarni 1999). One particular drawback of this method is degradation. It is unavoidable that fibres become ever shorter through the shredding process which means they lose quality. Recycling natural fibre in this way has been practiced for many years and the perceptions towards recycled fibre stem from this degradation of the quality through this particular method of recycling fibre. This method is downcycling as recycled fibre will eventually go to either be incinerated or landfilled (see Figure 2.2).

Material recycling technology (see Figure 2.3) has made it possible to recycle used plastic bottles into clothes. It was impossible to manufacture a fibre of less than 6.0

Figure 2.3 Material recycling
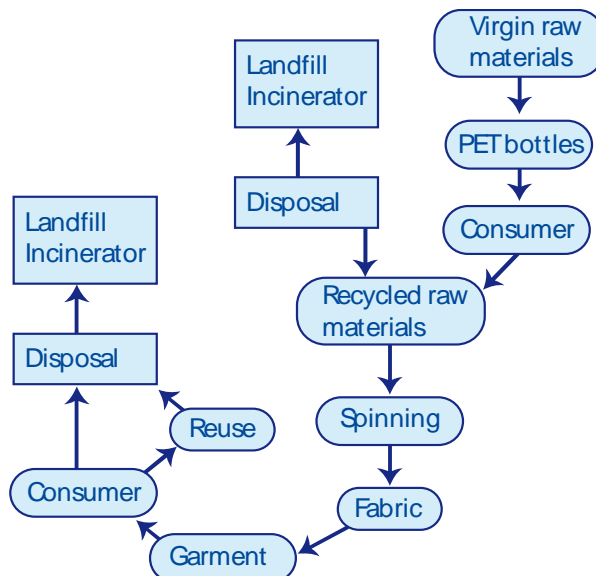
denier from post consumer PET until 1993. Using plastic bottle waste has the benefit of reducing the amount of waste going to landfill but they are also a high quality alternative to the raw material crude oil, especially when the oil price is high. However, Figure 2.1 shows that this technology is used for both upcycling and downcycling.

Recycling plastic bottles involves collecting, sorting, crushing and washing processes through which they are turned into small chips called 'flakes'. In order to produce a high quality raw material, sorting is one of the most important processes. 1 part per million (ppm) of PVC (Poly-Vinyl-Chloride) can discolour PET (Ehrig 1992: p.52). PVC is also used for beverage bottles and because of its similarity of density to PET it is not feasible to separate them using gravity flotation techniques. Therefore an X-ray detector that spots chlorine is used to separate them. Separation of different polymers should be carried out with great caution as it may cause machinery to break during the extrusion process (Nadkarni 1999). PET flakes also need to be dried properly, especially if gravity flotation techniques are used for the separation, as it may cause contamination. The flakes derived from the processes above are melted into liquid form called viscose and pushed through spinnerets (nozzle-like holes) to form filaments. This liquid needs to have an I.V. (the intrinsic viscosity that is a measure of the molecular weight) of more than 0.6 in order to maintain the high quality needed for the process to run without problems. If the I.V. of the polymer is lower than 0.6, problems will most likely occur as the melt viscosity is dependent on the rate of I.V. (higher is better) (Ibid. 1999). There are numerous technical improvements in order to reduce complications in the processes and to increase the quality of fibre. As a result, finer deniers for clothing applications have been produced. Generally, the finer the fibre size, the higher the quality of the fibre. They are softer, they drape better and are lighter in weight (Hatch 1993: pp.90, 223).

However, quality of available recycled PET fibre is not consistent. Some of the Japanese recycled PET fibre manufacturers mentioned that there are many low quality recycled PET fibres in the market as filling for soft toys, and they pay extra to secure high quality chips as the chip quality is crucial to producing high quality fibre. They also mention that staple (short length) fibre that are usually produced by material recycling easily hide uneven colour so it is not always obvious whether the material is of high quality or not (author's own interview, see Appendix 5.3). Phil Patterson questioned some of the poor quality recycled PET fibre in relation to its poor dyeability. He is concerned that we risk sending the wrong message to consumers by flooding the market with clothes made from the poor quality recycled PET fibre (Patterson 2009: pp.20-21)

One of the leading Japanese recycled PET fibre manufacturers clearly stated that 'quality of fibre will degrade as polyester is made with polymers that have a long chain of the same structure. These chains will break when heat is added to melt the polyester.

This length of the chains is very important when we produce polyester fibre as the quality of the fibre will be unstable if these chains are broken in some place.' (author's own interview, see Appendix 5.3) This means that although introducing recycled plastic bottles into clothing is upcycling and extending the life of a useful resource, the quality will eventually degrade and thus it becomes more likely it will be used for lower quality products, or go to incinerator or landfill (see Figure 2.3).

Figure 2.4 Ecolog system
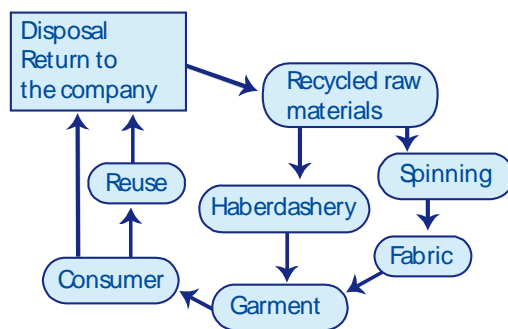
In 1994 Ecolog (Germany/Japan) took recycling PET a step further. They collected second hand Ecolog garments (polyester 100%) at the shops in order to return the material to polyester granules through several processes to then again produce clothes, buttons and zip fasteners (Nadkarni 1999). They have achieved the first closed–loop system in the clothing sector (see Figure 2.4).

Figure 2.5 Chemical recycling
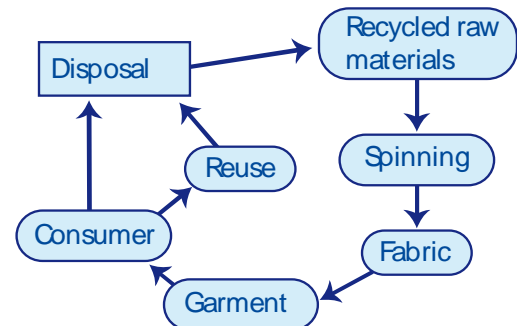
In 2002 Teijin (Japan) launched an operation of highly advanced chemical recycling (see Figure 2.6). They have succeeded in removing impurities not only from PET bottles but also polyester fibres as well as many other polyester products. It means that they can recycle blended fabrics such as polyester and cotton fabric. Using this highly advanced chemical recycling technology, a quality of material as high as that from crude oil DMT (dimethyl terephthalate) will be produced. They claim that the energy consumption is reduced by 30% in comparison to producing raw materials from crude oil, thus reducing emitted CO_2 gas as well as reducing the use of limited resources and diverting waste from landfill. As a part of the highly advanced chemical recycling project, there are 'fiber-to-fiber' (EcoCircle), 'bottle-to-bottle' and 'film-to-film' recycling projects (see Figure 2.6).

They have developed an endless recycling system for PET just like the ones already existing for iron and aluminium (Teijin 2002) (see Figure 2.5).

Figure 2.6 The highly advanced chemical recycling system (source: Teijin 2002)
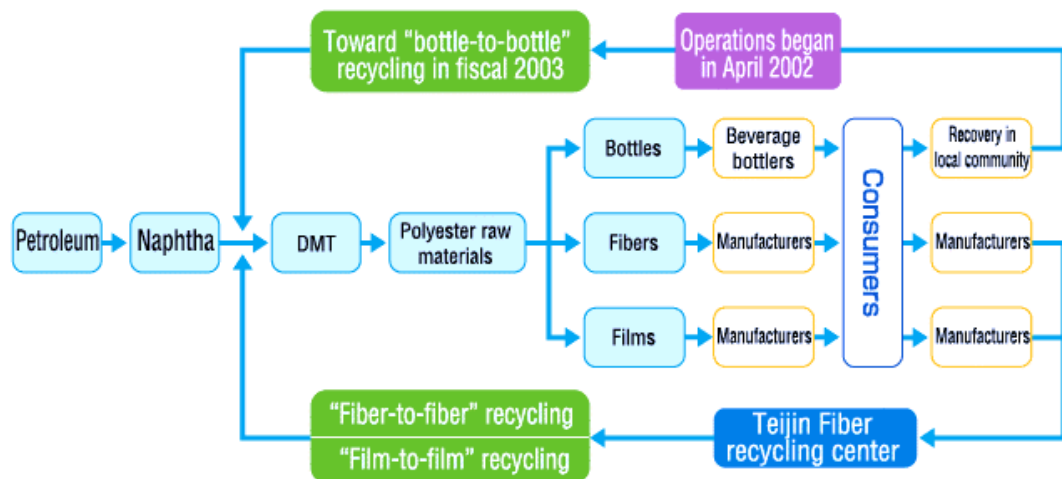
McDonough and Braungart express their concern about toxins within fibre from recycled plastic bottles. They criticised the use of recycled PET fibre from plastic bottles for clothing as it contains toxins such as antimony, catalytic residues, ultraviolet stabilizers, plasticizers, and antioxidants which are potentially harmful for humans (McDonough and Braungart 2002: p.58). However, one of the leading Japanese recycled fibre manufacturers commented that these toxins will all be removed through the chemical recycling system unless antimony is used again for the production of polyester fibre afterwards (author's own interview, see Appendix 5.3).

This technological development in recycling PET fibre can be a base for developing sustainable clothing products, particularly because polyester is least environmentally damaging when kept in 'an industrial loop system', because it is not biodegradable and comes from a limited resource.

In the next section, current use of this technology in the clothing sector is discussed.

2.2.2 Recycled PET and its use

There are several indications that the fibre/fabric manufacturers are moving a step further towards incorporating recycled materials into their production.

For example Teijin (Japan), which introduced 'highly advanced chemical recycling'

Figure 2.7 Fleece jacket made from fibre to fibre recycling   Source: Patagonia 2009

collaborated with Patagonia to launch the 'Common Threads Garment Recycling Programme'. This programme collects used garments from their customers and produces new garments from the old. Patagonia claims that creating new garments from end of life clothes, rather than using virgin materials, saves 76% in energy production and reduces CO_2 emissions by 71% (Patagonia 2007). At the same time the companies can make sure they know exactly what materials they are handling when recycling (the raw materials are their own products) as impurities could cause major problems when producing high quality recycled fibre. They have started to collect used garments from customers since September 2005 and are now producing garments through this programme (see Figure 2.7). Howies (UK) is also using Teijin's Eco-Circle fabric for their 'born again jacket'.

In 2006 Unifi Inc. (USA) produced a '100% recycled polyester yarn with permanent performance benefits' called 'Repreve®'. This recycled yarn has high performance characteristics of insulation and weather protection, making it ideal for the outdoor sports market. Repreve® was developed as a response to demand from consumers. Unifi Inc. found that more than 50% of women and more than 33% of men are keen to purchase eco-friendly athletic clothes with technical performance (TextileWeb 2007, Unifi 2006). This innovative Repreve® yarn is used for the production of Polartec® fabrics by Malden Mills (USA). Polartec® is the fabric used by Patagonia (USA) for their fleece jacket products (Unifi 2006).

In 1993 Patagonia launched the first outdoor eco-clothes; the PCR (Post Consumer Recycled) Synchilla fleece jacket made from recycled Polyethylene Terephalate (PET)

plastic bottles. The company declared that in two years (1994-1996) over 22 million PET bottles were saved from going into landfills (Brown and Wilmanns 1997: pp.29-30). Patagonia's PCR fleece jacket, launched in 1993, is a good example of eco-clothes made of recycled PET plastic bottles for the first time. The popularity of the fleece fabric can easily be explained through its practicality. The fleece is warm, easy care and lightweight and a better alternative to the knitted woollen jumper that generally needs more care and is heavier.

It was an exciting new innovative product development for a company that has already pioneered the use of organic cotton, through which they had already gained strong support from their customers. It perfectly fitted the company direction of taking a stance to reduce the impact on the environment as much as they could. By using this fabric, they contributed by diverting waste from landfill sites, reducing the use of resources and reducing emission. Patagonia targets the outdoor market and appeals to the nature lover and the outdoor sports enthusiast. In fact, the director and most of the staff at Patagonia passionately engage in outdoor activities such as climbing and surfing and developing products with the environment in mind as a natural direction for the company to take (Chouinard 2006).

Fifteen years later, the recycled PET material has not been widespread to other markets apart from this niche sports apparel market. From the early nineties there were several factors that have hindered wider use of recycled PET bottles materials in other clothing sectors, which are:

- High cost
- Lack of variety of fabrics and garment types
- Negative perception towards recycling
- Negative perception that recycled materials have an inferior quality.

Firstly, the fleece jacket made from recycled plastic bottles was priced much higher (£70 plus at Patagonia) while you could grab a fleece jacket for around £20 in the marketplace. Secondly, recycled PET was used only in niche and targeted markets, and there was not enough choice in terms of design, types of fabric and garments. Thirdly, there was also uncertainty towards recycling itself and its actual benefit to the environment. Recycling consumes energy and creates pollution just like any other industry and there is a lack of information on the exact impact the recycling process has

on the environment. (Fletcher 1999b: pp.47,69, Cooper 1997: p.65, Hinte 1997: p.10, Maes 1997: p.85). Finally, recycled materials are perceived to be of inferior quality. Recycling waste materials always causes degradation, no matter if it is textile or plastic waste (before the development of chemical recycling). A common practice to improve the quality is by mixing recycled materials with virgin materials (Breds et al. 2002: p.12). The perception that recycled synthetic fibres are of inferior quality most likely has its roots in the recycling of natural fibres, where the process of pulling the fibres apart irreparably damages the fibres which subsequently can only be used in low quality products.

With innovative advanced chemical recycling system, it is now possible to close the industrial loop. Quality issues mentioned above are removed as there is no quality difference between polyester from virgin oil and recycled materials. Furthermore, using recycled PET material has environmental benefits such as conserving non-renewable fossil fuel resources, saving valuable resources from landfill and reducing the contamination risks from non-biodegradable plastic bottles or synthetic fibres.
To investigate the current usage of recycled PET in clothing further, five Japanese recycled fibre manufacturers were interviewed. The outcomes of the industry surveys are discussed in Chapter Five. To maximise the environmental benefit for using recycled PET material, this research has focused on examining the possibility of recycled PET usage by high street clothing retailers in the UK, due to their high volume turnover.
In the next section, awareness and attitude of UK high street clothing retailers' awareness of issues surrounding sustainability are discussed.

2.3 Clothing retailers

It is important to understand the current eco-clothes market in order to evaluate the potential use of recycled synthetic materials in the UK high street clothing market. This section will look at the shift from 'Green fashion' to 'Sustainable fashion' in order to understand where recycled synthetic materials fit in with the current understanding of concepts and terminology that surround this market. I will discuss recent clothing retailer's awareness and initiatives towards sustainability as important indicators of their willingness to move towards more responsible business practices and outline the rationale for focusing on the manufacturing processes in order to reduce the

environmental impact in relation to clothing through looking at LCA studies and the current fashion phenomena; fast fashion versus slow fashion.

2.3.1 Change of the term to ethical/sustainable fashion

This section discusses how the approach to environmental issues in the clothing market has evolved; from initially a rather shallow approach that used only natural fabric to investigating the roots of the supply chain and how this is reflected in the terminology that is used in and around the clothing industries throughout the early nineties to the present. Figure 2.8 shows previous and current examples of eco-clothes. They are divided and categorised under four different types of materials that include 'recycled PET', 'organically grown fibre', 'fairtrade/ethical trade' and 'reuse'. The five colours represent the various types of eco-clothes such as 'high-end', 'simple casual', 'fashion casual' 'outdoor/sports casual' and 'corporate'. Categorising them into different types of materials and garment types and listing them in chronological order provides a clear understanding and an overview of eco-clothes development.

Figure 2.9 shows in chronological order important social events that are related to environmental issues and major events (including fashion trends, predictions and publications) in the clothing sector. A simplified version of Figure 2.8 is also aligned in chronological order in Figure 2.9. This enables an analysis of how social events (general and specific to the clothing sector) influenced eco-clothes development.

Figure 2.8 An overview of eco-clothes development as derived from this research ©Yukie Nakano (Diagram sources referenced throughout the literature review.)

Recycled synthetic (PET)

1. Patagonia (1993)
2. KOMODO
3. LL Bean
4. Berghaus
5. San Marino
6. Famous Trail
7. Propeller
8. TOABO
9. TEIJIN
10. ECOLOG/Germany+Japan (1994)
11. SWEATER HOUSE
12. Levis Strauss
13. Pen Field Kal Horn
14. HIS TUBE
15. Hollywood Ranch Market
16. Any Mountain (UK)
17. SANKI
18. TOYOBO
19. KANEBO
20. Common Threads Garment Recycling Program (2005) with Patagonia and Teijin
21. Common Threads Garment Recycling Program (2005) with Patagonia and Toray
22. Patagonia - The foot print chronicle

Fair Trade / ethical trade

1. KOMODO (1998)
2. People Tree (2001)
3. Hug (2002)
4. Selfridges/People Tree Collection (2004)
5. M&S (2006)
6. TopShop/People Tree Collection (2006)

Organic cotton, organic grown wool, hemp, nettles

1. Hess Natur (Germany) (1976)
2. KOMODO (Hemp) (1988)
3. Esprit – Ecollection (1990)
4. M&S – Early 90s)
5. Patagonia (1992)
6. Kathrine Hamnett, designs jeans made from organic cotton (1994)
7. GAP, organic cotton underwear (1994)
8. Benetton – bring back old clothes (1995)
9. Britta' Steilmann – Germany (1995)
10. Sustainable Solution Design Association (1995)
11. Greenfibres (1996)
12. Patagonia 100% organic (1996)
13. Holstein Flachs-Hemp (Germany) (1996)
14. Gossypium (1998)
15. NIKE 3% organic cotton (1998)
16. Paradigm/Denmark (1999)
17. M&S (2000)
18. Hug (2002)
19. Timberland (2003)
20. H&M (Sweden) (2004) 5% of production
21. M&S Yoga range (2004)
22. Katherine E Hamnett (2005 Spring)
23. M&S 5% by 2010
24. NIKE by 2010 3% organic cotton for entire range

Reuse

1. OXFAM- NOLOGO scheme (1991)
2. 2nd life by Helen Storey (1993)
3. Kosuke Tsumura – Final Home (1994)
4. TRAID (Textile Recycling for Aid and International Development) (1999)
5. From Somewhere / London Fashion Week
6. Junky / London Fashion Week
7. Gary Harvey / London Fashion Week

Figure 2.9 An overview of social events and eco-clothes development as derived from this research ©Yukie Nakano (Diagram sources referenced throughout the literature review.)

● High-end   ● Simple Casual   ● Fashion Casual   ● Outdoor/Sports Casual   ● Corporate

Social events	Fashion trend, prediction, publication	Reuse	Fair trade / ethical trade	Recycled synthetic (PET)	Organic cotton, organic grown wool, hemp, nettles
FoE (1969)					
Gaia Theory 1970s					
Greenpeace (1971)					
Mad cow disease (mid 80s)	Novotex –Denmark (1983)				①
	Rifat Ozbek collection in white (Autumn 1989)				②
	Foxfibre (naturally coloured cotton) (1989)				③
	Eco-look established (1989-1992)				④
	Clean clothes campaign focused on working conditions (1990)				
	Novotex Certified cotton R&D (1990)				
	Water & Toxics campaign by FoE (1990)				
	Against bleaching campaign by WEN (1990)				
	Textiles and Environment – International Textiles magazine (1991)				
	CIS centre, Denmark (1991)				
Agenda 21 by UN (1992)	TENCIL –Courtaulds (1992)	①			⑤
	Textiles Environment Network (TEN) (1993)	②		①	
	Eco-View article - Textile View (1993)			②	
	Peat –Kultaturve –Finland (1993)			③	
	ECO2 (1994)	③		④	
	Dioxin level found in textiles/ Germany (1994)			⑤	⑥
	Cot deaths and flame retardants/UK (1994)			⑥	⑦
Landfill crisis debate/ Incinerator/ Air pollution/ Dioxin (1995)	William McDonough & Design Tex ultimate biodegradability, The Climatex Lifecycle range made from wool and lamie (1995)			⑦ ⑧ ⑨	⑧ ⑨
	Goldsmiths –e codesign course start (1995)			⑩	⑩
CJD 10 new cases in humans (1996)	Sustainable Cotton Project (SCP)/USA (1996)			⑪ ⑫ ⑬	⑪
	Fighting Fashion by Helen Storey (1996)			⑭ ⑮	⑫
	22 EU Eco label (1996)			⑯	⑬
Packaging electronics legislation (1997)	REUSE, International Design Exhibition (1997)			⑰ ⑱ ⑲	
The Kyoto Protocol (1997)					⑭
Ethical Trading Initiative (ETI) (1998)	Cleaner Cotton Campaign by SCP (1998)	①			⑮
Sustainable Consumption Programme/UNEP (1998)					
GM crop (1999)	The end of fashion by Teri Agins (1999)	④			⑯
Are you doing your bit? campaign (1999/2000)	DEMI(UK) (1999)				
	Green Cotton campaign- Novotex & KH (2000)				⑰
	NOLOGO by Naomi Klein (2000)				
Waste Strategy (2000)					
'Re-Awaken the Challenge' Blair's speech (2000)					
Demand for organic food (2000)			②		
Labour behind the Label (2000)					
Sweat shops – NIKE & Gap (2000)					
Foot and Mouth outbreak (2001)			③		
Code of Conduct (2002)	Guidelines by SSDA (2002)				⑱
GM crop (2003)	EVERGREEN closed down (2003)				⑲
increase in recycling rate (2003/04)	NIKE bring back old trainers (2003)				
	MS CSR report (2003/04)				
	NEXT CSR report (2004)				⑳
	Chelsea College of Art, research project called textile-environment-design (TED) (2004)				㉑
	MS CSR report (2004/05)				
	NEXT CSR report (2005)		④	⑳	
Live 8 – Bob Geldof (2005)	MS CSR report (2005/06)				㉒
Make Poverty History campaign (2005)					
Healthy Eating/5 a day campaign(2005)					
Frequent TV coverage/Global warming (2005)					
Frequent TV coverage/Climate change (2005)					
Hurricane Katrina (2005)	Ethical consumer 'clothes shop s' (Jan/Feb 2006)		⑤		
Climate report 'Act now' (Oct 2006)	Ban for thin models (2006)				
Climate change protest in London (2006)	M&S' Look Behind the Label' campaign (Jan 2006)				
	The Well Fashioned exhibition by the Crafts Council (2006)				
	LFW Esthetica section (2006)		⑥		
UK summer of floods (2007)	M&S 'Plan A' launch (2007)	⑤ ⑥ ⑦			㉓ ㉔
	Sustainable Clothin Road Map (2007)				
	RITE conference launch (2007)		㉑		
Stock market collapse(2008)	Patagonia- Foot Print Chronicle (2008)				
Northern Rock nationalised (2008)	Sustainable Fashion Textiles by Kate Fletcher (2008)		㉒		
oil price plumets below 50$/barrel (2008)	Eco-chic: The Fashion Parades by S. Black (2008)				
	Fashion Practice Journal launch (2009)				
	Sustainable Clothing Action Plan (SCAP) launch (2009)				

Green fashion

In the nineties the term 'green fashion' was often used. The 'eco-look' incorporated ideas of 'natural' and 'green' by favouring natural fibres and natural looking colours. However, the fashion world was preoccupied with style and appearance and misrepresented and oversimplified the multifaceted array of effects the fashion industry can have on the environment (Fletcher 1999b: p.25). Ideas such as 'Natural' equals 'Ecological' were typical examples of the misconceptions of environmental issues by the fashion world. The natural 'eco-look' very quickly became a stylistic expression of the moods of the time. Designers sought inspiration for their colour palette from nature. Fabrics such as unbleached natural cotton, hemp, linen and silk became increasingly popular. The fashion industry also increasingly looked into more environmentally sound production methods such as vegetable dyes. It was generally accepted by the industry and the fashion and textile media that natural fibres have a lesser impact on the environment than man-made fibres, and this was fuelled by a perception that the chemical industries are to a large extent to blame for the current environmental imbalance (Heeley 1997: p.36).

Heeley comments on attempts by the media to promote the idea of 'natural is best', evident in a variety of environmental publications. General advice to rely on renewable materials rather than non-renewable resources such as petroleum was common. However the misapprehension that natural automatically means environmentally sound has oversimplified the environmental issues surrounding the textile industry. Although the general debate was to a large extent clouded by this idea of 'natural is ecological' (Heeley 1997: p.37) the eco-look fashion also attracted strong criticism from several campaigns such as 'Water & Toxics campaign' by FoE (1990), 'Against bleaching campaign' by WEN (1990), and 'Clean clothes campaign' focused on working conditions by NGOs and trade unions (1990) (see Figure 2.9). These campaigns urged looking at the real environmental issues surrounding the clothing industry, unlike the previous approach that merely used environmental concerns as a fashion design theme. Figure 2.8/2.9 show that around the same time and soon after the above campaigns, intense eco-clothes product development using organically grown fibre, recycled PET and reused materials took place.

Environmentally friendly clothes

In the early nineties, the term 'environmentally friendly' was often used and there were several companies that launched eco-clothes that carried real environmental benefits such as non-use of fertilisers and herbicides and the diversion of plastic bottle waste from landfills. Typical examples were clothes from Esprit (USA) and Patagonia (USA) (see Figure 2.8).

In 1992 Esprit launched Ecollection. Lynda Grose (the co-founder of the Ecollection) states that Ecollection became the first international clothing line that actively tried to reduce the impact on the environment through environmentally sound processes. Ecollection used organic cotton and marked a very important step in the development of a more environmentally friendly fashion industry, as it was the first time that a clothing producer had gone back to the bottom of the supply chain. The success of the collection was enormous while the general trends for a natural look supported its use of earthy pale colours between 1992 and 1994, but the collection finally disappeared with the trend as consumers moved back to colourful garments (Myers and Stolton 1999: pp.102,105).

Figure 2.10 PCR fleece jacket
Source: Patagonia 2009

Wider concerns of consumers prompt demand for natural

1994 also saw media coverage of a study carried out by German scientists that found high toxin levels in textiles, while in the UK a relationship between cot death and flame retardants on textile products was established. This media coverage encouraged an escalating feeling of unease and uncertainty towards conventional cotton products among the general public and created a market for organic cotton products (McCarthy 1996: p.155, Lorek and Lucas. 2003: p.35). Figure 2.9 shows the concentration of organic cotton products in the mid nineties.

Between the middle of the nineties and the beginning of the millennium, there was a huge outcry among the general public for safer foods due to several incidents that had

Figure 2.11 The puff sleeve stripe dress   Source: People Tree 2009

occurred, such as the increase of human CJD* cases, the GM crop debate and the Foot and Mouth disease outbreak (see Figure 2.9). These incidents fuelled demand for organic foods (Breds et al. 2002: p.10); the UK organic food business has grown by 70% to £1.5 billion during 2002 and 2007 (Mintel 2007). The huge demand for and interest in sustainable agriculture methods for foods had an effect on the way cotton fibres were cultivated (Fletcher 1999b: p.44). There were two campaigns promoting sustainable agriculture, the Cleaner Cotton Campaign/SCP (1998) and the Green Cotton campaign/Novotex & KH (2000). At the same time the NOLOGO book (2000) by Naomi Klein was published, the Labour behind the Label campaign (2000) was underway and media coverage of sweatshops revealed the involvement of two big companies (NIKE and Gap) (see Figure 2.9), which led to a serious questioning of business practice in the clothing industry. Furthermore, the trend towards 'natural colour and look' and 'environmentally friendly' inspired eco-clothes design to be simple, comfortable and lasting. In other words, not stylish at all. However, the clothing industry realised that it was not possible to ignore the advancing fashion trends and it was a challenge to alter the perception that eco-clothes equals 'not fashionable' (Lorek and Lucas. 2003: pp.28-29, Fletcher and Tham 2003).

It was noted that one of the factors that held back the eco-clothes market during the nineties was the lack of variety in fabric and garment types. Past experience of eco-trends lead to the conclusion that eco-clothes need to have fashion elements (Breds et al. 2002: p.5, Lorek and Lucas. 2003: p.37).

A few companies proved that it was possible to achieve this (Breds et al. 2002: p.9) and a recent example is People Tree (see Figure 2.8) that offers Fairtrade clothes and accessories with design and style (see Figure 2.11). Their collection was displayed in one of the major department stores (Selfridges) in 2004. Mirza (2004) anticipated that it may not have been a success as Selfridges did not comment on reactions from consumers (Mirza 2004: p.21).

Ethical Fashion

In March 2006 TopShop (the UK's fashion-conscious high street clothing retailer) introduced People Tree into their Oxford Street store in London and they launched a promotion for 'ethical fashion' in February 2007 that coincided with the LFW 'Estethica' launch (see Figures 2.8, 2.9).

The LFW defines the criteria to be exhibited at the Estethica as follows;

Ethical Trade - By ensuring that farmers and producers get a guaranteed fair price for their labour, investment is returned

Slow Clothes - Fashion that is not time based, but is about producing, designing and consuming better

Eco Fabrics - Consideration of the environmental footprint of fabrics

Organic - Man made, natural and sustainable fibres

Recycling- Using only pre-existing materials

(London Fashion Week 2008)

Figure 2.12 The dress made of recycled fabrics Source: From Somewhere 2009

The overwhelming success of the LFW 'Estethica' put the spotlight on ethical fashion. The integration of a much wider array of issues into the term 'ethical' rather than a single preoccupation with workers rights is clear from the 'Estethica'. A much broader understanding of social responsibility that includes issues such as ethical trade, slow fashion, eco-fabrics, organic and recycled materials suggests that there is a deeper understanding of the impact of clothing production and consumption on the environment and people. Ethical trade as defined by the ETI means that worker's rights such as wages, working hours, health and safety and freedom to join a trade union are protected throughout their supply chain (ETI 2009). However the broadening up of the term to include other surrounding issues and concepts around sustainability indicates that previous radical and uninformed eco-clothes movement interpretations (such as all synthetic materials are harmful and unnatural) would now be less likely. This is directly significant to the integration of synthetic materials into the eco-clothing market, as these materials have previously been looked upon as not fitting the green image eco-clothes have been trying to portray.

The 'Estethica' was first introduced for the A/W collection in 2006 and on both occasions this particular exhibition within the LFW was positioned near the entrance of the exhibition on the ground floor to draw maximum attention from the visitors. The number of designers who showed their works at 'Estethica' had grown from twelve to thirty eight including People Tree and Oxfam for the 6th event in February 2009 (LFW 2009). In addition, seventy ethical fashion labels have been shown at the Paris Fashion Week since 2006 and since 2005 the annual Ethical Fashion Show has taken place in Paris. The Esthetica shows clearly that the interest towards eco-clothes has increased significantly and this time the concern is broader, taking in the environment as well as workers rights (LFW 2008). What is more, it certainly changed the perception that eco fashion is dull (Lee 2007:p.10). Sandy Black, the author of 'Eco-chic the Fashion Paradox' noted that 'today's eco fashion is with concept innovation and a high level of design aesthetic (Black 2008: pp17-18)'.

Sustainable fashion

The scrutiny and understanding of the broader issues surrounding sustainability leads to the conclusion that these issues cannot be separated. For example, organic cotton clothes cannot be produced by unlawfully operating factories.

The term 'Sustainable Fashion' has not been used frequently in comparison to 'ethical fashion' as it covers a broader range of issues rather than one aspect of the various issues that are listed in the previous section. First attempts at environmental fashion only pursued the natural look rather than considering the environmental impact caused by textile and clothing production. There was a resistance toward harmful chemicals, in particular those used in the dye process, and hence no colour and no bleach clothes became fashionable. This no colour and no bleach approach was short lived with the realisation that the fashion aspects of clothes could not be ignored; increased education of the public meant that not only material (what they were made of) issues but also ethical (how they were made) issues related to clothing production emerged.

According to Julia Hailes, the author of the new green consumer guide, 'sustainability' consists of health, ethics, fair trade and animal welfare (Hailes 2007: p.8) and they are all related to each other. Linda Welters (2008) suggested that 'now is the time for sustainable fashion' (Welters 2008: pp26-27). She wrote that we are living in 'overabundance'; many affordable fashionable clothes are sold worldwide and therefore we are forced to consider material resources, fair working conditions and the health of our environment (Ibid.).

There is a long way to go to achieve truly sustainable fashion which satisfies all issues involved, in particular for a mass market such as high street clothing.

It is however noteworthy that the clothing sector has begun to move from 'green fashion' concerned with styles and appearance to 'ethical fashion' that includes social aspects as well as environmental benefits in the last eighteen years. More and more high street clothing retailers are taking these issues seriously and reacting to them. In the next section, their reaction and attitudes are discussed.

2.3.2 Retailer campaigns and initiatives

Retailers' current initiatives towards CSR are an indicator of their readiness to implement the use of recycled materials and more specifically synthetic materials in their production.

There are considerable pressures from government, shareholders and the general public in the push to make industry take responsibility for their business practices, such as material sourcing, manufacturing and disposal of products, and businesses are

expected to behave in an ethically and environmentally sound way. (Collins and Aumônier 2002: p.1, Bhamra et al. 1999: pp.211-212) In the UK, "the Producer Responsibility" policy was introduced in 1997 requiring producers to take back their products at the end of the product's life. It aims to encourage producers to develop sustainable products in terms of raw materials use, reusability and recyclability of the products. Currently this policy applies to packaging, vehicles and electrical/electronic goods, but there are plans to expand to other goods in the future and a pilot study has already been carried out in the textile and clothing sector through the Sustainable Clothing Roadmap project (DEFRA 2007).

The UK's largest retailer expects that environmental pressure will force government to react in the near future, perhaps implementing new legislation such as a tax for carrier bag use, or a carbon trading system for retailers (Marks and Spencer 2008). In December 2008 new European legislation, the 'Waste Framework Directive' (WFD) was introduced to encourage consumers and corporations to recycle more. They identified textile recycling as potentially very beneficial to the environment (Research and Markets 2009).

Furthermore, the British Fashion Council (BFC) launched the sustainable clothing action plan (SCAP) at LFW with Esthetica in February 2009. This plan is aiming to make fashion cycles more sustainable by considering whole lifecycle of clothes. Nike, Tesco, Marks and Spencer, Sainsbury's and Oxfam are involved with the plan (Anon. Ecotextile News 2009: p.17).

There is also The World Business Council for Sustainable Development (WBCSD) that was formed on the day of the 1992 Rio Earth Summit. They offer their expertise to companies moving towards sustainable development (WBCSD 2009). Stephan Schmidheiney, one of the founders of the WBCSD, believed that in order for business to be competitive in the next decade, being 'eco-efficient' is vital so that business can deliver better goods or services while using less resources and create less pollution (McDonough and Braungart 2002: p.52). 'Being sustainable' offers business opportunity to not only improve their goods or service but also contribute to improve employee morale. Furthermore, it protects their brand value and also attracts investors. Managing sustainable issues reflects to business performance and quality overall (Lee 2007: pp.105).

In the UK 12 % (nearly £40 billion) of all retailer sales was clothing in 2007 and more than 95% of the clothing were produced abroad (Anon 2008 Drapers, pp.16-17).

The ethical clothing market value went up from an estimated £40 million to approximately £175 million between 2004/5 and 2009 (Mintel 2009).

There are some campaigns and publications that have raised awareness among the public such as the Clean Clothes Campaign, the Cleaner Cotton Campaign/SCP (1998), the Green Cotton campaign/Novotex & KH (2000), Labour behind the Label (2000), NOLOGO(2000) and news coverage of ethical issues mentioned above (see Figure 2.8/2.9).

At the RITE conference that was held October 2008 in London Tesco revealed the YouGov survey results. 78% of shoppers wanted to know about how clothes were made. 31% responded that they had decided not to buy any of clothes because they were not sure how they were made in 2006. In 2008 this figure increased to 40%.

Due to increased demand from consumers, clothing retailers were pushed to apply codes of conduct and now the ETI (Ethical Trading Initiative) represents 54 companies including Marks and Spencer, NEXT, Gap Inc, Inditex, Monsoon, New Look and Primark which joined in 2006. They have all published either their CSR (Corporate Social Responsibility) report or their initiatives on ethical issues on their websites. Bhamra and Lofthouse stated that 'CSR is an expression used to describe a company's obligation to consider the needs of all of its stakeholders' and it is closely related to the wellbeing of society and the environment (Bhamra and Lofthouse 2007: pp.24-25). The high numbers of delegates that attended the RITE conference for sustainable textiles in October in London illustrate the high interest from clothing retailers. There were about 260 delegates including sixteen clothing retailers (see Table 2.1).

Table 2.1 Attended delegates at the RITE conference in October 2008 in London

Name of the company (Number of delegates)	
Marks & Spencer (4)	Fat Face (1)
NEXT (4)	Adidas (1)
NIKE (4)	Howies (1)
Arcardia Group (3)	Sainsbury's (1)
Tesco Clothing (2)	John Lewis (1)
Speedo (2)	C&A (1)
H&M (2)	Burberry (1)
Monsoon (1)	Jaeger (1)

The advantages of taking action and being able to respond to consumer demands can be described as improving their corporate image, gaining consumer support, reducing production costs and being able to respond to changes easily when new legislation is introduced with the advantage of saving the cost of penalties or taxes (Bhamra 2004). Some retailers took initiatives to react to consumer demand. The major UK retailer Marks & Spencer for example has carried out a 'Look Behind the Label' campaign and along with Gap Inc were the first corporations in the clothing sector to deal with CSR activities at the centre of their business (Fletcher 2008: p.45). Topshop is promoting the People Tree range in their Oxford Street store and Monsoon is sponsoring the Esthetica at LFW. Tesco is now selling 15 to 20 million fair-trade cotton garments (second biggest buyer after M&S) and has stopped sourcing cotton from Uzbekistan as there have been concerns over the large number of child labourers used there (Butler 2008: p.22). H&M (Sweden) used approximately 3,000 tonnes of organic cotton in 2008 and is planning to increase this by 50 per cent for 2009. NIKE announced that they have switched to organic cotton for 3% of their entire range and Marks & Spencer announced plans to switch to 5% organic cotton by 2010. Asda, NEXT, Primark, New Look and the Arcardia group all produced organic or recycled cotton ranges in 2008.

The situation within the clothing sector certainly seems to improve as is evidenced by all these initiatives and retailers are taking part in improving the situation. However, there is a concern about the difficulties of enforcing the code of conduct throughout the supply chain (in particular labour standards) despite the increase in awareness towards ethical issues among clothing retailers (Allwood et al.2006: p.2).
Phil Wringley, chairman of New Look urged clothing retailers at the Draper's Fashion Summit 2008 that clothing retailers need to work more on ethical issues rather than just ticking the boxes and relying on auditors. He believed that ethical trading will be more on the agenda for consumers despite the economic downturn and he suggested that clothing retailers focus on broader issues rather than survival (Anon. 2008: p.17).

There are some companies that have committed themselves to make real changes. Marks & Spencer in particular have moved further ahead due to the demand from their customers, employees and shareholders. They have revealed an ambitious £200m "eco-plan" called "Plan A" that includes reducing CO_2 emissions and waste to landfill, improving sourcing and trading in sustainable/ethical ways and supporting customers and employees in choosing healthier option lifestyles (Marks & Spencer 2007).

For their clothing products, they announced that by 2012 they will use recycled plastic bottles for their polyester clothing, Fairtrade cotton for over 20 million garments and none of their clothing products will go to landfill. At the end of their product life, they will be reused in a sustainable way (Ibid.). They have clearly stated that they are taking

Figure 2.13 Aerodynamic trailers
Source: Marks & Spencer 2009

their social responsibility seriously and have demonstrated that this is the way forward for future profits (Ibid.). A year on in late 2008 the 'How we do business' report was published. In the report Richard Gilles, Director of Plan A, stated that

Figure 2.14 Wash at 30 °C label
Source: Marks & Spencer 2009
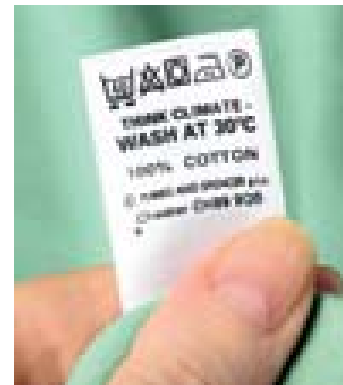
these are difficult times due to the economic downturn but that pursuing Plan A goals has lead them to 'short-term cost savings' and 'long-term competitive advantages. At the RITE conference Marks & Spencer reported that out of 100 commitments they had set at the launch of Plan A, 17 have been achieved, 76 are underway, 8 have not yet started and 1 is on hold. In the report they claim that they have reduced their CO_2 emissions by 9% to 469,000 tonnes in 2007/8. They now use aerodynamic trailers (see Figure 2.13) but the use of bio fuel is on hold as there is uncertainty over environmental benefits. In April 2007 they supported the 'Together' campaign to promote 30°C clothes wash temperatures (see Figure 2.14). Due to this campaign, 31 per cent of customers now wash at 30°C compared to 23 per cent before the campaign. In January 2008 'the Oxfam clothes exchange' six months trial was launched. Customers could bring Marks & Spencer's unwanted clothes in return for a discount voucher. Furthermore, they sold more than 300,000 fleece garments (men's, women's and children's) made from recycled PET plastic bottles (the equivalent of four million two-litre bottles) and now they are extending the product range to trousers, suits and furniture filling by 2012 (Marks & Spencer 2008).

They have disturbed the UK retail and clothing industry waters and it will be worthwhile observing the reaction of other industries over the coming years. In order to take such big steps in all areas of business, CSR knowledge needs to be shared among all

employees from sourcing, designing, merchandising and marketing through to customer service. Krishan Hundal, head of general merchandise technology at Marks & Spencer explained his role as one in which sustainability and ethics are the most crucial points since the introduction of Plan A as well as quality control, safety and science (Hall 2008a: p.26). If sustainability is considered seriously, it is impossible to tackle one aspect of a broad set of issues rather than dealing with the whole. For example, companies that use organic or recycled materials for their products often also consider ethical trade and vice versa. The researcher understands the broader thinking behind sustainability, but there is a limit to the breath of the topic that can be covered within a PhD study. Therefore this research concentrates on recycled polyester materials and less on other aspects of sustainability. There is no doubt that Marks and Spencer took a step further in the clothing sector as well as other sectors. Lee explains that carrying out sustainable business in the clothing sector is particularly challenging due to the nature of the business being fast moving and changing suppliers frequently. This needs strong leadership as well as dedication, a resource which not many businesses can devote to sustainability (Lee 2007: pp.83). In the next section a LCA study that lead Marks & Spencer to carry out the wash at 30°C campaign as well as other clothing LCA studies are discussed.

2.3.3 Clothing LCA studies

Life Cycle Assessment (LCA) is a tool to assess a product of environmental impact throughout its lifecycle, from obtaining the raw materials to the end of product life. The outcomes of an LCA of a product are useful and vital for designers in improving or designing a new product, however it is advisable the LCA is not carried out by designers themselves as it is a time consuming process (Bhamra and Lofthouse 2007: pp.65-67).

Carrying out full LCA assessment is complex and 'extremely resource intensive' (Collins and Aumônier 2002: p.2, Patterson 2008: p.23). Due to the nature of the full LCA assessment and a highly competitive marketplace with pressures from shorter lead times, designers who are already dealing with a hectic and short cycle of manufacturing have no spare time to incorporate whole life cycle thinking into their products and to learn about it (Evans and McAloone 1996: p.76). Black argues that the situation is changing. Due to incorporating CSR into their business practice UK clothing retailers are starting to have direct contact with their downstream suppliers (Black 2008: p.181),

and are starting to see more of an overview of the environmental impact of their product.

In order for the LCA to be widely used as a tool and lifecycle thinking to be incorporated throughout all the product development stages, there is a need to simplify the LCA and make it easier to understand for designers (Evans and McAloone 1996: p.76). And recently the 'Eco-metrics calculator', a simple, accessible tool was developed for the textile and clothing sector so that industry, brands and consumers can now consider the whole life cycle of their products. For example, producers can select garment, fibre and yarn types, dyeing and finishing methods and fabric weight to match their own products and then choose how their customers will treat their products by choosing wash temperature, life expectancy and drying method. Resulting eco metrics will provide an understanding of impact on water, energy consumption, use of non-renewable materials and pollution. (Patterson 2008a: p.23).

Before this recent innovation, despite the fact that carrying out an LCA is complex, the streamlined LCA carried out by Marks & Spencer (2002) was of major significance as it was the first LCA carried out on clothing products by a high-street retailer. Patagonia (Brown and Wilmanns 1997) have developed their own modified version of the LCA and they stated that they needed to use information already available, since testing all of their products (over 300) would create prohibitive costs (Ibid: p.31). As a result, some information was missing; however they stated that this was a starting point and it was useful to gain an overview of the environmental impact caused by the products through the materials selection, manufacturing, distribution, product use/care and disposal cycles (Ibid.: pp.34-35).

Studies carried out by Marks & Spencer (2002) and Patagonia (1997) have revealed that customer care (e.g. washing and drying) and disposal of the products are the major causes of environmental impact. Marks & Spencer's LCA study (2002) mentioned above is described as a more useful and inexpensive tool to assess a product's lifecycle (Ibid.: p.2). The study used a pair of men's polyester trousers (polyester 100%) and three packs of men's medium size briefs (cotton 100%). The result of the study on the polyester trousers (see Figure 2.15) was that most energy was used (76.3%) during consumer use. Energy consumption was calculated assuming 2 years of lifetime with 92 washes at 50°C with a 3kg wash load, tumble drying and 2 minutes of ironing time. The same study also revealed that if trousers were washed at 40°C instead of 50°C that would lead to a 10% reduction in the lifecycle energy consumption, and increasing the

wash load from 3kg to 3.5kg leads to 5% reduction of the whole life cycle energy consumption (Collins and Aumônier 2002: pp.8,14-15). It is also not necessary to tumble dry polyester clothes as polyester has a quick dry character. The study demonstrates that it is easy to reduce energy consumption during consumer use.

Figure 2.15 Analysis of life cycle energy consumption for a pair of pleated polyester trousers (lifetime of two years) (Source: Collins and Aumônier 2002)
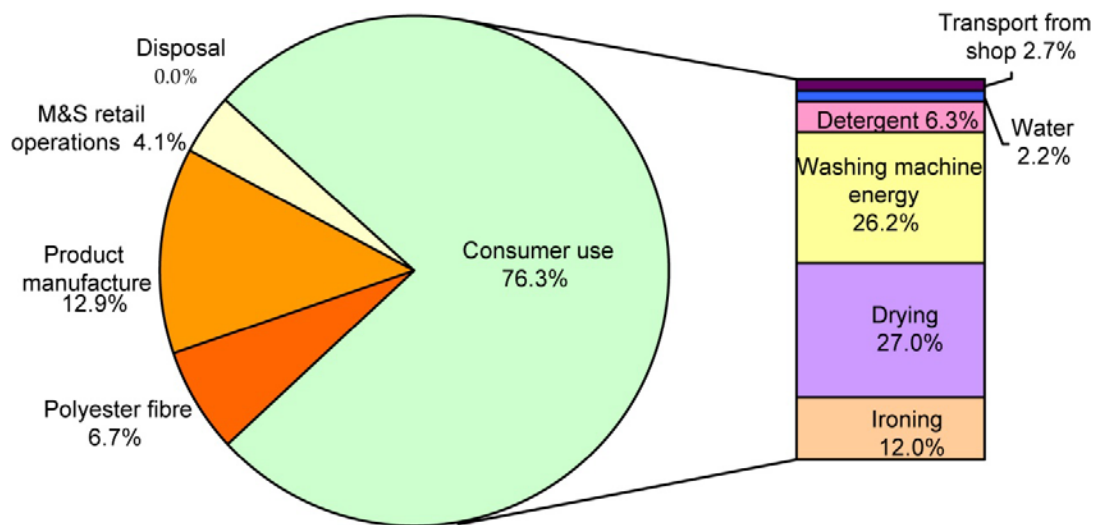
The two studies mentioned above and also a polyester blouse LCA study conducted by Franklin Associated for the American Fiber Manufacturers Association in1993 concluded that the usage phase is the most significant cause of energy use (Fletcher 2008: p.17).

However, there is a need for more research into the relationship between environmental impact and different types of clothes; 'Fashion' garments for example would produce completely different outcomes. The lifecycle of the 'Fashion' items lasts between six and twelve months (Fletcher and Tham 2003), which means that the ratio of the energy consumption would be quite different in comparison to the study above as it set its lifecycle for two years (Marks & Spencer LCA study). If the lifecycle is one year the environmental impact through consumer use will be dramatically reduced. In other words, the longer the lifecycle gets, the greater the energy consumption from consumer care, while a short life cycle means that the impact on the environment from initial production is much more significant.

The studies carried out by the University of Cambridge Institute for Manufacturing incorporated the lifecycle difference between garment types; cotton T-shirts and viscose blouses. The results of the studies revealed that for cotton T-shirts, consumers hold the key to reducing energy consumption: the same results as the studies mentioned earlier. On the other hand, a viscose blouse has a shorter lifecycle and is less frequently used than cotton T-shirts: this means that less energy is used during the usage phase. Instead there is more significant impact from its production phase as viscose production needs higher energy than cotton production. The studies concluded that recycling for both types of garments held significant benefits and more so in the case of viscose products due to high energy use during the production. Therefore man-made fibre such as viscose or polyester should be recycled. Transport of these products involves little energy usage therefore relocating sourcing countries will have little impact (Allwood et al. 2006: pp.26-28, 37,43). They have also suggested that an opportunity exists to reduce extracting new resource by reclaiming already used materials in the form of a 'closed-loop' system (Allwood et al.2006: p.69).

The research carried out by Fletcher and Tham in 2003 also concluded that there is the possibility for recycled materials to be used for 'Fashion' type garments (see Table 2.2). They have listed three different archetypes of clothes – 'Classic', 'Basic' and 'Fashion' – and pointed out that our wardrobe is a mixture of these three types of clothes. They have also stated that to produce all garments to be as durable as possible is not feasible as the fashion element cannot be ignored. 'Fashion' garments are characterised as disposable and of a short life span and therefore they should be produced from recycled materials. They further point out that the impact on the environment if the high street used recycled materials would be substantial as it is a very large market (Fletcher and Tham 2003). In Fletcher's recent publication she reports the research project mentioned above: a polyester fashion party top scenario has a short lifecycle with less washes, perhaps no wash at all, a 'one-night wonder' to be discarded. As the top is not biodegradable, there is the possibility for it to be effectively recycled (Fletcher 2008: pp.176).

Table 2.2 Strategies for promoting resource efficiency of garment archetypes

Archetypes	Characteristics	Strategy
Classic (The plain coat)	- expensive - high quality - durable - timeless design - used frequently over a long period	- specify virgin materials - materials, dyes and finishes that age 'gracefully' - re-fitting, mending service from outlet - instructions for low impact care and wear - information about a garment's history to increase user-garment 'bonding'
Basic (Underwear, combat trousers)	- cheap - functional 'easy' design - used frequently for a short period	- equal standard of material and making - instructions for low impact wear and care - take back scheme
Fashion (The party top)	- affordable - fashionable - rich in status, identity, etc - used infrequently for a short time	**recycled materials** - components are easy to both disassemble and dispose of - instructions for low impact care - take back scheme - rental option

(Source: Fletcher and Tham 2003)

The studies mentioned above indicate that there is a convincing case for a reduction in the energy consumption in fibre and garment production, particularly in the 'Fashion' category.

However, the recent economic downturn has meant that clothing retailers are focusing on cutting transport costs as well as reducing energy usage throughout the supply chain using aerodynamic trailers, changing air to sea freight and relocating manufacturing operation to closer places such as Central Europe and North Africa so that they can reduce transport costs as well as CO_2 emissions (Jack 2008: p.29, Spear 2008b: p.32). However, Patagonia urged other clothing retailers to focus on making a real difference in the manufacturing process. 'The Footprint Chronicle' showed that transportation is using about 1 per cent of the overall energy, therefore we should rather concentrate on the manufacturing process where a real difference can be made (Spear 2008a: p.21). 'The Footprint Chronicle' is a project launched by Patagonia (see Figure 2.16). Every season they test a few new products for their footprint and the outcomes and methodology are published on their website for their customers as well as for other retailers as a reference (Patagonia.2008).

Figure 2.16 The footprint chronicle Source: Patagonia 2008

Some retailers (such as Marks & Spencer and NIKE) are already working towards a list of set targets and have made a first step forward. For example, NIKE is producing what they call 'considered' products that are produced in a fully closed loop using the least possible variation of materials within one product, 'designed for easy assembly while allowing them to be recycled into new products or safely returned to nature at the end of their life.' NIKE are aiming to achieve the targets for apparel by 2015, footwear by 2011 and all other equipment by 2020 (Ecotextile News December 2008/January 2009: p.15).

2.3.3.1 Waste Minimisation and Pollution Prevention

Bhamra and Lofthouse explain that environmental issues were dealt with by companies as 'clean up' of waste and pollution at first as a way of escaping fines. Later companies realised that applying 'end-of-pipe' technology that prevents pollution has more economic benefit as it leads to a 'cleaner production' that involves a restructuring process in order to prevent pollution and waste in the first place (Bhamra and Lofthouse 2007: pp.23-24). There was also a growing realisation that most of the environmental impact could be phased out during the initial design processes such as the materials selection process (Bhamra 2004, Heeley 1996, 1997, 1999, Fletcher 1999a,1999b). According to the Design Council 80% of environmental impact could be reduced at the design phase and Lee noted that the responsibility that designers, brands and clothing retailers have, has not been addressed enough in the fashion sector (Lee 2007; pp.83). In recent years there has been a growing concern among companies to produce more sustainable products (Bhamra and Lofthouse 2007: p.24). In order to develop sustainable products, it is crucial to choose the right materials. Selecting materials is the initial design stage where possibilities exist to prevent much of the environmental impact of products (Heeley 1996: pp.23, 206).

However, in order to apply a strategy of developing sustainable products, designers and buyers who select materials ought to have an understanding of environmental issues related to their clothing production and they should also have access to reliable information so that they can successfully judge the most suitable materials for their products (Fletcher 1999a: p.273). For example, there were (and still are) debates about which fibre (natural or synthetic) is the most environmentally friendly. Watson clearly states that it is impossible to conclude with definite answers and suggested that every stage of the lifecycle needs to be assessed (1991: p.30) Indeed, any type of fibre is in one way or another causing an impact on the environment and the way forward is to develop sustainable products. It is unrealistic to target 100% environmentally friendly products (Breds et al. 2002: p.21, Bhamra 2004, Fletcher 2008: p7, Slater 2003: p.179).

Manufacturing polyester involves numerous hazardous chemicals (some of them are considered carcinogenic) and high-energy consumption (Mackenzie 1997: p.138, Breds et al. 2002: p.48). Air emissions from PTA (pure terephthalic acid) contain ethylene glycol which is known to be toxic in large quantities and can enter the bloodstream through the skin (Heeley 1997: p.117). Polyester is usually dyed with dispersion dyes that could cause skin allergies (Breds et al. 2002: p.52).

However, Laursen and Hansen (1997) revealed that water consumption for polyester production is less than that for natural fibre production. Air and water emissions need to be treated as they have a medium to high environmental impact if they are not treated (Fletcher 1999b: pp.36-37). A recent study regarding carbon emissions and fibre types by CIRFS (International Rayon and Synthetic Fibres Committee) revealed that recycled PET fibre produces less carbon emissions in comparison to virgin polyester, cotton and PLA (see Figure 2.17/2.18). CIRFS also stated that in Europe, 300,000 tonnes of collected bottles are recycled into fibre and contributes to reducing carbon emissions by 800,000 tonnes compared to virgin polyester production (Anon: Ecotextile News 2008, pp.30-31).

Figure2.17 CO_2 emissions associated with selected fibres Source: CIRFS 2008
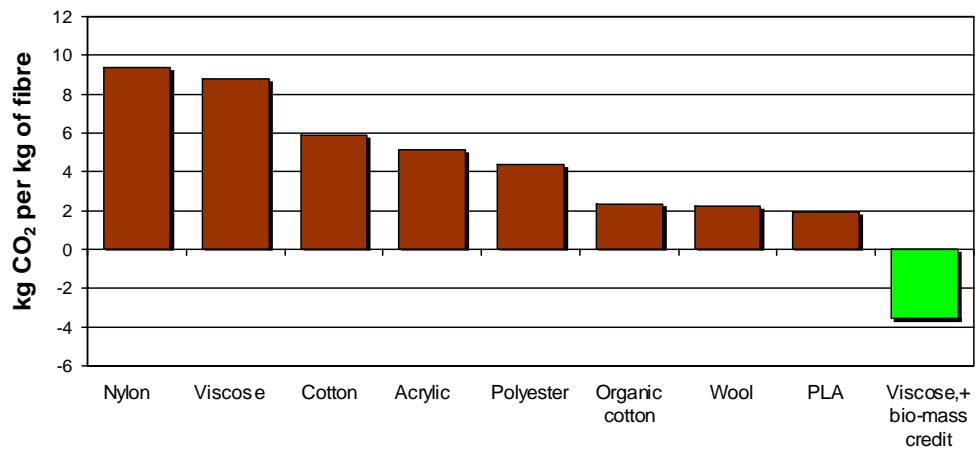
Figure 2.18 CO_2 emissions associated with polyester staple   Source: CIRFS 2008
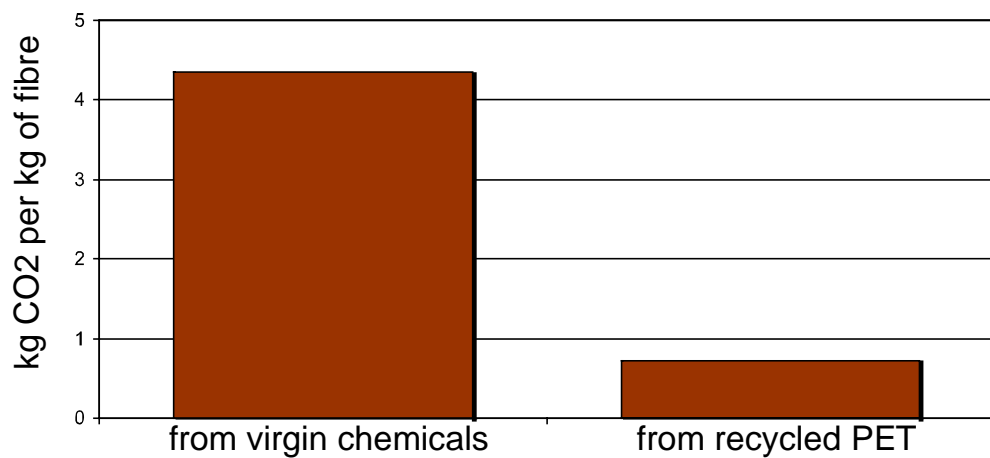
Polyester uses non-renewable resources but if kept in an 'industrial loop system' the impact on the environment is reduced. (Breds et al. 2002: p.12)

It is clear that polyester is a highly desirable fibre in the world market. Global man-made fibre production grew by 8.5% in 2007, with the growth concentrated mainly on polyester (Textiles Intelligence 2009). The Wool Mark company concluded that this is due to cheaper and improved synthetic fibres.

Polyester fibre is known to be adaptable as it can be mixed with other types of fibre. This became very popular in the nineteen sixties. By mixing two different types of fibre, it became possible to compensate for the fibres' negative properties and increase their merits (Hatch 1993: pp.216, 295). Polyester also performs well under small and repeated stress, which makes it suitable for use as a garment (Ibid.: p.216). In addition polyester is hydrophobic which means it dries very quickly in comparison to cotton. Therefore polyester is often used as fiberfill (Ibid.). There is no doubt that polyester's character of durability, high temperature resistance, resistance to chemicals and easy care (Ibid.: p.224) is well fitted to our lifestyle. Black also notes the significant quality development from the seventies to the present day and commented on the environmental benefits of using polyester, such as less water consumption and recyclability (Black 2008:pp.150-151).

Although this study recognizes the importance of LCA, customer use, distribution and disposal are not focused on due to the limitation on the resources and timespan for the research. Instead, this study concentrates on the production stage: the materials selection in particular, and the use of materials with recycled content. As materials selection is the vital first step for sustainable product development (Papanek 1995: p.29, Brown and Wilmanns 1997: p.32), it is critical to investigate materials selection processes in the clothing industry.

Awareness in relation to environmental issues and clothing is growing in the clothing sector. In-depth understanding of ethical issues as well as environmental impact caused by clothing is becoming more common and some significant campaigns and initiatives are being carried out by the leading clothing retailers. However, in order to achieve 'sustainability', there is a long way to go. The UK clothing sector made a vital first step but it needs to be a continuous progress where good intentions actually lead to an improvement in the situation.
Some of the LCA studies have indicated that the clothing retailers need to focus on the product development phase in order to make a significant difference to the environmental impact.

Five interviews with four major high-street clothing retailers were carried out in order to gain insights into their current practices for product development (in particular the materials selection process), to evaluate the level of environmental consideration they have when they develop products, and to find out their readiness to use recycled

materials based on currently available samples and their understanding of fabrics with recycled polyester content. The results are discussed in Chapter Five.

In the next section another key player, the consumer, his shopping behaviour, and his awareness towards environmental issues as well as eco-clothes are discussed.

2.4 Consumer

In this section the current hot topic in the clothing sector, fast fashion versus slow fashion, are discussed. Consumption rates for clothing as well as awareness towards environmental issues and attitude towards eco-clothes are also covered.

2.4.1 Fast and slow fashion

Industry has always thrived on the obsolescence of products. If more people purchase products more frequently, profits will increase. Designers are educated to develop products based on the seasonal trends (Papanek 1995: pp.58-59). Short product life spans based on trends fuelled by the media that urge people to buy unnecessary goods is a typical characteristic of the fashion clothing industry (Lorek and Lucas. 2003: p.36). UK consumers are used to having trendy, cheap and disposable clothing on offer from high street retailers such as H&M, Topshop and Inditex and supermarkets such as Tesco and Asda. What is more, there are value fashion retailers like Primark and Matalan that offer cheap and highly fashionable clothing (Allwood et al.2006: p.38). Clothing retailers used to offer two seasons a year (Autum/Winter and Spring/Summer); it is now common to have up to twelve seasons so that they can offer something new every four weeks (Lee 2007: p.17). The craze over the opening of the flagship branch of Primark on Oxford Street in London is proof of the popularity of fast fashion retail. Tyler et al. remark that a price driven market was created by the clothing retailers and intense marketing will be necessary if they want to consumers to pay extra (Tyler et al. 2006: p.324). Black stated that at first, fast fashion seemed to deliver three desirable qualities - that were said to be impossible to deliver at once: 'fast', 'cheap' and 'good'. However, it became clear that this was not the case. It thrived on unfairness for its producers and suppliers (Black 2008: p.182). Fletcher believes that 'fast fashion is simply about selling more clothes and making more profits' and somebody is paying for us (Lee 2007:p.175). Fast fashion is also having an environmental impact. The best way to reduce the impact on the environment is to wear clothes until they are worn out (Allwood et al.2006: p.38). Fast fashion does the exact opposite, by making clothes unfashionable sometimes even before they have been worn. Black explains that the

slow design movement was conceptualized by Alistair Fuad-Luke, the author of the *Eco-Design Handbook*, and extended to the textiles and clothing sector by Kate Fletcher, the author of *Sustainable Fashion and Textiles* (Black 2008: pp.53-56). Fletcher states that slow fashion is not opposed to fast fashion but rather it is about consuming quality and less quantity (Fletcher 2008: pp.185-186). The question is whether UK consumers are ready to ignore the seasonal trend, wear second hand clothes, wear them till they fray and mend them as much as possible (Allwood et al.2006: p.43). Even if they do so, reducing the sales of new garments will cause job losses (Slater 2003:pp.91-92).

The fashion industry thrives on short cycles of consumption. It therefore contradicts the notion of sustainability (Fletcher and Tham 2003) and industries as well as designers are unwilling to accept an idea of sustainability based on reuse and durability (Papanek 1995: p.47). Re-use and designing long lasting garments are the typical approaches to sustainability in the clothing sector. Wearing only reused clothes and wearing them until they are frayed completely is the most sustainable way of life (Collins and Aumônier 2002: p.9) and there are always a few people who choose to live in such a humble way. However it is unrealistic, especially for affluent societies to make the assumption that the majority of garments will be reused. There is no point in denying that there exists a desire for 'Fashion'.

Furthermore due to globalisation (relatively cheap labour and materials), it is economically sound and convenient to purchase new products rather than to mend or repair them. It is also a challenge to persuade consumers to pay extra for durability without an absolute guarantee (Cooper 1997: pp.65-66).

Black questions how we can reduce our consumption while guaranteeing the survival of the clothing industry. She suggests that the answer lies in the hand of the consumers, design thinkers and designers (Black 2008: pp.53-56). Lee stated that slow fashion is a new approach for all key players such as designers, producers, buyers, retailers and consumers. It is based on an understanding of ethical and environmental issues so that we could consume, design and produce better (Lee 2007:p.175).

However, Allwood et al. predicted in 2006 that competition will continue to grow in the clothing sector while prices will keep going down (Allwood et al.2006: p.2). Indeed that has been the case until now but how long it will last and how cheap can clothing possibly become? A recent article in the Drapers Record revealed that clothing prices are increasing. According to the research company Compability, prices are 1 to 4 per

cent up compared to a year ago due to the weak sterling (Donati 2009: p.16). Emerging Textiles also mentioned an increase in clothing prices in 2009 and a decline in clothing sales (Emerging Textiles 2009). Consumers are demanding cheaper garments and that has reflected on Primark sales for the first half of the end of February 2009 which went up 5 per cent (Seares 2009: pp2-3). Sir Stuart Rose, the executive chairman of Marks & Spencer commented that 'they encourage consumers to buy better rather than to buy less' to the question of how one can motivate customers to consume goods in a way that leads to the reduction of waste and throwaway goods. (Lee 2007:p.187). Does this indicate a change in the consumption pattern of UK consumers? The next section looks at the clothing consumption rate in the UK and consumer's awareness towards environmental issues and eco-clothes.

2.4.2 Consumption rate

UK consumers purchase 35 kg per person (a total of 2.15 million tonnes) and spend approximately £780 for clothing and textiles per year. Within that around 13 per cent are reused and the rest are disposed of (Allwood et al.2006: p.2). As the price of clothing is so cheap, mending clothes does not make economic sense any longer and therefore encourages a throwaway culture (Lee 2007:p.44).

Over four years (2001 to 2005), prices decreased by 14 per cent, sales by volume were up 37 per cent, spending on women's wear was up by 21 per cent and men's wear was up by 14 per cent. This means that UK consumers bought 30 per cent more clothing (Allwood et al.2006: pp.11-12). Increased volume in the clothing sector lead to growth in polyester production whereas volume of natural fibre production has remained unchanged (Ibid.: p.2).

UK consumers are purchasing 40 per cent of their clothes from value retailers such as Asda, Tesco, Primark and Matalan with less than 20 per cent of their total clothing budget. These value retailers offer a pair of jeans so cheaply that women own on average eight pairs of jeans nowadays (Lee 2007: p.23).

Consumers themselves hold the key to slowing down consumption and the first step is for them to understand the consequences of their behaviours.

The next section discusses the public's awareness towards environmental issues.

2.4.3 Awareness towards environmental issues

Current attitudes towards, and awareness of, environmental issues are most certainly influenced by the fact that climate change has increasingly become a general topic. In 1995, the Inter-Governmental Panel on Climate Change announced that there was now clear evidence that mankind was causing the planet to heat up (McKibben 2003: p.29).
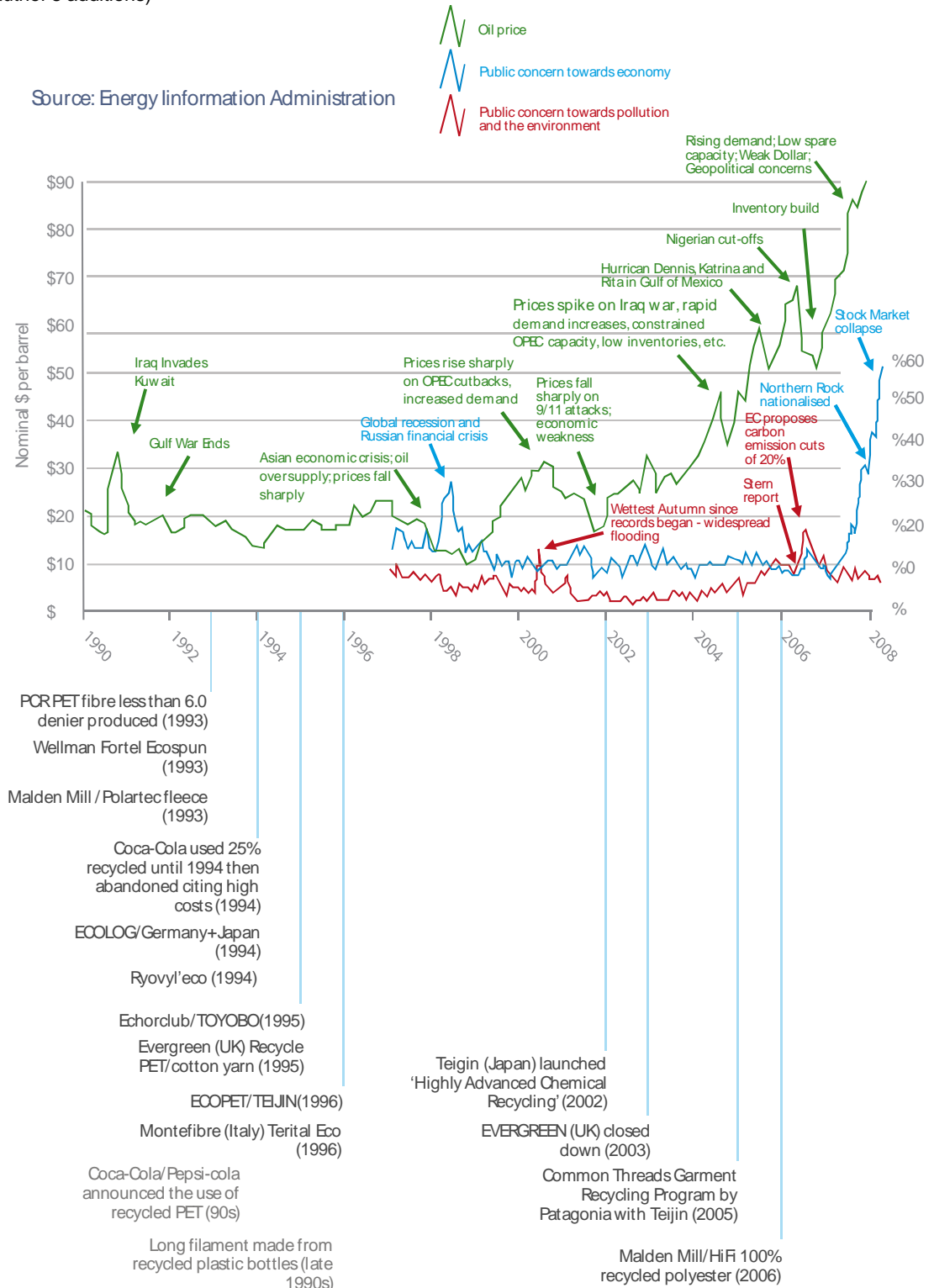
Research into the UK public attitude's to climate change, published in 2008 by Ipsos MORI, concluded that the majority of the public are concerned about climate change, but are still not convinced. 77 per cent said that they are concerned and nearly a quarter (23 per cent) said they are not concerned. 60 per cent have doubts whether humans are contributing to climate change despite that fact that it was officially announced by the Inter-Governmental Panel on Climate Change mentioned above.

Figure 2.19 shows, in chronological order, the fluctuation of oil prices along with major political events, UK public concern towards pollution/environment and economy, as well as developments in recycling plastic bottles and polyester fibre. The price of polyester is reflected in the fluctuation of oil price as it is derived from oil. In 2008 polyester prices fell as crude oil prices dropped due to decreased demand from developed countries that consumed less petrol (Emerging Textiles 2008).

Looking at current trends in the economy parallel to public opinion on environmental issues (see Figure 2.19), indications are that public opinion towards pollution/environment (shown by the red line in Figure 2.19) reacts or runs parallel to the fluctuation of oil prices. When the oil price is high, the rate of the public who select 'pollution/environment' as the main/other important issue in the UK (Ipsos MORI 2008) rises within a couple of years and vice versa (see Figure 2.19). The figure shows relatively low oil prices until 2004. Several dips in the oil price were related to political events such as the Gulf War in 1991, the Asian economic crisis in 1997 and the 9/11 attacks in 2001. It shows that environmental concerns amongst the general public were rising, reaching 10.1 per cent in 2006 and nearly 20 per cent in 2007 up until the beginning of 2008 when the economic downturn takes precedence in the media and the public conscience. During 2008, public concerns were focused on 'Economy' (see blue line in Figure 2.19). 58 per cent said it was important in comparison to 6 per cent for 'Environment'. In the meantime oil price has came down to around 40 to 50 dollars per barrel instead of over 100 dollars per barrel in late 2008 (Ibid.). In the same opinion poll, 47 per cent of the respondents said that they will have to do more such as change

transport and purchasing decisions to deal with climate change and 13 per cent think they will have to change their lifestyle significantly (Ibid.). Similar results are reported in the 2008 *How We Do Business* report by Marks & Spencer. They grouped their customers into four categories that were 'Green Crusaders (11%)', 'If it's easy (27%)', 'What's the point? (38%)' and 'Not my problem (24%)' (Marks & Spencer 2008). This means that just over one tenth of the public are ready to change their lifestyle drastically. This suggests that the majority of the public are aware of climate change but just over 10 per cent of the public are prepared to deal with the issue seriously enough to reduce their environmental impact. In the next section, public reactions towards eco-clothes are discussed.

Figure 2.19 Major events and real world oil prices 1990-2008 (EIA) and the rate of the UK public concern towards pollution/environment and economy 1990-2008 (Ipsos-MORI) along with development of recycled plastic bottles and polyester fibre. (Source: Energy Information Administration 2008, Ipsos-MORI 2008 and author's additions)

Oil price

Public concern towards economy

Public concern towards pollution and the environment

Source: Energy Iinformation Administration

Rising demand; Low spare capacity; Weak Dollar; Geopolitical concerns

Inventory build

Nigerian cut-offs

Hurricane Dennis, Katrina and Rita in Gulf of Mexico

Prices spike on Iraq war, rapid demand increases, constrained OPEC capacity, low inventories, etc.

Stock Market collapse

Iraq Invades Kuwait

Prices rise sharply on OPEC cutbacks, increased demand

Prices fall sharply on 9/11 attacks; economic weakness

Northern Rock nationalised

Global recession and Russian financial crisis

EC proposes carbon emission cuts of 20%

Gulf War Ends

Asian economic crisis; oil oversupply; prices fall sharply

Stern report

Wettest Autumn since records began - widespread flooding

Nominal $ per barrel

$90
$80
$70
$60
$50
$40
$30
$20
$10
$

%60
%50
%40
%30
%20
%0
%

1990 1992 1994 1996 1998 2000 2002 2004 2006 2008

PCR PET fibre less than 6.0 denier produced (1993)

Wellman Fortel Ecospun (1993)

Malden Mill / Polartec fleece (1993)

Coca-Cola used 25% recycled until 1994 then abandoned citing high costs (1994)

ECOLOG/Germany+Japan (1994)

Ryovyl'eco (1994)

Echorclub/TOYOBO(1995)

Evergreen (UK) Recycle PET/cotton yarn (1995)

ECOPET/TEIJIN(1996)

Montefibre (Italy) Terital Eco (1996)

Coca-Cola/Pepsi-cola announced the use of recycled PET (90s)

Long filament made from recycled plastic bottles (late 1990s)

Teigin (Japan) launched 'Highly Advanced Chemical Recycling' (2002)

EVERGREEN (UK) closed down (2003)

Common Threads Garment Recycling Program by Patagonia with Teijin (2005)

Malden Mill/HiFi 100% recycled polyester (2006)

2.4.4 Attitude towards Eco-clothes

This section looks at public attitudes towards eco-clothes in relation to ethical clothing shopping.

The Mintel report noted that high awareness of sustainability and ethically produced goods among the UK public reflects the growth in the ethical clothing market. Mintel also suggested that there is a huge potential for this sector to grow as their current market share is less than 1% of the whole clothing sector (Mintel 2009).

There are many magazines, books and websites that inform consumers about ethical shopping nowadays. Recent guides for ethical fashion published in 2007 such as 'green is the new black' by Tamsin Blanchard and 'Eco chic' by Matilda Lee offer information on how consumers can reduce the impact they have on the environment when buying clothes and how they can shop more ethically. The guides contain extensive lists of where and how to shop as well as how to make your own clothes. The Ecologist, Ethical Consumer, New Consumer and Organic Life are also good source of information for the public. Additionally an exhibition called 'Well Fashioned: Eco Style in the UK' was organised by the Craft Council in 2006 to 2007, targeted at the general public. A group of designers who challenge the environmental issues that the clothing industry is facing exhibited their works, which were original and well-designed. The exhibition also offered an opportunity for the general public to become informed and understand environmental issues relating to the clothing industry (Crafts Council 2006). The 'UK Shopping Guide' was available on the exhibition website that includes 187 UK-based fashion and textile retailers (Ibid.).

The general public have started to look into how clothes were produced since the late nineties (Heeley 1997: p.55). Marks & Spencer reasoned that their launch of 'Look Behind the Label' campaign in 2006 as well as the introduction of certified Organic and Fairtrade goods in their stores was a result of strong customer demand. The YouGov survey commissioned by Marks & Spencer revealed that 78% of customers wanted to know about how clothes were made. In 2008, 40% responded that they had decided not to buy clothes because they were not sure how they were made (see section 2.3.2 P.30).

The report published by TNS Worldpanel Fashion in October 2008 revealed that ethical concerns among UK consumers were up dramatically to 72 per cent from 59 per cent in 2007 (TNS Worldpanel Fashion 2008). The Co-operative Bank announced that the economic downturn will not affect the sale of ethical goods (The Co-operative Bank 2008). Mintel also highlighted that due to 'emotional attachment' by the consumers who

buy ethical clothing, the economic downturn will not affect ethical clothing sales (Mintel 2009). The Ethical Consumerism report indicated that the UK ethical market grew 15 per cent, from £31 billion in 2006 to £35.5 billion in 2007. Ethical clothing grew 71 per cent, from £52 million in 2006 to £89 million in 2007 (The Co-operative Bank 2008). According to Mintel ethical clothing sales grew to approximately £175 million in 2008 from an estimated £40 million in 2004/5. The report also suggested that increasingly attractive ranges of ethical clothing will contribute to establish more markets for ethical clothing (Mintel 2009).

67 per cent of consumers think clothing retailers should apply ethical standards to all of their products. Consumers are more concerned about social aspects such as child labours and fair wages rather than environmental aspects such as using organic fabric and reducing the environmental impact (TNS Worldpanel Fashion 2008).

The report also highlights that those over 55 years old were the most keen on ethical and environmental issues, show more concern, are more skeptical about the retailers' claims and are prepared to pay more for ethical clothing than the rest of the age groups. What is more one third (33 per cent) of respondents said that they were happy to pay extra for ethical goods (Ibid.) which contradicts the outcomes of survey report 'How Women Shop' by the research group Allegra Strategies. They concluded that despite high awareness towards ethical issues, UK women were not ready to pay extra for ethical clothing (Hall 2008b: p.18). This survey also revealed that 44 per cent of UK women check the label to establish where the product came from (Ibid.). This is an encouraging result for clothing retailers to include more information (for example applying eco-labels such as organic certifications from the Soil Association, 'OEKO-TEX 100' and 'The EU Flower') about products in a label so that they can communicate with customers through labels. Mintel's research also suggested a need for clear communication with consumers as 11% of the UK public has doubts about the genuine nature of ethical clothing and there is confusion over what 'ethical clothing' really is (Mintel 2009).

UK clothing industry views are different. 80 per cent of industry executives considered that ethical shopping was still for niche markets although they predicted that it may change in the future (Hall 2008b: p.18).

At first glance it seems that fast fashion brought desirable products which are good quality, fashionable and most of all cheap. However, a closer look reveals less attractive throwaway culture in clothing and an often unseen undesirable reality of clothing production abroad. Due to frequent media coverage the UK public is

increasingly aware of environmental and ethical issues. However, as the studies mentioned above show, despite a high percentage of the public being concerned about environmental issues only a small percentage are willing to take serious action. The studies also indicate that the majority of the public support ethical clothing and demand clothing retailers to do more about it. However, if their purchasing decisions do not follow their concerns, it is not feasible for retailers to produce ethical clothing that cannot sell. Furthermore, these studies indicated that UK consumers are less concerned about environmental issues in the clothing sector in comparison to social aspects of it. The UK public's concerns towards clothes with recycled content are unknown.

Therefore, the public's shopping behaviour for clothes and reaction towards clothes with recycled contents were examined through a public survey. The outcomes of the survey were discussed in Chapter Four.

2.5 Conclusions

Environmental issues such as climate change and resource depletion have been talked about by the media and among the public for some time now. Media coverage and campaigns to raise awareness among the general public have helped individuals to understand the issues while information about environmental and ethical issues have become accessible and available on the web, allowing the public to be more informed than ever in the past. However, to what extent increased public awareness leads to action that can alter our current waste situation is not clear.

In recent years (since 2004) the recycling rate in the UK has increased significantly due to pressure from the EU Landfill Directive. However, we still consume significant amounts of resources such as plastic bottles, clothing and any other materials. This study focused on non-biodegradable synthetic PET materials in the form of plastic bottles and clothes with synthetic fibre content.

There is evidence that the UK government is trying to seek ways to use resources in the most effective way rather than concentrating on only achieving set targets as has been the way in the past. Recent changes of approach towards sustainability are evident in industry, government, the general public and clothing retailers. Each might be motivated by slightly different factors but they are all closely interlinked.

UK consumers are increasingly aware of environmental issues and more so about ethical issues in terms of child labour and fair wages. They feel strongly about ethically

made clothing but less so for environmentally conscious clothing. There has been increasing demand for clothing retailers to take more initiative and provide consumers with ethical clothing, yet they do not want to pay extra for them. Fast fashion clearly indicated to us that it is not a way forward as it has a huge impact on the environment and creates unethical practices, yet the fast fashion market is increasing.

Recent success in increasing recycling rates and markets for recycled PET paint an optimistic picture. However it is clear that although the recycling rate has increased, the rate of consumption of PET is also predicted to increase sharply, therefore it is vital that markets created for recycled PET are sustainable in the long term. Fluctuations in world recycled PET markets mean that demand is volatile and needs to be strengthened. The most obvious way to do this is by strengthening local markets for recycled PET. Considering that the latest technological developments allow for high quality fibre production in fashion markets as well as ever accelerating fast fashion trends, the clothing sector is ideally suited to use recycled PET in its production. This is reinforced by the fact that virtually all growth in the textile sector is in synthetic fibres whereas natural fibre production is stable. While it is vital to be preoccupied with the questions of how we can shift our attitudes that are used to purchasing large amounts of cheap, good quality and fashionable items to a more sustainable shopping behaviour, the environmental impact of the fast moving high street fashion market can be reduced significantly through the use of recycled PET.

There are ongoing projects to use recycled PET materials in the clothing sector but it is almost always limited to sports or outdoor wear markets. However in the new millennium there have been several significant developments in the polyester fibre/fabric recycling industry (e.g. Teijin, Unifi and Malden Mills). The use of highly advanced chemical recycling systems (closed loop technology) not only means that high quality fibre equivalents to the fibre derived from oil can be produced but most importantly this cycle can be repeated endlessly. It is now possible to upcycle recycled materials into new quality garments and this is an ideal sustainable cradle to cradle approach. Especially in fast moving, resource intensive markets like high street fashion there is potential to maximise the advantage of this technology.

On the other hand clothes made from certified Fairtrade, organic cotton and recycled (reused) materials have moved into the spotlight recently. Ethical clothing was shown in several fashion shows including the LFW: Esthetica, the most influential show in the UK

fashion and clothing industry. The exhibiting designers are proposing upcycling and slow fashion, and their creations notably wiped away negative perceptions towards clothes with recycled materials, by being fashionable and colourful.

What is more, the biggest UK retailer Marks & Spencer has moved a step further by showing their commitment to change their business practice to more environmentally and ethically responsible ways. That has influenced other clothing retailers to take responsibility, particularly in dealing with ethical issues.

There is no doubt that this is a vital step for UK retailers to take. However, they will have to take real sustained action rather than just acting for the benefit of their corporate images. Production of environmentally friendly clothing is a multifaceted and complicated process that needs to be understood by the relevant people in the organisations in order to make a real difference.

The literature points to the importance of understanding the products' life cycle impact in order to develop sustainable products for the future. It is evident that currently retailers that are most successful in implementing sustainable thinking in their product development understand the value of LCA studies. This study is focused on one specific material; recycled PET and the materials selection process in order to make it manageable within available resource and time for this study. The literature has highlighted that this first stage has a major influence on determining how sustainable the products are throughout their life.

In the next section, the emerging questions derived from reviewing the existing literature are stated.

2.6 Emerging research questions

The literature review identified several issues and some vital questions that were focused on this study have emerged.

UK consumers are aware of environmental and ethical issues in clothing. However, there is a need to examine whether their awareness is reflected in their purchasing decisions for clothing or not. There have been some consumer studies examining the UK public's awareness and attitude towards ethical clothing. However, there is no study relating to UK consumer attitudes towards clothes with recycled content. The barriers and drivers for UK consumers in purchasing clothes with recycled content were examined through public survey. The results of the survey are discussed in Chapter Four.

We are still consuming resources at a pace that the earth cannot sustain but we are making progress to recycle more. The technology that could use this resource in closed loop cycle exists. However, it seems that the recycled PET fabrics are not widely used in the clothing sector yet apart from the sports apparel market. Therefore, the barriers and drivers for Japanese recycled PET fibre and fabric manufacturers to supply fabrics to UK clothing retailers were investigated through interviewing them. Their future visions for the recycled PET materials and closed loop recycling system were also discussed.

This study also scrutinises the barriers and drivers preventing high street clothing retailers from using recycled PET materials more widely, because if this material is more widely used it would lead to the most significant outcomes due to the high volume of sold garments. Through face-to-face semi-structured interviews their way of sourcing materials, their awareness towards environmental issues related to clothing production as well as their attitude to recycled PET materials were investigated. The outcomes of the interviews are discussed in Chapter Five.
In the next chapter, the methods used are described.

3
CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter aims to provide an overview of the research design and presents the research methodology which was adopted in this study. It includes a discussion of the research methodology underpinning the literature search and review, the street survey, and the industry survey interviews with the selected experts in the field of study, the recycled fibre manufacturers and the high street clothing retailers. It also describes how the data were collected, analysed and correlated in order to generate the final conclusions.

The literature review supporting the understanding of the background to the study is stated in Chapter Two. Chapter Three features discussions to determine the research methods and justifications of the methods used for collecting primary source data to progress the aims of the research.

3.2 Aims and objectives of the research

This research aims to add knowledge to the development of the end-market for recycled materials in the clothing industry. The drivers and barriers, consumer attitudes and industry perceptions are closely scrutinised through quantitative and qualitative approaches.

The objectives of this research are:

1   To review existing literature in order to identify existing knowledge and understanding concerning the barriers and drivers influencing the introduction of clothes with recycled content, including technological development, consumer acceptance and retailers' awareness of recycled synthetic materials;

2   To identify through a street survey levels of consumer awareness and attitudes towards recycled materials in clothing and their clothes shopping behaviour;

3   To identify the barriers and drivers of the recycling technology influencing the introduction of clothes with recycled content in the UK market, and the future views of recycled fibre manufacturers with regards to recycled synthetic fibre development and its markets through industry survey interviews with Japanese recycled fibre manufacturers;

4   To identify through face-to-face interviews the attitudes of fabric sourcing personnel towards recycled materials and their materials sourcing procedures in the UK high street clothing industry;

5   To provide recommendations for recycled fibre manufacturers attempting to expand into UK high street markets, and UK high street retailers wishing to use recycled synthetic materials in their products.

The street survey

The public survey was designed to identify the level of public acceptance of clothes with recycled content using a fleece jacket as an example. It also aimed to assess shopping behaviours in order to evaluate the potential market for clothes with recycled content.

The objectives of the street survey were;
- To identify the public reaction towards clothes with recycled contents;
- To examine shopping behaviours for clothes and environmentally friendly products;
- To find out about public awareness towards clothes marketed as environmentally friendly;
- To identify the potential market for clothes with recycled contents.

The industry surveys

The aim of the industry surveys was to identify the attitudes and views of the key players (including experts in the area of study, recycled synthetic fibre manufacturers and high street clothing retailers) on the use of recycled synthetic materials in the clothing sector.
The industry survey objectives are stated below.

Recycled synthetic fibre manufacturers
- To find out what has become possible due to advanced technology;
- To identify the current recycled fabrics situation (market, quality, production and cost);
- To identify their future visions with regards to their target markets and use of recycled material.

High street clothing retailers

- To find out how materials sourcing and product development have changed recently, if at all;
- To examine their views on the use of recycled materials in their products;
- To identify their attitudes towards the idea of a future slowdown of consumption (slow fashion).

3.3 Discussion of Research Methods

3.3.1 Qualitative and quantitative approaches

Before we discuss the selected methods used in this study in detail, it is necessary to debate research methodology in terms of qualitative and quantitative approaches with respect to methodological choices for this research project. Qualitative and quantitative research are frequently compared and discussed as divergent research approaches. Qualitative research is often described as 'soft' and quantitative research is often considered as 'hard' and scientific (Yin 2003a: p.33). This is due to the characteristics of different approaches (Denscombe 2003: pp.232-234).

The characteristics of both qualitative and quantitative research approaches seem to be of a completely contrary nature and are generally discussed in a way that might convey the idea that combining them in the same study would be unworkable. However, Yin (1993) argues that qualitative research can be 'hard' and scientific. On the other hand quantitative research can be 'soft' and based on non-scientific data. He concludes that the debate about qualitative and quantitative research is not of the differences of these two types of research but that it ought to be whether research is 'good' or 'poor' (Yin 1993: p.57).

The use of multiple methods and triangulation is encouraged in order to improve the quality of the research, and these involve data collection from various sources for the same issue (Denscombe 2003: p.132, 231, Yin 2003b: pp.8,9,14, Yin 1993: pp.57,59).

In this study, a literature review, street survey and semi-structured interviews were selected as the data collection methods, allowing the outcomes to be triangulated. The detailed research methods used in this study are discussed below.

3.4 Selecting appropriate methods

In order to select the most appropriate research methods, the research strategies by Marshall and Rossman (2006: p.34) and Remenyi and Williams et al. (1998: pp.59,104) were used as a guide for this study. As well as using the research strategies mentioned above, previous research papers and their applied research methods were closely scrutinised prior to developing the research methodology for this study. There are several numbers of doctoral research projects that have been carried out in the area of environmental concerns and textile design and manufacture; Heeley (1997) and Fletcher (1999) are of particular interest to this study. Despite the difference between this research and the aims of Heeley and Fletcher, whose researches were helpful guides to this study, the research methods employed in their studies were considered informative in selecting appropriate research methods for this study.

Heeley (1997) investigates the environmental impact associated with textile production in the UK and industry reaction towards it. She also looks at the role textile and clothing designers could play in minimising the environmental impact. Her approach is exploratory and qualitative using action research and case study methods. She used numerous interview techniques (such as open-ended, in–depth and elite) throughout the exploratory stage to the main study. She decided not to carry out a quantitative survey; she considered the advantages and disadvantages of carrying out such a survey by post but anticipated a low response rate in view of the nature of the postal survey as well as the sensitive nature of the research topic (Heeley 1997). Fletcher (1999b) examines environmental impact within the textile industry and the industry's strategy to reduce it, especially at the designing stage. Her study was of an exploratory nature and she examined the designer's general knowledge with regards to the environmental impact of textile/clothing production. As the study required relatively straightforward general information, she adopted a quantitative approach using a postal questionnaire survey. As environmental studies in the textile/clothing sector were relatively new and not well documented, unlike in the product design sector (e.g. electric/electronics), both Heeley and Fletcher's studies were of an exploratory nature.

Taking into consideration the works discussed above, it was considered that adopting an empirical and phenomenological approach based on an understanding that the world is made up of a complicated mix of interlinked events and facets, rather than one single reality, would be the most suitable for this research (Remenyi and Williams et al.

1998: pp.35, 59,104). This research is empirical as it is based on observation and tries to understand the current circumstances surrounding the use of recycled material for clothing by collecting information directly from the public and the industries. The purpose of this study is to explore the rationale behind the use of recycled materials for clothing. The research attempts to understand the situation from technological, public, and industrial points of view. As this particular area of study is considered particularly complex (Bhamra 2004: pp.1, 7). The research strategy (Marshall and Rossman 2006: p.34) was used as a guide and Figure 3.1 is the overview of the research design used in this study.

Figure 3.1 Overview of the research design

	Aim of study	Research Framework	Methods	Outcomes
Exploratory Phase	To explore the previous and current eco-clothes example in order to identify the barriers and drivers to introducing clothes with recycled content. To review the existing literature in terms of technological barriers, consumer acceptance and retailer awareness for recycled materials. To determine the viability of the research, the final research methods and formalising research questions.	Develop theoretical work Examine, collect existing data Grasp, understand the overview of the area of study Contact the area of experts Determine the research methods. Pre-test/pilot (e.g. street survey, interviews) Data/document analysis Determine the final research methods and formalising research questions	Literature search and review (e.g. publications, company documents, brochures, website) Conferences, international trade fairs, company/shop visit Presenting at conferences Interviews (e.g. visit, telephone, email)	Visual evidence (e.g. fabrics, yarn, company brochures) Feedback from the area of experts or researchers Emerging research questions
Main Phase	To identify the consumer acceptance and attitude towards recycled materials through public survey. To investigate through interviews the barriers and drivers of the recycling technology influencing the use of recycled materials with the recycled fibre manufacturers To examine the situation within the high-street clothing retailers and identify their acceptance and attitude towards recycled materials through semi-structured interviews. Recommendations for the recycled fibre manufacturers to expand its markets to fashion markets and for high street clothing retailers to use recycled materials for their production materials for their products.	Data collection 1 Determine the sample, questionnaire design, data collection method Pre-test Data collection Data collection 2&3 Select/contact appropriate cases Determine the questions, data collection method Finalise participating cases and informants/ set time/date Pilot test Data collection Validation by the informants Correlate the findings from previous stages Final reporting	On-going literature review to update current events Street survey Face-to-face Industry survey Face-to-face / telephone Open-ended/semi-structured interviews Company visit	Data analysis and reporting Data analysis and reporting Finalise the report Discuss research findings Summarise research conclusions Suggestions for further research

The research consists of two phases: the first is the exploratory phase and the second is the main study phase including primary data collection/analysis, correlation of the findings, drawing conclusions and forming recommendations, including for further study (see Figure 1.11/3.1).

<u>Exploratory phase: Stage One</u>
It is essential to complete the exploratory phase prior to carrying out the main study. The purposes of the exploratory phase are stated below.

1. To explore previous and current eco-clothes examples in order to identify the barriers and drivers influencing the introduction of clothes with recycled content.

2. To review the existing literature in terms of technological barriers, consumer acceptance and clothing retailers' awareness for recycled materials.

3. To determine the viability of the research, the final research methods and to formalise the research questions.

The exploratory phase consists of the literature search and review, contacting and interviewing the area of experts, attending and presenting at conferences nationally and internationally, exploring international fibre and textile trade fairs, and visiting companies and shops. This is discussed further in detail in Section 3.5.

<u>Main phase: Stages Two and Three</u>
The aims of the main phase are listed below:

1. To identify consumer acceptance and attitude towards recycled materials through a public survey;

2. To investigate through interviews the barriers and drivers of the recycling technology influencing the use of recycled materials with the recycled fibre manufacturers;

3. To scrutinise the materials selection stage within the clothing industry and identify their acceptance and attitude towards recycled materials through semi-structured interview;

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4. To synthesise the findings from stages one, two and three and correlate the findings, to provide recommendations for the recycled fibre manufacturers to expand its markets to fashion markets and for high street clothing retailers to use recycled materials for their production as well as suggestions for further study in the field.

In the main phase: stages two and three were designed to collect primary data through a street survey and industry survey interviews. These research methods were determined and the research questions were finalised at the exploratory phase: stage one. The main phase is discussed in Section 3.6.

The final part of the main phase – synthesising the findings from all stages, providing recommendation and suggesting further studies – is discussed in Chapters Six.

3.5 Exploratory phase

The purpose of the exploratory phase is to identify the barriers and drivers influencing the production of clothes with recycled content through technological development, consumer acceptance and industry awareness. It also aims to determine the viability of the research, the final research methods and the formalisation of the research questions.

3.5.1 Literature review

Denscombe (2003) noted that carrying out a literature search and review has a significant role in an initial phase of the research. The literature review informs the research in depth on the chosen subject and also highlights gaps within existing knowledge. (Denscombe 2003: pp.212-213) Yin (2003b) also states that the literature review helps the researcher 'to develop sharper and more insightful questions about the topic' (Yin 2003b: p.9). The advantage is that the researcher can access updated information anytime covering a wider range of information. The disadvantage is that only information published can be reviewed and some information may be intentionally blocked (Yin 2003b: p.86).

3.5.2 Identifying contacts

Having direct contact with experts in the particular area of study was a vital first step to obtain up-to-date information. It also generated alternative explanations to the phenomena under scrutiny, which increased the validity of the outcomes of the study.

At the beginning of the study, several companies (such as Wellman, Teijin, Toyobo) that were known in the early 1990s for their production of recycled plastic fibre were contacted via email as they are located globally. Dialogue with these companies was essential in order to find out about technological developments and the drivers and barriers to their recycled PET fibre business. This led to the selection of the participating companies at the latter stage of the study.

Several clothing companies were also contacted and interviewed with regards to their material selection process at the beginning of the study. This included Marks & Spencer, Next, Berghaus, KOMODO and Penny Plain. The outcomes of these interviews are compared with the results of the 2008/9 industry survey interviews and served as valuable information for analysis of shifts during the time between the two studies. The outcomes of the comparison are discussed in Chapter Five, section 5.4.3.2.

Furthermore, the conferences, seminars and trade fairs the researcher visited provided another useful source of information. Attending conferences and seminars allowed information to be obtained as well as providing direct contact with experts in the field. In fact, interviews with textile recyclers, sustainable and fibre consultants are the results of direct contact with them at the RITE conference in October 2008 in London. The results of the discussions are stated in Chapter Two, section 2.2 and Chapter Five, section 5.4.1.

3.5.3 Formalising the research questions

The literature review has identified current issues such as resource depletion, synthetic material waste and limited markets for the recycled synthetic materials. Contacting experts – textile recyclers, a sustainable fashion consultant, a sustainable technology consultant and a fibre consultant – facilitated the isolation of significant issues regarding wider use of recycled synthetic materials for clothing applications. The detailed results of the literature review and the research questions that emerged from the exploratory phase are discussed in Chapter Two.

Furthermore, the study in the exploratory phase realised the importance of three key players (consumers, recycled fibre manufacturers and high street clothing retailers) for the expansion of the use for the recycled synthetic materials. Therefore, carrying out a street survey (for consumers) and industry surveys (for manufacturers and clothing retailers) were the main focus of this study. The questions for the street survey and industry survey interviews in the main phase were formed through the studies carried out previously by the researcher. The outcomes of the previous street survey were published in 'Ecotextiles –the way forward for sustainable development in textiles' (Nakano 2007: pp.3-14) and the survey carried out in 2008/9 was developed by revising the previous one to better suit the current market situation. Comparison of these two survey outcomes resulted in critical analysis of the changes of consumer attitude and behaviour regarding clothes with recycled materials content between the times of these two surveys. The detailed discussion of this comparative analysis is stated in Chapter Four.

Previous to the main phase of study interviews with clothing companies were carried out in order to explore their material selection processes. The outcomes were compared with the results derived from the industry survey interviews carried out in 2008/9. The analysis of the two sets of studies again led to valuable outcomes that indicate how material selection processes and procedures have been carried out within the clothing sector in the last three years. Contacting the recycled fibre producers in the exploratory stage led to a realisation of the necessity of obtaining information about their points of view on the wider use of recycled materials in the clothing sector, hence semi-structured interviews were carried out in the main phase.

3.6 Main study phase

The aims of the main study were to examine the perception of the general public towards clothes with recycled materials content and their key drivers when they purchase clothes. The study also investigates the recycling technology influencing the wider use of recycled materials use in clothing applications with recycled fibre manufacturers, the current attitude of the high street clothing retailers towards the use of recycled materials in their products, and their awareness and level of understanding of environmental issues in the clothing sector. The main study was divided into two stages (see Figure 1.11/ 3.1);

Stage Two: Street Survey (see Section 3.6.1)

Stage Three: Industry Surveys (see Section 3.6.2)

The main study contains the street survey, the industry surveys including document analysis, interviews and direct observation) with the recycled fibre and fabric manufacturers and the high street clothing retailers as well as updated literature searches and reviews.

3.6.1 Street survey

The survey was considered the most appropriate method to make generalisations about a wider population and their behaviours, attitudes and opinions (Cohen et al. 2000: p.78, McCormack and Hill 1997: p.6). Although the street survey is not usually considered best suited to analyzing these factors in depth (Ibid.: p.25), the street survey method was selected as this enabled the researcher to reach the general public directly rather than by choosing the sample through a particular type of organisational database or mailing list. The advantages of the face-to-face survey are widely considered to be greater than its disadvantages. Direct contact between interviewers and participants gives interviewers opportunities to recognise whether given answers are trustworthy or not, thereby increasing the validity of the data. That makes the face-to-face survey method superior to other survey methods such as postal and telephone survey (McCormack and Hill 1997: p.29, Denscombe 2003: p.8).

This study concentrates on clothing with recycled content, particularly those made from plastic (PET) bottles. In order to examine the public perception towards clothes with recycled content, a survey was carried out using a fleece jacket as an example. The fleece jacket is a product that can be made from recycled materials and it is a particularly good example of recycled clothes currently available in the marketplace, as it shows that recycled materials are no longer inferior in quality in comparison to virgin materials (see Chapter Two, Section 2.2.2).

The quantitative approach needs to be planned ahead in detail. It takes significant time to prepare the carefully designed questionnaire which needs to undergo feasibility testing. The latter part of the study, collecting and analysing data, is a relatively straightforward process (Cohen et al. 2000: p.272). The table below shows the process of carrying out a survey that was adapted in this study.

The details of the survey process are discussed below.

Table 3.1 The survey process adopted in this study (McCormack and Hill 1997: pp.26-28)

Stage 1: Set objective • To identify the public reaction towards clothes with recycled contents using a fleece jacket as an example. • To examine key drivers when they purchase clothes. • To find out about public awareness towards eco-clothes. • To identify the potential market for clothes with recycled contents.
Stage 2: Select a data collection method • Face-to-face street survey
Stage 3: Identify an appropriate sample (see Appendix 4.2/Quota) Exclude those who fall under the following categories: • They have not made their choice of outer clothes themselves. • Their occupation is related to fashion/textiles/clothing retail. • Their occupation deals directly with environmental issues. Number in total: 144 respondents. (72 males and 72 females.)
Stage 4: Design a questionnaire • Filter questions • Closed-ended questions • Pilot test
Stage 5: Collect the data • Street survey • Face to face interview
Stage 6: Process the data • SPSS (Statistical Package for the Social Sciences)
Stage 7: Interpret and report findings Outcomes are disseminated in the forms of • PhD thesis • Conference paper

3.6.1.1 Questionnaire development

In this study closed-ended questions were used. Rather than open-ended questions, respondents were only given a restricted choice of possible answers decided by the researcher. The advantage of using closed-ended questions is that all responses are easily replaced by statistics as they can be pre-coded. This makes it easy to compare and analyse the data. On the other hand, answers are limited and there might not be an answer that mirrors respondents' true feelings or opinions. As a result respondents might feel frustrated, as they cannot express themselves fully (Denscombe 2003: pp.155-156).

Scaled questions were considered to be suitable for this study as they are usually used to find out about attitudes. They are very useful as they can produce more subtle data, e.g. degrees of feelings and degrees of opinions, rather than two extreme responses 'yes/no'. The data can be compared statistically. The questions in this study

were designed as five-point scale questions, as Cohen et al. mentioned that there is no absolute solution as to whether the six-point scale may push respondents to select either side. The 'other' option which was included provides an opportunity for respondents to add an option if the list does not include the one they feel most strongly about.

There are four different types of scaled questions; unipolar, bipolar, likert and semantic differential. In this study, semantic differential scales were selected to be used in the questionnaire as they are considered best to gain 'the closest to true internal data' (McCormack and Hill 1997: p.125). Table 3.2 shows an example of a semantic differential scale question used in the main study. 'Other' was included in the list to allow for further expansion. This enabled respondents to express themselves more fully by filling in their own option (Gordon 1999: p.35), in case they could not find a suitable example in the list or felt they wanted to add to the choice.

Table 3.2. An example of the semantic differential scale

Do you recycle any of the following materials? (Please circle the appropriate number according to your degree of preference. 1 to 5.)					
Not at all				**As much as possible**	
Paper	1	2	3	4	5
Tins &Cans	1	2	3	4	5
Glass Bottles	1	2	3	4	5
Plastic bottles	1	2	3	4	5
Other (Please specify)	1	2	3	4	5

The questionnaire has been developed from the one used in the researcher's previous study, mentioned in section 3.5.3. It has been modified to better satisfy the main study research questions. The details of the modifications are discussed in Chapter Four, section 4.3.

The survey focuses on the general public reaction towards eco-clothes, their shopping behaviour and their awareness of environmental issues. The questionnaire themes consist of four sections:

<u>Shopping behaviour</u>
This section is designed to find out what the key drivers are when people choose clothes.

Eco-clothes

This section is designed to find out reactions towards eco-clothes e.g. fleece garments and how much people are informed about these products.

Environmental issues

This section is designed to find out the general public awareness towards environmental issues.

General

This section is designed to understand the background of the group of the respondents.

3.6.1.2 Pre-testing the questionnaire

The questionnaire was pre-tested in line with accepted practice (McCormack and Hill 1997: p.97, Remenyi and Williams et al. 1998: pp.151-152, Cohen et al. 2000: pp.77, 260-261). The questionnaire for the main phase was developed from the previous survey carried out by the researcher. At the previous survey, the first questionnaire was prepared taking into account all the suggestions and it was shown to a market research expert within the School of Design at Northumbria University. The researcher received some constructive suggestions and comments, mainly clarifying the questions and wordings as well as adding optional answers such as 'other', 'unsure' and 'do not know'. The questionnaire was modified and the two pre-tests were carried out.

In this study, the questionnaire used for the previous survey was applied as a starting point. There was some scope for improvements in the previous survey questionnaire, such as a shorter length of survey. The questionnaire was carefully examined to establish if there were any repetitive and unnecessary questions or if the questions were really answering the survey objectives. It was a particularly hard task to eliminate questions as the researcher intended to cover as much ground as possible. However, some irrelevant questions were eliminated and the order of the questions was also modified to ensure the research questions suited the main phase of study.

The intensive preparation time involved in organising the venue and the time involved in carrying out the survey meant that it had to be right the first time and there was no room for error. It was impossible to go back and ask the same respondents more questions and repeating the survey was not feasible.

The first (with thirteen people) and second (with seven people) pre-tests were carried out with people immediately around the researcher in her place of work in an office block in North Tyneside housing various design consultancies. Necessary changes resulting from the first pre-test were made in order to clarify the wording and instructions. After modifying the first questionnaire, the second pre-test was carried out. There were only a few minor changes in wording and the questionnaire was ready to undergo the third pre-test. The third pre-test was carried out with fourteen people who were either working or studying at Northumbria University. The fourteen selected respondents had varied backgrounds such as academic staff (e.g. lecturers and researchers), technicians and administrators. All respondents filled in the questionnaire without need for further clarification.

The final version of the questionnaire is shown in Appendix 4.1. The outcomes of the pre-tests are stated in Chapter Four, Section 4.3.

3.6.1.3 Determining a sample

Deciding on the population of interest who are relevant to the study and getting the right respondents that fall into the set categories are crucial in order to obtain quality data from the survey. Thus adapting non-probability sampling and convenience sampling to generate the sample are considered to be the best methods for this study.

Non-probability sampling involves selecting a sample that represents only a particular group of the population and not the wider population. As non-probability sampling does not choose respondents entirely at random, it will most likely cause bias to the data. However, small-scale research tends to use the non-probability sampling method despite its disadvantages caused by its non-representative nature, especially if the research does not require absolute accuracy. The benefit of lower cost outweighs accuracy in market research. (Cohen et al. 2000: p.102, McCormack and Hill 1997: pp.54-55). Convenience sampling is selecting samples in a way that is convenient to the researcher. Descombe argues that almost all research takes into account convenience factors when a sample is chosen (Denscombe 2003: pp.16-17). In this study the quota was set up in order to obtain the data from the required number of age groups and genders, 144 samples including 72 males and 72 females, age groups ranging between 19 and above 61 were set (see Appendix 4.2). As each gender and age group contains more than 30 respondents, the researcher can draw conclusions from the data in terms of gender and age group differences.

Furthermore, filter questions were asked to make sure the researcher was getting data from the sample which fell within the categories required for this study.

3.6.1.4 Locating participants

When designing the survey the location and population were carefully considered. A variety of factors had to be taken into consideration, for example what the best location could be for reaching a cross-section of the population, how long it would take to interview a reasonable number of people, and how comfortable the interviewer and interviewees would be in this location. Due to the relatively large size of the survey, an expert in the Northumbria University Social Science department of the Business School advised the researcher to look for a location where people have some spare time, where it is warm and cosy, for example an airport. The researcher however rejected the idea of an airport because the population would be too specific. In Newcastle upon Tyne, surveys are most frequently carried out on Northumberland Street, a busy market street that attracts a wide cross section of the population. This coincides with McCormack and Hill's suggestion that street surveys normally take place in shopping areas that give access to a wide population in a short time (McCormack and Hill 1997: p.30).

Northumberland Street is not the most comfortable place however to carry out an involved interview and the local shopping mall, Eldon Square, was much more suited for the survey. Eldon Square offers the advantage of high numbers of people from a wide cross section of the population as well as a warm and cosy location where people often sit down on a bench to have a rest during their shopping. Usually marketing companies would be refused permission to carry out surveys in Eldon Square but the expert from Northumbria University nonetheless suggested contacting Eldon Square directly as they usually let researchers carry out surveys as long as it is purely for academic purposes. The researcher initially contacted Eldon Square by telephone. They requested to have a look at the questionnaire, after which permission to carry out the interviews was granted. The researcher needed only to report on arrival, get a returnable identity badge and report on departure. A further advantage of carrying out the survey in Eldon Square is the fact that the interviewer is required to wear an Eldon Square badge. The shopping mall badge inspires confidence and sets interviewees more at ease.

The public survey was carried out in the city centre of Newcastle upon Tyne over two weekends (18th, 19th and 25th, 26th) in October 2008. The data were collected from 162 respondents aged over 19 years old. Particular attention was paid to obtaining data from a cross section of the population with regard to such categories as age and gender. In order to avoid interviewing irrelevant respondents, filter questions were asked before filling in the main questionnaire. For instance, respondents in the survey were required to have chosen their outer clothes by themselves, their occupations could not be related to fashion, textiles or clothing retail, and they could not be dealing with environmental issues as part of their occupation. The detailed selection criteria and their reasoning are explained below.

• Respondents who choose outer clothes by themselves.

One of the objectives of the survey was to find out the key drivers for the respondents' purchasing decisions and also to determine the potential market for recycled materials. Therefore, those who did not purchase or choose their own clothes were excluded from participation in the survey.

• Where their occupations are not related to fashion, textiles, clothing retail and not dealing with environmental issues as part of their occupations.

The street survey was particularly concerned with gaining data from the general public. Therefore people who were not familiar with the fashion/textile/clothing business and did not deal with environmental issues through their occupations were targeted. Table 3.3 shows the filter questions that were asked.

Table 3.3 The filter questions that are used in the survey

Do you choose outer clothes by yourself, or not?
Is your occupation related to fashion/textiles/clothing retail?
Are you dealing with environmental issues as part of your occupation?

3.6.1.5 Analysing and interpreting data

In this study, a data analysis software package (SPSS) was used. This enables researchers to transfer the raw data from the questionnaires to the computer software, to generate frequencies and to perform statistical tests relatively easily and quickly (McCormack and Hill 1997: p.28).

There are different types of statistical tests to perform on different types of data.

Therefore it is necessary to distinguish types of data and select suitable tests to produce valuable outcomes.

Table 3.4. Quantitative data types and suitable descriptive statistics
(Adapted from Worthington and Holloway (1997: p.76) cited by Denscombe 2003: p.263)

Type of data	Central tendency	Dispersion	Statistical test
Nominal	Mode	Frequency distribution	Chi-square
Interval	Mean	Standard deviation	Analysis of variance / T-test

Table 3.4 shows the types of data derived from the survey and suitable descriptive statistics. These are used in this study in order to measure central tendency (averages), to measure dispersion (the spread of data) and to carry out statistical tests of significance. In order to interpret statistical data derived from the survey, the researcher undertook an intensive detailed study that enabled the application of appropriate statistical tests that would produce reliable outcomes. The detailed discussions of the survey findings are stated in Chapter Four, Section 4.4.2.

3.6.1.6 Validity and reliability

Carrying out a public survey requires careful planning and detailed preparations at each stage of the process, such as determining sample and sample size, designing the questionnaire, pre-testing the questionnaire, collecting the data and analysing the data. It is crucial for researchers to be aware of bias creeping into the data and they should make the best effort to minimise the risk of reducing the validity and reliability of the findings. Validity is the ability of the survey to produce precise and significant information from the research questions and reliability means that the survey can be repeated and produce consistent data over and over again (McCormack and Hill 1997: p.6). It is impossible to eliminate bias completely from the data but great attention was paid in each stage of the process to minimise the bias affecting the data in this study. The results of pre-testing the questionnaire and the main street survey are discussed in Chapter Four.

3.6.2 Industry surveys

The latter part of the main study is made up of the industry surveys, which involve a more qualitative approach. It was adapted for this particular research as it allows the researcher to investigate current issues in greater detail (Cohen et al. 2000: p.183). In this particular research it is used to shed light on the technological development of

recycled synthetic fibre affecting its current and potential markets and the materials selection process in the UK high street clothing retailers. It is of an exploratory nature as it aims to ascertain whether there exists enough opportunities for recycled synthetic fabrics to expand into other markets other than the existing uniform and sports apparel markets, and to what extent the person who is typically responsible for the materials selection considers producing environmentally friendly products when selecting materials for the development of clothing products. It focuses on a limited number of cases -- five cases (five interviews) with recycled fibre manufacturers and four cases (five interviews) with high street clothing retailers (cf. Denscombe 2003: pp.30-32, Cohen et al. 2000: p.185). The researcher was aware of the need to be cautious of her direct effect on the interviews. Although the personal involvement of the researcher can provide an advantage when looking into the area of study, collecting and analysing data are the results of their interpretation and particular attention needs to be paid so that the collected data will not be affected by personal bias (Ibid.: p.268).

This stage is designed to scrutinise industry perception and awareness towards recycled materials. Table 3.5 illustrates the process of carrying out the industry survey that was adapted in this study. The study questions were derived from the literature review and the previous process of the research. The outcomes of the industry survey are stated and discussed in Chapter Five.

Table 3.5 The industry survey process adopted in this study (Yin 1993: pp.91-92, 72-75)

Stage 1: Set study questions
Japanese recycled fibre and fabric manufacturers
• What are the possibilities due to advanced recycling technology?
• What are the current markets for the recycled synthetic materials?
• How have they been produced? Quality and cost?
• What are the manufacturers' views with regard to wider use of recycled synthetic materials?
UK high street clothing retailers
• Who is the key person dealing with materials selection?
• What criteria does the key person (dealing with materials selection) use when choosing materials for the development of clothing products?
• To what level are they aware of eco-friendly issues in the clothing industry?
• Does their level of understanding influence the materials selection process?
• What are the industry perceptions towards recycled materials?
• Do they see potential for recycled materials in their products?
Stage 2: Select a data collection method
• Semi-structured interviews with open-ended questions
• Website/Company document analysis
• Direct observation (the clothing retailers only)
Stage 3: Identify appropriate cases (see Appendix 3.1)
Multiple cases that predict similar outcomes (replications)
Cases that fall under the following categories:
Japanese recycled fibre and fabric manufacturers
• Producing recycled synthetic fibres or fabrics
Number in total: 5 participating companies with 5 informants
UK high street clothing retailers
• UK based high street clothing retailers
• Has a women's wear section
Number in total: 4 participating companies with 5 informants
Stage 4: Design the questions
• Open-ended questions
• Filling in scaled questions (the clothing retailers only)
• Pilot study
Stage 5: Collect the data
• Semi-structured interview by telephone
• Semi-structured interview at the participants' premises
• Transcribe the interviews
• Create a database
Stage 6: Process and Analysis of the data
• QSR N6 (Qualitative data analysis software)
• Rival theories
Stage 7: Interpret and report findings
Outcomes are disseminated in the forms of
• PhD thesis
• Conference papers

3.6.2.1 Interview themes

The interview themes used in the industry surveys with Japanese recycled fibre and fabric manufacturers and UK high street clothing retailers are listed below. The interview questions used for the industry surveys are listed in Appendix 5.1.

• **Japanese recycled fibre and fabric manufacturers**

General information

- Their role within the company
- Their products
- Company information
- Size of their team

Development of recycling technology

- Types of recycling technology used
- Possibilities due to recent developments
- Production capacity
- Current markets

Fabric development process information

- Development of fabric processes
- Possibility to expand to fashion markets

Their views on alternative thinking

- Use of biodegradable polyester derived from plant base
- Use of only natural fibres

• **UK high street clothing retailers**

General information

- Their role within the company
- Their products
- Company information
- Size of their team

Materials selection information

- Sourcing materials
- Agency
- Priority of selecting materials

Design process information

- Development of design process
- Key person making critical decisions at each stage
- Role of the designer

Attitudes towards recycled materials

- Perception and reaction towards recycled fabrics
- Awareness of environmental issues in the clothing sector

Their views on alternative thinking

- Use of purely natural fibre

A set of questions was planned for the interviews and in most cases the researcher followed the pre-planned questions. However, in some instances the researcher needed to add more questions to clarify respondent comments or asked respondents to expand more on the topic. The outcomes of the industry surveys are discussed in Chapter Five.

3.6.2.2 Pilot studies

The aim of carrying out the pilot studies was to spot and correct any weakness of the industry survey design prior to the main study data collection. It also helped to refine the questions as well as gain insights from experts in the area of study (see Yin 1993: p.110). This prepared the researcher for the main interviews by informing her well about the topic of inquiry. Thus the researcher was quite capable of adding vital questions during the interviews when necessary (see Yin 2003a: p.27, Denscombe 2003: p.172). The questions for Japanese recycled manufacturers were tested on a garment designer who understands both Japanese and English, as the interviews with the manufacturers were carried out in Japanese. The pilot studies for the clothing retailers were carried out with experts in the area of study at Northumbria University. The outcomes of the pilot studies are stated and discussed in detail in Chapter Five, Section 5.3.

3.6.2.2.1 The participating respondents

Three experts in the field within Northumbria University (see Table 3.6) were contacted. They have extensive industrial experience in the clothing industry nationally and internationally and have worked, or are working, as decision-makers in terms of design. Initially two of them (respondents A/B) were asked to go through the interview questions in an informal setting, respond to some questions and make comments and suggestions for changes if they felt it necessary. After that, a few changes were made and respondent C was asked to participate in the interview. This time the whole interview procedure was carried out and audio taped. Respondent C was also asked to comment on how easy it was to answer the questions and to express her opinions about the interview process. The detailed results and changes resulting from the pilot studies are stated below.

Table 3.6 Respondents to the pilot study

	Title	Organisation
Respondent A	Fashion Design Programme Leader/Senior Lecturer	School of Design at Northumbria University
Respondent B	Fashion Design Associate Lecturer	School of Design at Northumbria University
Respondent C	Associate Senior Lecturer BA Fashion Marketing	School of Design at Northumbria University

3.6.2.2.2 The pilot studies results

As a result of carrying out the pilot studies, numerous changes were made to the questions. Those changes were mainly to clarify the questions as well as adding and refining the wording used in the questions. Furthermore, having opportunities to discuss the contents of the interview with the experts turned out to be more beneficial than the researcher expected initially. It gave the researcher insights that are difficult to obtain from publications as they discussed issues that the clothing industry is currently dealing with. The discussion revealed the necessity of finding out the key person who is dealing with materials selection, as it was suggested that materials selection may not be a designer's job, rather, it depends on a company decision.

In terms of sourcing materials, they mentioned the fast and short production cycles as well as sourcing and manufacturing abroad. Therefore they do not necessarily have control over the materials selection. As this seemed to be a key issue for the materials selection, the researcher intended to expand on this issue for the main industry survey interviews. Furthermore, there were comments regarding reaction towards fabrics with recycled contents. As this study focused on recycled polyester fabrics, some informants mentioned that there are negative perceptions towards polyester (synthetic) fabrics. This was also closely looked into for the main interview during the direct observations.

After the interview questions were amended, comments regarding the content of the interview were taken into consideration, and final alterations to the interview questionnaire and procedure of the interview were completed. Then the main industry survey interviews were carried out.

3.6.2.3 Selecting companies and informants

The criteria used for selecting companies and informants are discussed in this section. Non-probability sampling which does not require random selection was used in this study as it is especially advantageous when used in small-scale research. Although it is an inexpensive and straightforward approach which does not present the level of complexity that other sampling methods do, it does allow the drawing of sufficient outcomes (Cohen et al. 2000: p.102). Within non-probability sampling there are two categories: 'convenience' and 'purposive' sampling. In this study the latter was used as the researcher sought out the informants with 'purpose' in mind, in particular the respondents with specific knowledge and experience which is known as 'expert

sampling' (Trochim and Donnelly 2007). Five recycled fibre manufacturers with five informants and four high street clothing retailers comprising five informants were selected in this study. Carrying out multiple studies is more expensive and time-consuming, but the derived outcomes are more convincing and robust as replication can be established (Yin 2003b: pp.35, 46-47).

• Japanese recycled fibre and fabric manufacturers
The study focuses on Japanese recycled fibre and fabric manufacturers, as they (Teijin and Toray) are world leaders in recycled fibre production (Cole 2007: p.29). Furthermore, it was considered to be advantageous that the researcher's native language is Japanese which made it possible to access key personnel who are engaged in the recycled fibre business in Japan, rather than their English speaking representatives in Europe or America.

First, Teijin and Toyobo were contacted as the researcher had already made contact with them at the exploratory phase of study. The person whom the researcher had contacted in the exploratory phase was still in post and Teijin agreed to participate in the study. However, the two staff known to the researcher at Toyobo had left the company and Toyobo declined the request for an interview as they do less business with recycled PET fibre and fabrics. The remaining companies were contacted through published contacts on their Japanese websites that led to the main personnel for their recycled fabric business. The participating companies and details of interviews are listed below (see Table 3.7).

Table 3.7 Participating companies and the interview details/ Japanese recycled fibre and fabric manufacturers
*Companies are listed in alphabetical order.

Company name	Position of informants /department	Date & duration of interview
Asahi Kasei Fibers Corporation	Polyester Filament Division	16/01/2009 22 mins
Kurabo	Marketing Group, Fibre Department	17/11/2008 40 mins
Mitsubishi Rayon Textile Co., LTD.	Assistant Director, Technology Department	04/11/2008 30 mins
Teijin Fibers Limited	Tetron Filament Planning & Control Section	26/11/2008 50 mins
Toray Industries, Inc.	Women's & Men's Wear Woven Fabrics Sect. 1, Women's & Men's Wear	27/11/2008 50 mins

• UK high street clothing retailers

The study focuses on UK based clothing companies of various sizes and target markets, and their commitments towards environmental issues. The selection criteria are that they are UK based, use synthetic fabrics for their products, are high street retailers and have a women's wear section.

Thirteen UK based clothing companies were listed based on the criteria mentioned above (see Appendix 3. 1). The fashion experts within Northumbria University were then contacted to see if they could add potential companies to the list and forward some useful contacts. In the meantime, the company websites were examined in order to determine if those companies were already concerned with, and actively involved with, environmental issues or not. If they were, what they did and how they wanted to be perceived by the public was investigated.

After identifying all the companies with design offices in the UK, initial contacts were made by sending an email asking them to participate in the study (see Appendix 3.2). Some of the contact details were forwarded by members of staff at Northumbria University, some are from the researcher's own contacts from the exploratory phase of the study (through the interviews and conference attendance) and others were contacts published on their company website.

Marks & Spencer and Next, which had previously participated in interviews at the exploratory phase, again agreed to take part of the main study. One of the informants from Marks & Spencer was a speaker at a conference (RITE conference in October 2008) that the researcher attended. None of the supermarkets showed any interest in taking part and in particular the researcher was shocked to receive a rather a hostile reception from the speaker from Tesco Clothing at the conference. The researcher approached this speaker during free talk time, asking how knowledge of sustainable sourcing passes on to the design department. Her reaction was rather aggressive and she clearly did not to want to engage in conversation with the researcher. This event led the researcher to reflect upon Katharine Hamnett's comment that she had doubts about Tesco's commitment to sustainability (see Chapter Two, section 2.3.2). Low budget clothing retailers such as Primark, Matalan and Peacock were also contacted but no reply was received (see Appendix 3.1).

Table 3.8 shows four companies with five informants that agreed to participate in the interview. Various types of companies in terms of size and products were included. The companies that declined to be interviewed, their reasoning behind this decision, their commitment to CSR and use of eco-fabrics are shown in Appendix 3.1.
The targeted informants within these companies were the key people dealing with the materials selection process for women's wear.
Prior to the face-to-face interview, the companies that agreed to participate in the interview were contacted in order to make sure the contacted person was the one who is responsible for the materials selection process. It was considered that they were in a prime position within their company to have relevant knowledge of the area of investigation.
In fact, the views derived from their expertise and experiences would add a higher level of credibility to the findings (Denscombe 2003: pp.172-173,186-187). The researcher presumed that it would not be a designer who held responsibility since the previous interviews in the exploratory phase revealed that the designers were only partly dealing with the materials selection process and there were other personnel who were responsible for selecting materials.

The researcher anticipated that there would be other personnel (such as CSR managers) involved in the materials selection process due to increased awareness within the clothing sector in terms of sustainable sourcing. In fact, the researcher's initial contact was often a CSR manager or design manager who did not see him- or

herself as involved in the practice of fabric sourcing, and who forwarded the researcher's requests on to the fabric sourcing manager who had knowledge of both supply chain and consumer bases. Marks & Spencer was the only company with two personnel who were considered to be dealing with the materials selection process.

Contacting informants prior to the interview also provided an opportunity to discuss the possibilities of using recording devices such as tape recorder. One company objected to the use of an audio recorder (see Table 3.8). This was due to company policy, not because of personal preferences. A few informants asked to remain anonymous, therefore personal names are not shown.

Interviews with the companies listed below were carried out in the end of 2008. The outcomes of the interviews are discussed in Chapter Five.

Table 3.8 Participating companies and the interview details / UK high street clothing retailers
*Companies are listed in alphabetical order.

Company name	Position of Informants *Products dealt with*	Date & Duration of Interview
Arcadia Group Limited ∕Burton, Dorothy Perkins, Evans, Miss Selfridge, Topman, Topshop, Wallis	Supplier Compliance and Fabric Manager *Whole range (Women/Men/Accessories)*	09/12/2008 60 mins with no tape
Marks & Spencer Group plc	Fabric Sourcing Manager *Women/Accessories*	08/12/2008 35 mins with tape
Marks & Spencer Group plc	Sustainable Raw Materials Specialist *Whole range*	26/11/2008 30 mins with tape
NEXT Retail Ltd.	Fabric Sourcing Manager *Whole range apparel (Men / Women and Kids)*	15/12/2008 25 mins with tape
River Island (Lewis Trust Group Ltd.)	Fabric Sourcing Manager *Ladies smart wear*	09/12/2008 55 mins with tape

3.6.2.4 Interviews

The interview is a vital source of evidence in a qualitative study. The researcher judged that focused interviews with semi-structured and open–ended questions (Yin 2003b: pp.89-90) were the most suitable method for this study. As Denscombe describes, a semi-structured interview is flexible and allows informants to talk freely

using their own words. This leads to the 'discovery' of facts relevant to the subject the researcher is investigating, rather than to 'check' the cause of a current phenomenon (Denscombe 2003: p.167). Telephone interviews are also used in this study and they are considered to save cost and time compared to face-to-face interviews. There has been uncertainly about the accuracy of data collected from telephone interviews. However, there have been more studies carried out that indicate that respondents answer in the same manner whether or not it is a telephone or face-to-face interview, therefore it is hard to argue the difference in terms of accuracy of the data (Ibid: p.9). The researcher needed to acknowledge the advantages and disadvantages of semi-structured interviews, be unbiased, well-informed about the area of study, flexible and a good listener during the interviews (see Yin 2003b: p.59). The researcher also needed to take care of confidentiality where necessary (Cohen et al. 2000: p.292). The researcher's experience of working as a designer in the clothing and textiles sectors contributed to the understanding and identification of industry practices which allowed for the further expansion of questions during the interviews. Recoding methods that were used in this study are stated below.

The interview recordings
In this study, field notes and tape recordings were used where informants agreed and see Denscombe (2003: p.175) for an evaluation of choice of method of interview.

The interview analysis
In this study all of the transcripts and the draft of the report were sent to the informants in order to be approved. The transcripts were amended following requests and suggestions from them.

3.6.2.5 Direct observation
The researcher realised the importance of visiting the actual companies and the opportunities this offered for direct observations from an early stage of the research design. Direct observation provides evidence that cannot be obtained otherwise. Information gained through direct observation can be of great value when used in conjunction with the information obtained through the actual interviews. In this study, observations were made about the premises, the work environments and reactions of the respondents towards fabric samples (Silverman 1994,1997 cited by Remenyi and Williams et al. 1998: pp.176-177) that can be used to validate the industry survey data

through triangulation. (Lumley and Benjarmin 1994 cited by Remenyi and Williams et al. 1998: pp.176-177).

Company visits

Visiting companies enabled observation of informant behaviour during the interview and also provided information about the organisational work environment. This is considered to be another source of evidence in this study (Yin 2003b: pp.92-93). The drawback of carrying out direct observation is that it is costly in terms of time (Ibid.: p.86) and travel expenses.

Fabric handling

One of the research questions in this study investigated the clothing retailers' reaction towards materials with recycled content.

The currently available fabrics containing recycled synthetic fibre were provided by four of the participating Japanese recycled fibre and fabric manufacturers.

 The details of these fabric samples are shown in Appendix 3.3. The outcomes of direct observation are discussed in Chapter Five, Section 5.4.3.2.6.

3.6.2.6 Analysing and interpreting data

The method of qualitative analysis is not as strictly defined as the quantitative analysis. This does not mean that the analysis can be carried out without any strategy. In fact, the absence of the defined analysis techniques encourages researchers to be more cautious. Qualitative research is end-loaded, which means the data need to be transcribed and coded after they have been collected and it is not necessary to sort out the data categories prior to the data collection. However, analysing the data takes considerably longer as the researcher needs to sort the data into emerged variables in order to identify the common topics between the cases. Further stages are triangulation and outcomes generation. During these processes the previous research developments and the literature reviews become useful (Cohen et al. 2000: p.272, Yin 2003b: pp.13-14). Throughout processing and interpreting the data the researcher tried to stay focused on the industry survey objectives. That enabled the researcher to concentrate only on relevant data (Yin 2003b: pp.109-114). The following analysis procedure was adapted in this study:

(1) Transcribing the interviews.
(2) Splitting the texts into units.
(3) Generating the categories.
(4) Coding the data.
(5) Seeking the rival theories.
(6) Writing the report.

The QSR N6 (Qualitative data analysis software) was used for processing and analysing the qualitative data that were collected from the interviews in this study. The benefit of using this software is that it enables the researcher to handle the data easier and faster. Other advantages are that all of the documents such as transcripts and field notes can be stored in computer files. Accessing these files and copying them is quick and easy. The data was categorised into 'nodes'. 'Node' is a term used by the data analysis software describing a section or category of data. There were 22 nodes generated through the main interviews analysis with Japanese manufacturers and 25 nodes created with UK clothing retailers studies. Using the researcher's own expert knowledge and previous work experience as a designer in the clothing and textiles sectors helped to generate significant and meaningful analysis (Yin 2003b: pp.137-138). These outcomes are discussed and stated in detail in Chapter Five.

3.6.2.7 Validity and reliability

Validity is the ability to demonstrate that the study produces valuable data to answer the research questions and reliability is the ability to show that the study can be repeated and produce the same data (McCormack and Hill 1997: p.6). However, the self involvement of the researcher is an integral part of the qualitative study and there is a possibility that two studies using the same study protocol derive a set of different but trustworthy outcomes (Cohen et al. 2000: pp.119-120). In this study, construct validity, external validity and reliability were carefully considered and Table 3.9 shows the methods used to establish validity and reliability in this study.

Table 3.9 The methods used to establish validity and reliability

	The methods used to establish validity and reliability
Construct Validity	• Multiple sources of evidence for triangulation • Establishing chains of evidence • The draft reviewed by the informants
External Validity	• Multiple studies / Replication logic • Rival theories
Reliability	• Protocol • Database / Chain of evidence

3.6.2.7.1 Construct validity

To establish construct validity, the researcher needs to demonstrate the effectiveness of the research design and data collection methods and show that they are fit to deliver valuable research outcomes. The strategies used in this study adapt multiple sources of evidence for triangulation and establish chains of evidence, and allow the draft to be reviewed by the informants (Yin 2003b: p.35-36).

Multiple sources of evidence /Triangulation

If there were evidence from three or more sources converging on the same findings, the research outcomes are considered to be robust. In this study, document analysis, direct observation and semi-structured interviews were used as multiple sources of evidence to ensure that the data derived from the interviews could be triangulated, as interview data ought not to be used at face value. It needs to be backed up by evidence derived from alternative sources (Yin 1993: pp.69,78, Denscombe 2003: pp.186-187,274-275).

<u>Chains of evidence</u>

The researcher paid particular attention so that information (such as the industry survey methodology, the protocol, the interview questions and the transcripts) would not get lost during the procedures. This allows the reader to trace back from the conclusion to the initial industry survey questions, the protocol and the raw collected data and vice versa (Yin 2003b: pp.83,105-106). In the report, all references from the collected data were clearly cited.

<u>Draft reviewed by the informants</u>

Having the draft of the industry survey reviewed by the informants was vital in order to increase the accuracy of the study. It helped the informants to confirm what they had said and also offered an opportunity for them to add what they had forgotten to mention during the interview. In this study, the draft (as well as the transcripts) was sent to all informants for validation. These came back with some changes and requests for anonymity. Modifications were made according to their comments and their suggestions were taken into consideration (see Yin 2003b: pp.159-160, Cohen et al. 2000: p.190, Denscombe 2003: pp.274-275).

Adding to the above, the researcher needed to be cautious not to oversimplify the findings while preparing the report of the outcomes of the study. The conclusion of the research should be consistent and not contain contradictions. The self influence of the researcher in reporting the findings was carefully handled in order to avoid biased interpretation (see Denscombe 2003: p.273-274).

3.6.2.7.2 External validity

To achieve external validity and to determine whether the outcomes could be explained by other similar circumstances, the findings needed to be correlated against existing knowledge of the area of study. The strategies adopted in this study in order to achieve external validity were to use multiple cases to establish replication logic and rival theories to explore alternative possible explanations of the outcomes (Yin 2003b: p.34, Denscombe 2003: pp.274-275). The detailed discussions are stated below.

<u>Multiple studies/Replication logic</u>

It is better to have findings from two or more cases rather than from just one case. If there is replication logic (i.e. similar ideas shared by several informants), it will increase the validity of generalisation. Qualitative study generalisation is analytical and

differs from quantitative research generalisation, which is statistical. The analytical generalisation can use the results from as little as two cases to make generalisations of broader instances rather than having to rely on a large sample size. In this study, the data were gathered from five cases for the recycled fibre manufacturers and four cases (with five interviews) with high street clothing retailers so that it is possible to use the analytical generalisation strategy (Yin 2003b: p.37, Denscombe 2003: pp.187-188). Additionally, it is vital to select companies that best fit the purpose of the study and to choose the most suitable informants with the best knowledge in the area of study as this increases validity of the data dramatically.

Rival theories

It is beneficial to use rival theories as a tool to increase validity of the findings. Yin (1993) promotes earnest and honest rival thinking to reduce the impact of bias. The rival theories are developed through reviewing existing literatures and previous research processes and they should be explored and tested throughout. The rival theories were taken into account right through from designing the industry survey and the research questions stage to the data collection and analysis of the data (Yin 1993: pp. 59-60,112-113, Denscombe 2003: pp.274-275). In this study rival theories are tested throughout from the literature review and industry surveys. The use of alternative biodegradable polyester and use of non-synthetic materials are considered as rival theories in this study and discussions are stated in Chapter Two, section 2.2.1.1 and Chapter Five, section 5.4.

3.6.2.7.3 Reliability

To demonstrate reliability is to show that the process of data collection can be repeated and produce the same outcomes. However, self involvement with the qualitative research makes it questionable whether a repeated study would reach the same results. This does not mean the study is unreliable. In fact it is possible, since reality is complex and influences are closely interwoven, that two researchers will deliver a set of different yet valuable outcomes using the same research procedures. However, it does not justify carelessness: the purposes of the study, the background theory, the methodology and justification of any conclusions need to be clearly stated (Denscombe 2003: pp.273-274, Cohen et al. 2000: pp.119-120). The strategies used in order to achieve reliability were using a protocol and creating a database (Yin 2003b: pp.34, 41). The detailed discussions are stated below.

Protocol

It was essential to use a protocol which contained the aims, questions and the methodology to carry out the study. It was particularly useful to make sure all multiple-case data collections followed the same procedures. With the knowledge that all outcomes were derived from using the same protocol it was possible to have fair and honest comparison between them (Yin 1993: p.40, Denscombe 2003: p.273-274).

Database/Chain of evidence

Creating a database was another strategy for increasing the reliability of the study. The database was a collection of the evidence derived from the research processes and separated from the actual report. The database usually contains field notes (e.g. notes made by the interviewer during the interviews), archival documents, tabular materials and the interview transcripts. They did not have to be in the style of the final report but they needed to be organised and comprehensible to a third party, so that anyone could access the data and confirm its plausibility and draw their own conclusions if necessary (Yin 1993: pp.40, 71, 78, 95). In addition, the main report clearly stated citations and references from the database. This enables an external observer to follow the initial questions from the collection of evidence to the final conclusions. If the external observer can trace each procedure easily, a chain of evidence is established which in turn demonstrates reliability of the findings (Ibid.: pp.71, 78, 98-99).

3.7 Summary and conclusions

The research methods adapted in this study consist of both quantitative and qualitative research strategies and were formed into three main data collection stages: the literature review, the public survey and the industry survey interviews (see Figure 1.11/3.1). These selected research methods were considered to be the most appropriate in order to obtain the data necessary to answer the research questions (see Section 3.4).

The data and information collected during the exploratory phase helped to determine the research methodology and finalise the research questions that were then scrutinised in Stage Two (the public survey) and Stage Three (the industry survey interviews).

During the second stage, data derived from the public survey were collected and the public perception and acceptance towards clothes with recycled materials was closely

examined. The third data collection stage involved the industry survey interviews with Japanese recycled fibre manufacturers and UK based high street clothing retailers. The aim of this was threefold; to investigate the potential for technological developments to expand the use of recycled synthetic materials in UK clothing markets, to learn about the UK high street clothing retailers' perceptions and acceptance of fabrics with recycled materials, and to find out their views about selecting and using recycled materials.

In addition to these three data collection stages, correlations of existing theories, the outcomes of the public survey and the industry surveys were carried out. The recommendations for the wider use of recycled materials in the clothing industry were finally formulated. Through the use of extensive data collection procedures, in the research design, the research questions that were raised from the current phenomena were satisfactorily answered. All of the processes (such as designing the questionnaire and the questions, collecting data, analysing and interpreting data) were carefully carried out in an unbiased manner. The researcher made efforts to reduce the impact of the bias as much as possible, but it is important to bear in mind that it is impossible to eliminate bias completely.

The outcomes of the main phase of Stage Two, the public survey, and Stage Three, the industry surveys, are discussed in detail in Chapters Four and Five.

4

CHAPTER FOUR

RESULTS OF THE STREET SURVEY

4.1 Introduction

This chapter outlines the outcomes of the public survey. The information derived from the survey should prove useful to clothing retailers who are considering using recycled materials for their products as well as recycled fibre/fabric manufacturers. The public survey was carried out in order to identify public acceptance of clothes with recycled content using a fleece jacket as an example. It also aimed to assess shopping behaviours in order to evaluate the potential market for clothes with recycled content. The data collection for this survey took place in October 2008 and the survey outcomes serve as an indicator of general public awareness towards clothes with recycled content. The results of the 2008 survey were contrasted with the results of the 2001 survey (Nakano 2007), which investigates the same issues and took place in the same venue, in order to scrutinise the shift of consumer awareness and shopping behaviour.

4.2 Survey objectives

The following survey objectives were established in order to explore public acceptance of recycled materials for clothing.

1. To identify the public reaction towards clothes with recycled contents.
2. To examine shopping behaviours for clothes and environmentally friendly products.
3. To find out about public awareness towards clothes marketed as environmentally friendly.
4. To identify the potential market for clothes with recycled contents.

4.3 Pre-testing the questionnaire

It is essential to carry out pre-tests before launching the main survey. It helps to spot any problems the questionnaire may have and correct them before the main data collection takes place. It also gives the researcher assurance that the collected data will prove to be meaningful data relevant to the research questions. It also serves as practice for the researcher in checking the questionnaire completion time (see Chapter Three, Section 3.6.1.2). The questionnaire that was used for the original survey in 2001 was modified to be better suited for the 2008 survey. Changes have been made to increase efficiency of the data collection and analysis however these changes do not affected the comparability of these two surveys.

In this study three pre-tests were performed: the first one with thirteen respondents, the second one with seven respondents and the third pre-test with fourteen respondents. The changes focused on eliminating any confusion by clarifying the wording, questions and instructions.

The final questionnaire used for the third pre-test is shown in Appendix 4.1. All of the respondents filled in a questionnaire without any confusion. They commented that the questionnaire was straightforward and the questions easy to answer, and it took about five to seven minutes to complete the questionnaire.

After performing the three pre-tests, the questionnaire was ready for the main survey. The outcomes of the main survey are discussed below.

4.4 Survey results

The in–street survey was carried out after the pre-tests and the modifications to the questionnaire were completed. The results of the survey are stated below.

4.4.1 The participant respondents

In–street and face-to-face surveys were used in this study. The survey location and the criteria of sample selection were carefully considered. For instance, in order to reach the appropriate respondents, three filter questions were used. The quota was also prepared so that the researcher could take into consideration gender and age distribution while approaching the potential participants (see Appendix 4.2). The detailed discussions of the methodology used for the survey are stated in Chapter three, Section 3.6.1.

The in-street survey took place in the Eldon Square Shopping Centre in the heart of the City of Newcastle upon Tyne between 18th and 25th October 2008. One hundred and sixty two people aged over 19 years old participated.

The Figure 4.1 shows gender and age distribution of the respondents. The details of statistical data are shown in Table 1.3.1./1.3.2 Appendix 4.3.

Figure 4.1 Gender and Age in the 2008 survey (n=162)
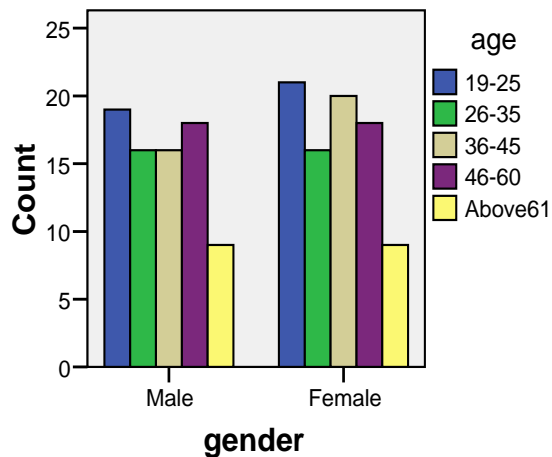
The total number of respondents were 162. Within that, 51.9% (n*=84) of the respondents were female and 48.1% (n=78) were male. The respondents fit into the age groups of 19 to 25 (24.7%, n=40), 26 to 35 (19.8%, n=32), 36 to 45 (22.2%, n=36), 46 to 60 (22.2%, n=36) and above 61 (11.1%, n=18) (see Figure 4.1). The population of the city of Newcastle upon Tyne at the time of the survey was 259,536 and approximately 10% of the population were between 20 to 24 years old. This high percentage of the 20 to 24 group is due to the number of universities and colleges within and around the city. The economically active population in the city is 58.5%. This is lower than the English average of 66.9% (Census 2001).

The outcomes of the in-street survey are stated below.

*(n stands for number of respondents)

4.4.2 In street survey results

The in-street survey findings presented here consist of three sections.

The first section was designed '**To identify public reactions towards clothes with recycled contents'.**

The second section was designed **'To gauge public awareness towards clothes marketed as environmentally friendly'.**

The third section was designed **'To examine shopping behaviours for clothes and environmentally friendly products'.**

The final objective **'To identify the potential market for clothes made from recycled materials'** is addressed in the conclusion section. The two survey results carried out in 2001 and 2008 were compared and the results are stated and discussed in this section. The findings derived from the two surveys and their comparison serves as a vital source of information that identifies a shift in general public awareness and shopping behaviour in the last eight years. The findings of the survey are illustrated below with graphs and the detailed statistics are shown in the form of tables in Appendix 4.3.

4.4.2.1 Consumer reaction towards recycled materials

In this section the public's awareness of clothes with recycled contents was investigated. The reason a fleece jacket was used in the survey was that it is a product that can be made from recycled materials and it is a good example of recycled clothes currently available in the marketplace. It shows that recycled materials are no longer of inferior quality when compared to new materials. The respondents were asked about their reaction towards clothes with recycled contents, their awareness towards clothes with recycled content and their views about the cost of such clothes.

Figure 4.2 Plastic bottles/Gender in the 2008 survey (n=162)
Q.1 Would it surprise you to know that fleece garments can be made from recycled plastic bottles?
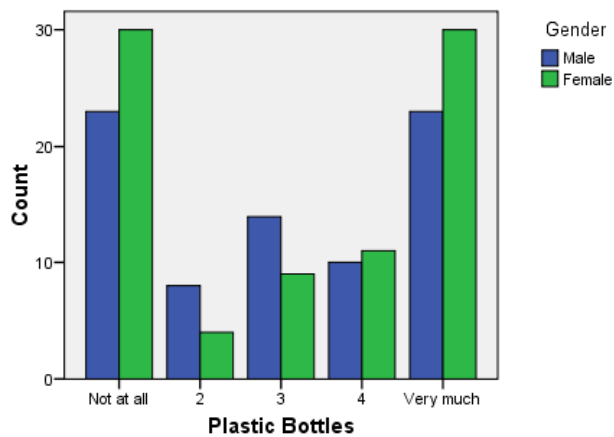
There appears to be a knowledge gap among people if they know that fleece garments can be made from recycled plastic bottles. Figure 4.2 shows that the data is separated into 'not at all surprised' (32.7%, n=53) and 'very much surprised' (32.7%, n=53) (see Table 1.1, Appendix 4.3). The data showed that there is no difference between female and male.

Figure 4.3 Plastic bottles/Year (n=256)
Q.1 Would it surprise you to know that fleece garments can be made from recycled plastic bottles?
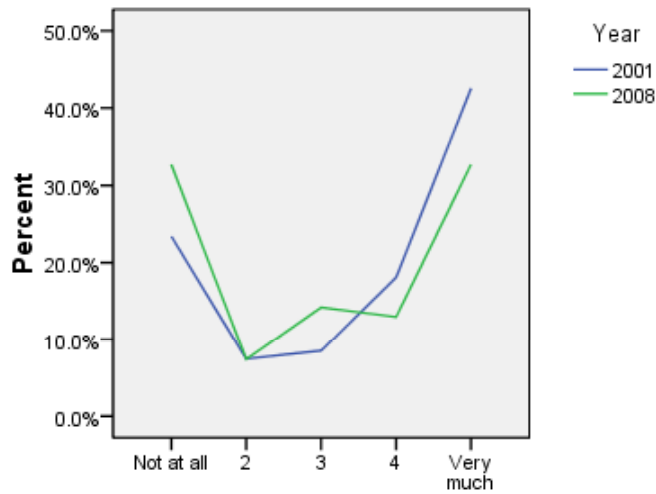
There is a significant difference between the 2008 and 2001 results (see Figure 4.3). People are more informed in 2008 than they were in 2001. In 2008, 32.7% (n=53) of respondents were aware that a fleece jacket can be made from recycled plastic bottles in comparison to 23.4% (n=22) in 2001 (see Table 1.6, Appendix 4.3).

Figure 4.4 Plastic Bottles/Age in the 2008 survey
Q.1 Would it surprise you to know that fleece garments can be made from recycled plastic bottles?
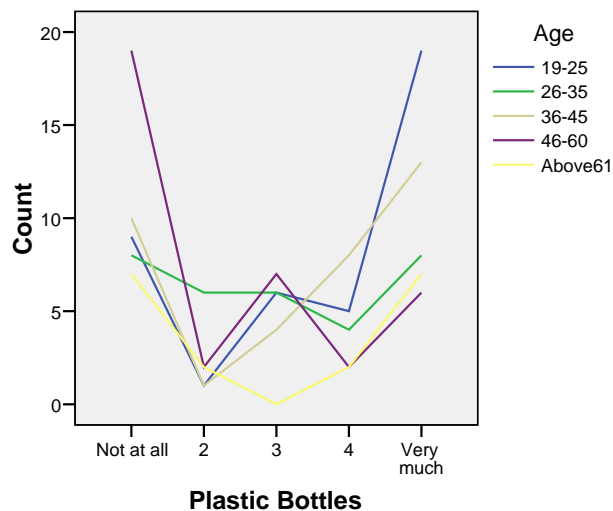
Figure 4.4 shows that there are differences between the age groups in the 2008 survey. The age group 46-60 are less surprised than the age group 19 to 25 (Sig* .003), 36-45 (Sig .008) and above 61 (Sig .037) (see Table 1.2/1.3/1.4/1.5, Appendix 4.3).

*(Sig stands for significant value.)

Figure 4.5 Reaction/Gender in the 2008 survey (n=162)
Q.2 If you are told that your fleece garment is made
from recycled materials, what would be your reaction?
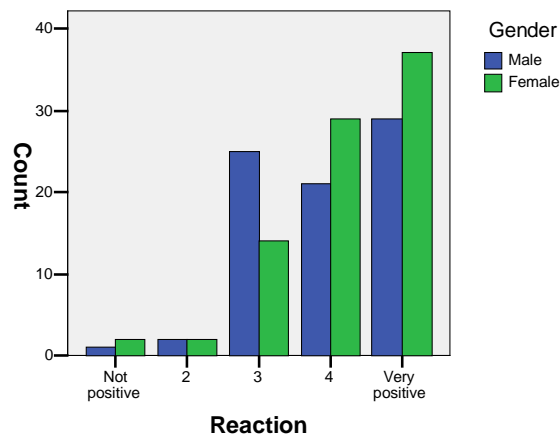
40.7% (n=66) of the respondents were 'Very positive' towards recycled materials especially for clothing. 71.6% (n=116) of the respondents chose 'Positive' and 'Very positive' and Figure 4.5 shows that there is no gender difference (see Table 2.1, Appendix 4.3). The majority of people do not seem to discriminate against recycled materials.

The data showed that there is no significant difference between 2008 and 2001 statistically. Both survey results revealed that the respondents have positive reactions towards clothes with recycled content. 71.6% (n=116) in 2008 and 76.6% (n=72) in 2001 of the respondents selected the scale 4 and 5. However, there is a ten per cent drop in the number of people who chose scale five (Very positive) which was 40.7% (n=66) in 2008 and 51.1% (n=48) in 2001 (see Table 2.3, Appendix 4.3).

Figure 4.6 Reaction/Age in the 2008 survey (n=162)
Q.2 If you are told that your fleece garment is made
from recycled materials, what would be your reaction?
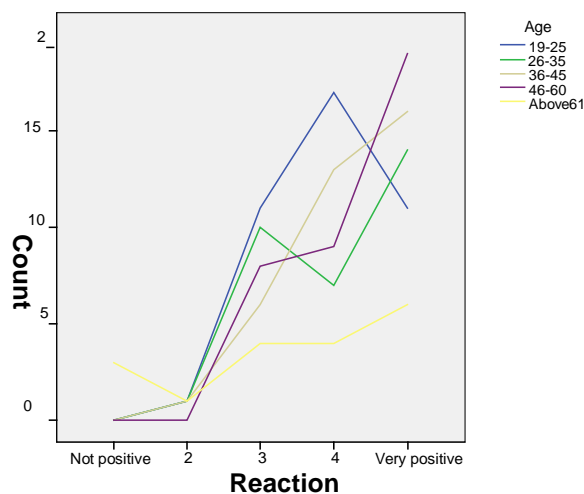
Figure 4.6 shows that the age group 'Above 61' have less positive reactions towards clothes with recycled content compared to the rest of the age groups (see Table 2.2, Appendix 4.3).
The age group '46-60 (Mean 4.31) have the highest mean among the age groups. However, Table 4.1 shows that across all the age groups between '19-60' there exists a relatively high mean; '36-45' (Mean

Table 4.1 Reaction/Age in the 2008 survey
Q.2 If you are told that your fleece garment is made
from recycled materials, what would be your reaction?

age	Mean	N	Std. Deviation
19-25	3.95	40	.815
26-35	4.06	32	.948
36-45	4.22	36	.832
46-60	4.31	36	.822
Above61	3.50	18	1.465
Total	4.06	162	.957

4.22, SD* .832), '26-35' (Mean 4.06, SD .948), '19-25' (Mean 3.95, SD .815) implying that they have a more positive attitude towards recycled materials than the age group 'Above 61'.

*SD stands for standard deviation.

Figure 4.7 Extra pay/Gender in the 2008 survey (n=162)
Q.3 How much extra would you be prepared to pay for a garment made from recycled materials compared to new materials?

Extra pay
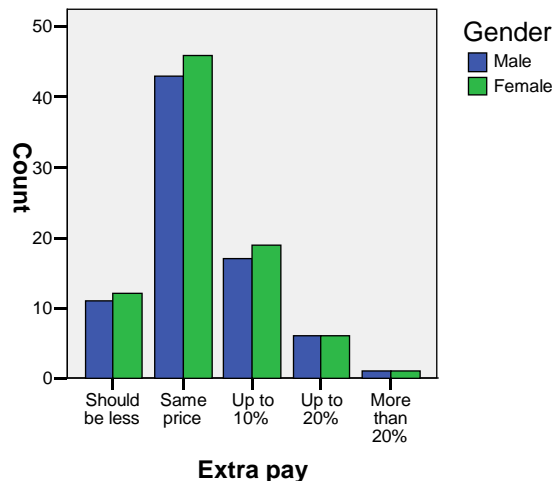
54.9% (n=89) of the respondents are prepared to pay the same price for recycled materials as for new materials and 22.2% (n=36) are prepared to pay up to 10% more than for new materials. There is no gender difference. If products made from recycled materials cost more than 10% higher than products made from new materials, they will not appeal to people (see Figure 4.7/Table 3.1, Appendix 4.3). There is no age group difference either (see Table 3.2, Appendix 4.3).

The data show that there is no significant difference between the results of the 2008 and the 2001 survey. 54.9% (n=89) of the respondents were prepared to pay the same price in 2008 and 45.1% (n=41) were prepared to do the same in 2001. It had to be noted that less people 22.2% (n=36) were prepared to pay up to 10% for clothes with recycled content in 2008 in comparison to 31.9% (n=29) in 2001 (see Table 3.3, Appendix 4.3).

Summary for section one

Section One was designed to find out general public reactions towards clothes made from recycled materials.

The outcomes of the surveys revealed that the general public are better informed in 2008 than in 2001 in terms of eco-clothes. For example in 2008, 32.7% (n=53) of respondents were aware that a fleece jacket can be produced from recycled plastic bottles and in 2001, 23.4% (n=22) of the respondents said that they knew this.

Reaction towards clothes with recycled content was good in both the 2008 and the 2001 survey. 71.6% (n=116) in 2008 and 76.6% (n=72) in 2001 of the respondents had positive reactions towards clothes made from recycled materials.

The 2008 survey results reveal that people have a positive reaction towards recycled materials although this is less pronounced in the age group 'Above 61'.

The age group '46-60' with the highest mean (4.31), have a more positive reaction towards clothes with recycled content. They are also the group who are best informed about fleece garments and know that they can be made from recycled plastic bottles. Despite the fact that the survey results reveal that there are differences between the age group about their awareness and reaction towards clothes with recycled plastic bottles content, the different groups appear to share the same view on pricing. The two survey results revealed that more people consider that there should be no price difference for clothes whether they contain recycled materials or not.

In 2008, 54.9% (n=89) of the respondents were prepared to pay the same price and in 2001, 45.1% (n=41) were prepared to do so. On the other hand, in 2008 less people 22.2% (n=36) said that they were willing to pay up to 10% for clothes with recycled content whereas in 2001, 31.9% (n=29) of the respondents were prepared to do so. They do not think it appropriate to pay more than a 10% premium for clothes made from recycled materials. Ideally recycled clothes should be the same price as clothes made from new materials.

4.4.2.2 Public awareness towards eco-clothes

This section was aimed at revealing the public awareness towards clothes which are marketed as 'environmentally friendly' or produced with recycled material content. The respondents were asked whether they are aware of any companies who are interested in environmental issues, if they have purchased such clothes and if so, the reason behind their purchase.

Figure 4.8 Eco-companies/Year (n=251)
Q.4 Do you know of any clothing companies that are concerned with environmental issues?
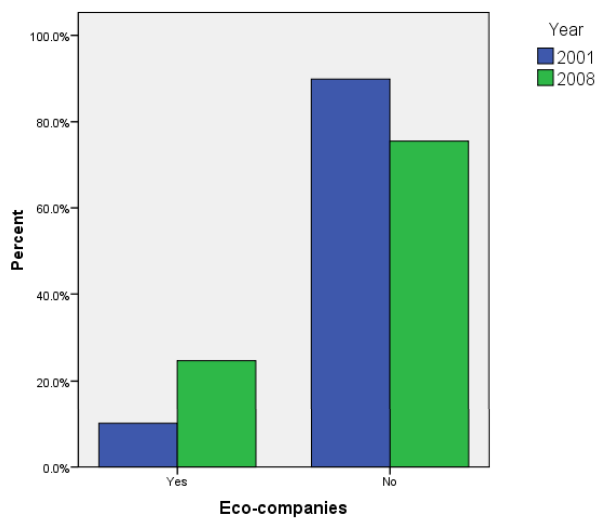
Figure 4.8 shows that there is a significant difference between the 2008 and the 2001 results people are more informed in 2008. The data revealed that 24.7% (n=40) of the respondents knew a clothing company that is concerned with environmental issues in 2008 whereas only 10.1% (n=9) knew such companies in the 2001 survey (see Table 4.5, Appendix 4.3).

Figure 4.9 Eco-company/Gender in the 2008 survey (n=162)
Q.4 Do you know of any clothing companies that are concerned with environmental issues?
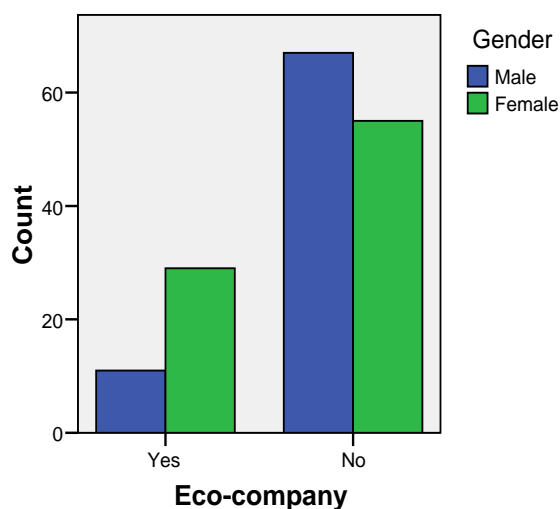
In the 2008 survey 75.3% (n=122) of the respondents did not know of any clothing companies that are concerned with environmental issues. 24.7% (n=40) knew such companies and 38 respondents listed names of the companies. 9.8% (n=16) of the respondents listed Marks and Spencer, followed by People Tree and Howies 3.7% (n=6). 2.5% (n=4) listed Top Shop and New look, 1.2% (n=2) listed Dorothy Perkins.

Figure 4.10 Eco-company/Age in the 2008 survey (n=162)
Q.4 Do you know of any clothing companies that are concerned with environmental issues?
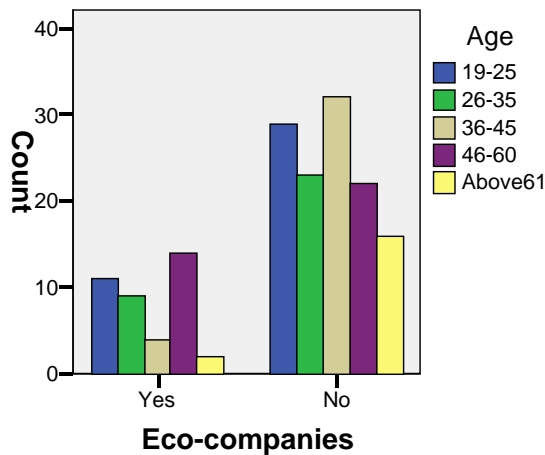
Other companies that were named are Berghaus, Rohan, Greenfibres, Patagonia, Seasalt, NEXT, Warehouse, Gap, Anya Hindmarch and Laura Ashley. Figure 4.9 shows that there is gender difference. Females have better knowledge about clothing companies that are concerned with environmental issues than males (Sig .003) (see Table 4.1/4.2, Appendix 4.3).

There are also age group differences (see Figure 4.10). The age group '46-60' knew more about clothing companies that are concerned with environmental issues than the age groups '36-45' (Sig .006) and 'Above 61' (Sig .035) (see Table 4.3/4.4, Appendix 4.3).

Figure 4.11 Bought Eco-clothes/Gender in the 2008 survey (n=162)
Q.5 Have you bought clothes which are marketed as "environmentally friendly"?
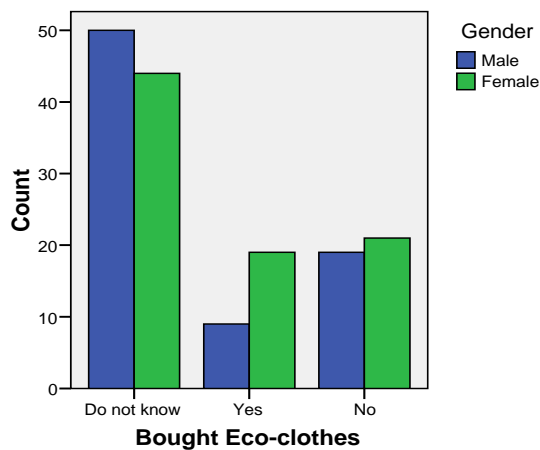
58% (n=94) of the respondents did not know if they have bought clothes that are marketed as 'environmentally friendly' and 24.7% (n=40) of the respondents never bought such clothes. 17.3% (n=28) of the respondents have bought eco-clothes. There is neither gender nor age difference in the 2008 survey (see Figure 4.11/Table 5.1/5.2, Appendix 4.3).

Figure 4.12 Bought eco-clothes/Year (n=251)
Q.5 Have you bought clothes which are marketed as "environmentally friendly"?
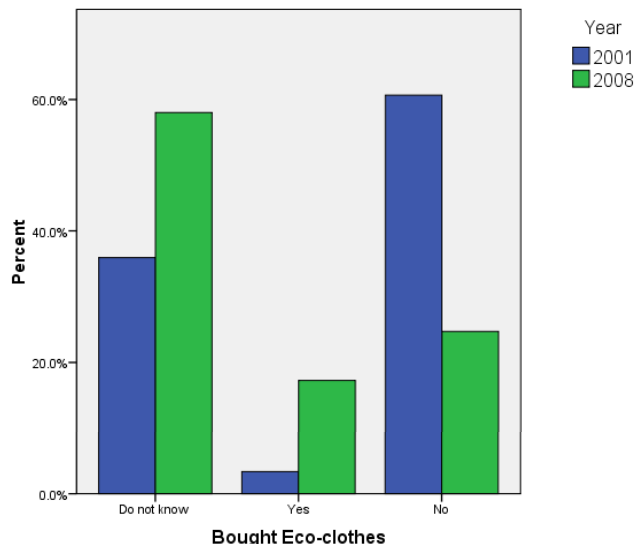
Figure 4.12 shows that there is noteworthy difference between the 2008 and the 2001 results. There is an increase of the respondents who have bought eco-clothes, 17.3% (n=28) in 2008 and 3.4% (n=3) in 2001. There is also an increase in the respondents who were unsure if they have bought such clothes or not, in 2008 58% (n=94) and in 2001 36% (n=32) (see Table 5.3, Appendix 4.3).

Table 4.2 Reasons for not having bought eco-clothes in the 2008 survey

Never seen any	n=15 (9.3%)
Never thought	n=3 (1.9%)
Not seen any I liked	n=2 (1.2%)
Not interested	n=2 (1.2%)
Not believe them	n=1
Too expensive	n=1

The respondents were asked the reason they have not bought clothes marketed as 'environmentally friendly and 9.3% of the respondents stated that it was because they have not seen any clothes marketed as such (see Table 4.2) which means that 69.2% (n=112) of the respondents were not well informed due to ineffective marketing.

Table 4.3 Types of eco-clothes which were bought in the 2008 survey

Type of clothes	Number	Company
Organic cotton tops	n=18 (11.1%)	M&S NEXT New Look PRIMARK
Recycled cotton tops	n=1	

The survey outcomes show that 17.3% (n=28) of the respondents have bought eco-clothes. Within that 11.1% (n=18) of the respondents bought organic cotton tops (see Table 4.3). The reasons the respondents purchased clothes that are marketed as environmentally friendly

were 'Colour' (Mean 4.13, SD .694) followed by 'Design' (Mean=4.09, SD .793), 'Good quality' (Mean=4.04, SD .908) and 'Trendy' (Mean=3.05, SD 1.046) while -

'Environmental concern' (Mean=3.54, SD .833) had less influence over the purchase decision (see Table 4.4).

Table 4.4 Reasons for having bought eco-clothes in the 2008 survey

	N	Minimum	Maximum	Mean	Std. Deviation
Colour	23	3	5	4.13	.694
Design	23	3	5	4.09	.793
Good quality	24	2	5	4.04	.908
Touch	23	2	5	3.74	.915
Value for money	23	1	5	3.65	.982
Easy care	22	1	5	3.55	.963
Environmental concern	24	2	5	3.54	.833
Trendy	22	1	5	3.05	1.046
Valid N (listwise)	21				

Figure 4.13 Recycled company/Gender in the 2008 survey (n=162)
Q.6 Do you know of any clothing companies that are producing clothes with recycled content?
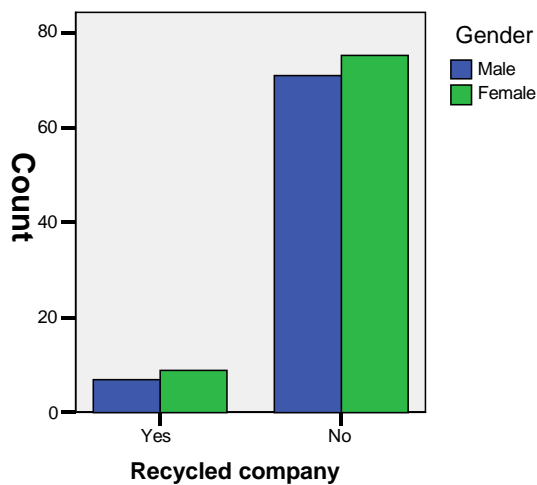
Recycled company

Figure 4.13 shows that 90.1% (n=146) of the respondents did not know and 9.9% (n=16) knew some clothing companies that are producing clothes with recycled content. There is neither gender nor age group difference (see Table 6.1/6.2, Appendix 4.3). 9.2% (n=15) in responses to this question. The companies listed by the respondents are; 3.7% (n=6) M&S, 1.2% (n=2) Artic, other listed companies are Patagonia, Rohan, North Face, Berghaus, Howies, Muji, NEXT and PRIMARK (see Table 6.3, Appendix 4.3).

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Figure 4.14 Bought clothes with recycled content/Gender in the 2008 survey (n=162)
Question 7 - Have you bought clothes with recycled content?

Figure 4.14 shows that 72.8% (n=118) of the respondents did not know if they have bought clothes with recycled content, 20.4% (n=33) of the respondents never bought such clothes and 6.8% (n=11) of the respondents have bought clothes with recycled content before. There is neither gender nor age group differences (see Table 7.1/7.2, Appendix 4.3).

Table 4.5 Reasons for having not bought clothes with recycled content in the 2008 survey

Never seen any	n=15 (9.3%)
Never thought	n=1
Would not like to	n=1

The respondents were asked the reason they did not purchase clothes with recycled content. 9.3% (n=15) of the respondents commented that they had never seen

clothes with recycled content and 82.7% (n=134) of the respondents were not aware of such products (see Table 4.5).

Table 4.6 Types of clothes with recycled content which were bought in the 2008 survey

Type of clothes	Number	Company
Fleece	n=5 (3%)	Artic
Hooded top	n=1	Howies
Socks	n=1	Muji

Table 4.6 shows that 3% (n=5) of the respondents have purchased fleece garments before and the reasons they have bought clothes with recycled content were 'Good quality' (Mean=4.27, SD .467) followed by 'Easy care' (Mean=4.18, SD .874) and 'Trendy' (Mean=3.27, SD .786) while 'Environmental concern' (Mean=3.55, SD 1.128) was listed as least important by the respondents (see Table 4.7).

Table 4.7 Reasons for buying clothes with recycled content in the 2008 survey

	N	Minimum	Maximum	Mean	Std. Deviation
Good quality	11	4	5	4.27	.467
Easy care	11	2	5	4.18	.874
Colour	11	3	5	4.00	.775
Value for money	11	2	5	4.00	1.183
Touch	11	3	5	3.91	.831
Design	11	3	5	3.82	.751
Environmental concern	11	1	5	3.55	1.128
Trendy	11	2	4	3.27	.786
Valid N (listwise)	11				

Figure 4.15 Inform/Gender in the 2008 survey (n=162)
Q.8 Do you try to inform yourself about environmental issues, or not?
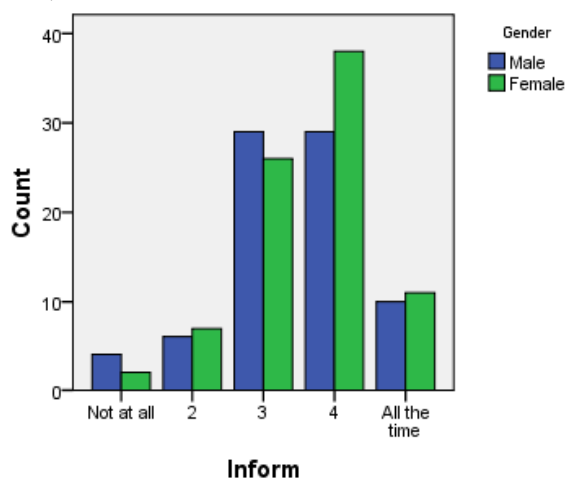
13% (n=21) of the respondents try to inform themselves about environmental issues all the time and 54.4% (n=88, including scale 4 and 5) of the respondents try to inform themselves. The data did not indicate a noteworthy gender difference, and there is no difference among the age groups. (see Figure 4.15/Table 8.1/2, Appendix 4.3).

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Figure 4.16 Inform/Year (n=247)
Q.8 Do you try to inform yourself about environmental issues, or not?
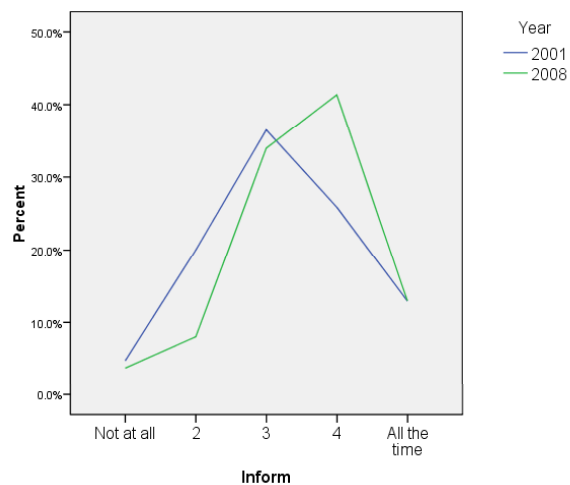
Figure 4.16 shows that there is a significant difference. More people try to inform themselves in 2008 in comparison to 2001. 54.4% (n=88) (scale 4 and 5) of the respondents tried to inform themselves in 2008 and 38.8% (n=33) (scale 4 and 5) did so in 2001 (see Table 8.3, Appendix 4.3).

Summary for section two

75.3% (n=122) of the respondents did not know of any clothing companies that are concerned with environmental issues. 24.7% (n=40) of the respondents who knew such companies are well informed. They could list the name of the companies and some listed more than one name.

People are more informed. In 2008, 24.7% (n=40) of the respondents knew of a clothing company that is aware of environmental issues and in the 2001 survey 10.1% (n=9) knew such companies.

17.3% (n=28) of the respondents actually have bought eco-clothes in 2008 whereas only 3.4% (n=3) said they had bought such clothes in the 2001 survey.17.3% (n=28) of the respondents have bought eco-clothes (mainly organic cotton products) in 2008 which means that 70% of the respondents who are aware of the companies that are concerned with environmental issues actually purchased clothes that are marketed as environmentally friendly. The key drivers for the purchase were 'Colour', 'Design' and 'Good quality' rather than 'Trendy' or 'Environmental concern'. 69.2% (n=112) of the respondents were either not aware or had never seen clothes that are marketed as environmentally friendly.

The outcomes of the 2001 survey revealed that the biggest obstacle preventing people from purchasing environmentally friendly clothes is that they do not know if such products exist. In addition eco-clothes are not easily or widely available. The result of

the 2008 survey is similar to the one in 2001 in this regard. Despite an increase in the number of respondents who were aware of clothes marketed as environmentally friendly, 58% (n=94) of the respondents did not know if they had bought environmentally friendly clothes as they have never seen any such clothes where they shop.

The respondents were less aware of companies that produce clothes with recycled content. 90.1% (n=146) of the respondents did not know any and 9.9% (n=16) knew some companies. Again the respondents who knew such companies were well informed and 69% of those respondents also bought the companies' products with recycled content which means an overall 6.8% (n=11) of the respondents have bought clothes with recycled content before. The reasons for the purchase were 'Good quality' and 'Easy care'. Being 'Trendy' and considering 'Environmental concern' were not priorities.

The outcomes of the survey show that the majority of people are not aware of eco-clothes due to a lack of availability in marketplaces or lack of effective marketing. And those who have purchased eco-clothes in the past bought them because of their quality and appearance rather than out of environmental concern.

However, the survey outcomes show that in 2008, more people try to inform themselves about environmental issues in comparison to 2001: 54.4% (n=88) in 2008 and 38.8% (n=33) in 2001.

4.4.2.3 Shopping behaviour for clothing and eco-products
This section was designed to examine shopping behaviours for clothes and environmentally friendly products. The outcomes of the survey are shown below.

The respondents' purchasing decisions for clothes are listed by the most important drivers. 'Colour' (n=162, Mean 4.27, SD.904) and 'Design' (n=162, Mean=4.16, SD 1.021) are top of the list, followed by 'Quality' (n=161, Mean=4.12, SD .812) and 'Comfort' (n=162, Mean=4.08, SD .856). 'Brand' (n=161, Mean=2.50, SD 1.319) and 'Easy care' (n=159, Mean=3.27, SD 1.178) were least important (see Table 4.8).

Table 4.8 Decision to purchase clothes in the 2008 survey
Q.9 Think about the last outer clothing (excluding underwear and socks) you purchased.
Please tell us what influenced your decision?

	N	Minimum	Maximum	Mean	Std. Deviation
Colour	162	1	5	4.27	.904
Design	162	1	5	4.16	1.021
Quality	161	1	5	4.12	.812
Comfort	162	1	5	4.08	.856
Value for money	161	1	5	3.91	1.045
Fabric	160	1	5	3.89	.915
Touch	161	1	5	3.60	1.125
Durability	160	1	5	3.37	1.190
Easy care	159	1	5	3.27	1.178
Brand	161	1	5	2.50	1.319
Valid N (listwise)	155				

Table 4.9 shows that the results were the same in 2001 and in 2008. 'Colour' and 'Design' were the two main factors that influence purchasing decisions for clothes.

Table 4.9 Colour_Design/Year

	N	Minimum	Maximum	Mean	Std. Deviation
Colour (2001/2008)	82/162	1	5	4.26/4.27	.90/.904
Design (2001/2008)	81/162	1	5	4.15/4.16	.91/1.021

Figure 4.17 Colour/Gender in the 2008 survey (n=162)
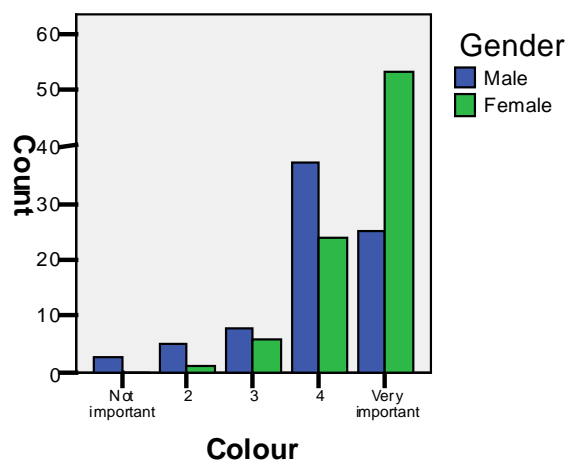
Colour

The Figure 4.17 shows that there is difference between genders (Sig .001) (see Table 9.1, Appendix 4.3) in terms of how important they rate colour as part of their deciding factors when purchasing clothes. Females (n=84, Mean=4.54, SD .685) are more influenced by a 'Colour' of the garment than males (n=78, Mean=3.97, SD 1.019) when deciding on their purchase (see Table 4.10).

Table 4.10 Colour/Gender in the 2008 survey

Gender	Mean	N	Std. Deviation
Male	3.97	78	1.019
Female	4.54	84	.685
Total	4.27	162	.904

Figure 4.18 Colour/Age in the 2008 survey (n=162)
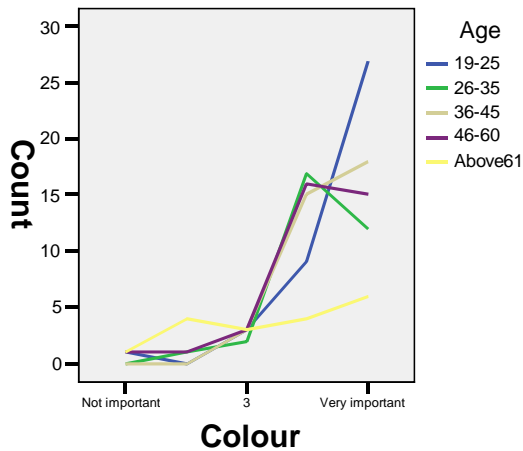
Figure 4.18 shows that there is a difference between age groups (Sig .003) (see Table 8.2/8.3, Appendix 4.3). More detailed analysis of the data revealed that the male group has no age group differences but the female group does. (Sig .023) (see Table 8.4, Appendix 4.3). The younger age group '19-25' are more influenced by 'Colour' than the age group 'Above 61' (see Table 9.5/9.6, Appendix 4.3).

Design

Figure 4.19 illustrates that 'Design' influences purchasing decisions for clothes differently between males and females (Sig .005) (see Table 9.7, Appendix 4.3).
Females (n=84, Mean=4.42, SD .748) put more weight on 'Design' than males (n=78, Mean=3.88, SD 1.195) (see Table 9.8, Appendix 4.3).

Figure 4.19 Design/Gender in the 2008 survey (n=162)
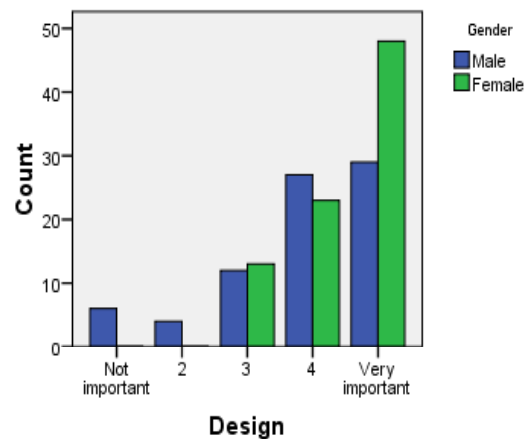
There are also differences between age groups. Figure 4.20 shows that the younger age groups '19-25' (Sig .009) and '26-35' (Sig .020) are more influenced by 'Design' when they select clothes than the age group 'above 61' (see Table 9.10/11, Appendix 4.3).

Figure 4.20 Design/Age in the 2008 survey (n=162)
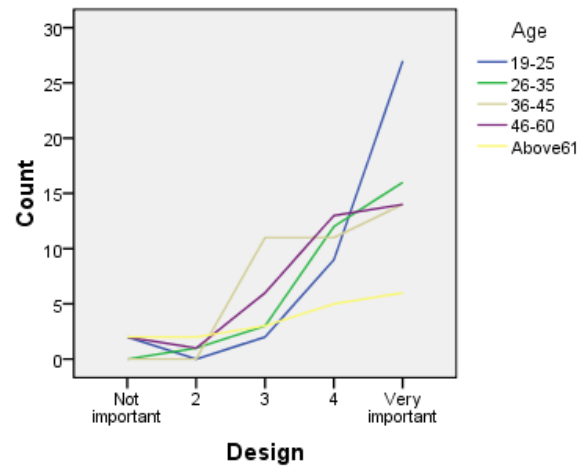
Figure 4.21 Quality/Gender in the 2008 survey (n=161)
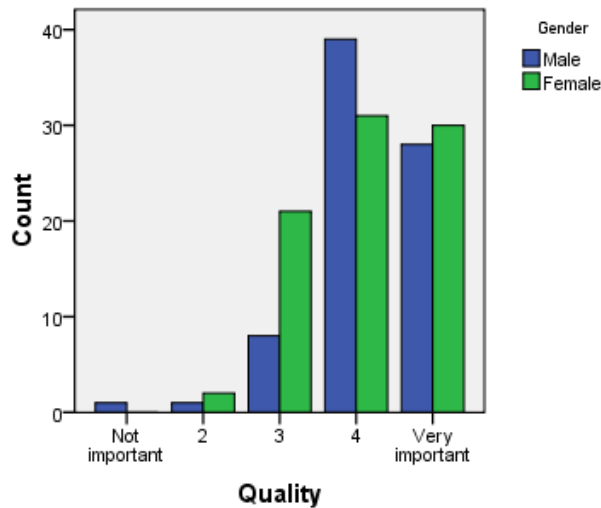
Quality

'Quality' (Mean=4.12, SD .812) came third after 'Colour' and 'Design' as the most important key when the respondents purchase clothes. The survey revealed that there are neither gender nor age group differences (see Figure 4.21/Table 9.12/13, Appendix 4.3).

Comfort

Figure 4.22 Comfort/Gender in the 2008 survey (n=162)

Figure 4.22 shows that there is no gender difference for this factor (see Table 9.14, Appendix 4.3). However, Figure 4.23 illustrates that there are age group differences (Sig .044) (see Table 9.15, Appendix 4.3).
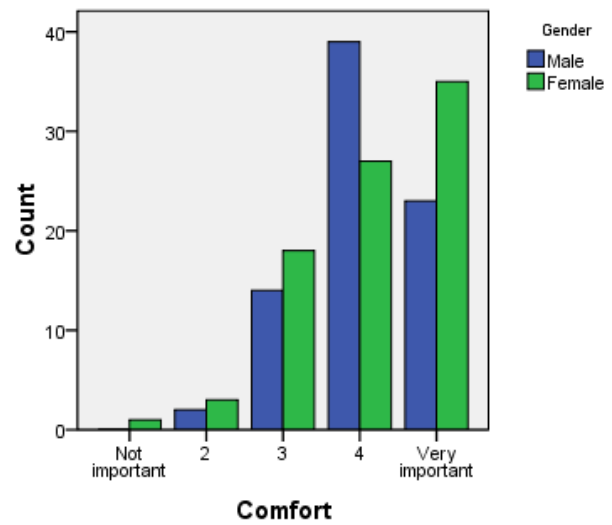
Figure 4.23 Comfort/Age in the 2008 survey (n=162)
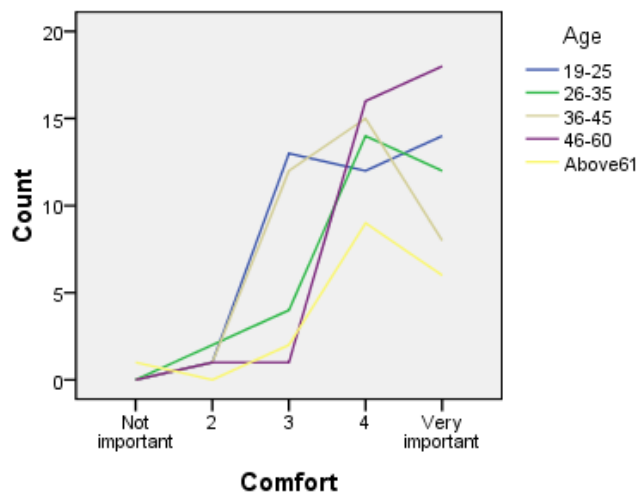
The survey results show that the age group '46-60' are more influenced by 'Comfort' than the age group '19-25' (Sig .012) and '36-45' (Sig .002) (see Table 9.16/17, Appendix 4.3).

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Figure 4.24 Value for money/Gender in the 2008 survey (n=161)
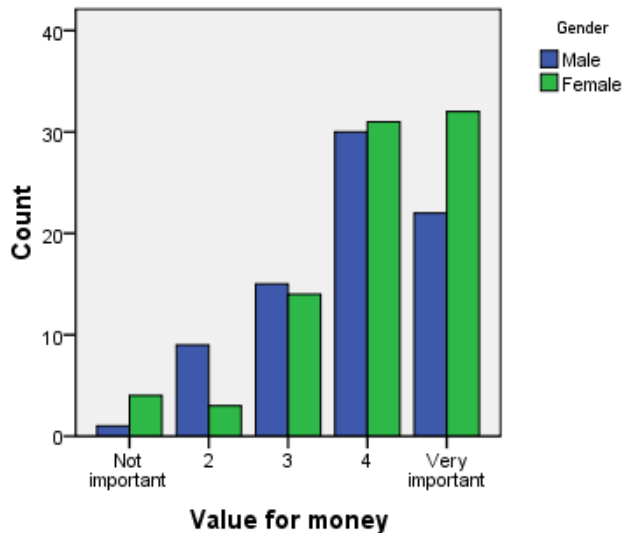
Value for money

The survey results for 'Value for money' have a mean of 3.91 and SD of 1.045. There are no differences between genders or age groups (see Figure 4.24/Table 9.18/19, Appendix 4.3).

Figure 4.25 Fabric /Gender in the 2008 survey (n=160)

Fabric

Figure 4.25 shows that there are no gender differences nor age group differences (see Table 9.20/21, Appendix 4.3).
The results were mean=3.89 and SD .915.
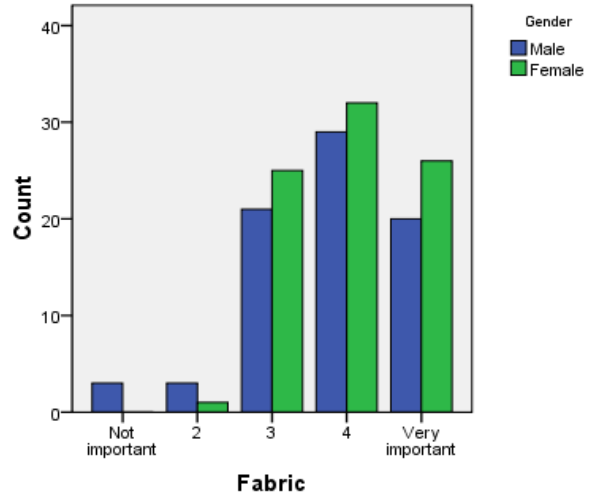
Figure 4.26 Touch/Gender in the 2008 survey (n=161)
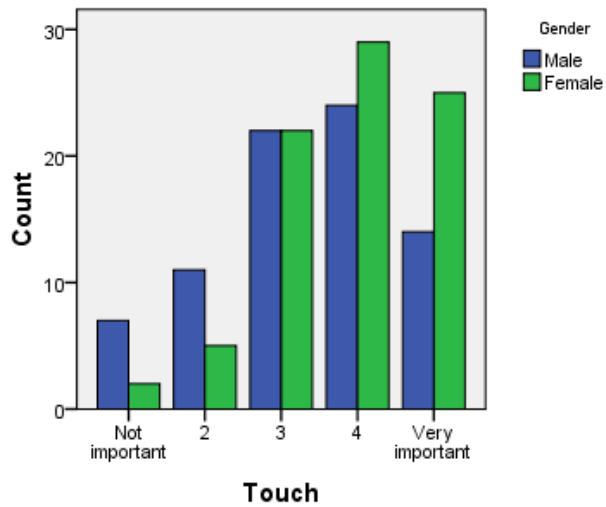
Touch

The data did not show any differences between males and females (see Figure 4.26/Table 9.22, Appendix 4.3). A closer look at the data revealed that there are differences between age groups (see Table 9.23, Appendix 4.3).

'Touch' appears to be less important to the age group 'Above 61', however the differences could not be proved statistically (significant level should be less than .05) between each age group (see Figure 4.27/Table 9.24, Appendix 4.3).

Figure 4.27 Touch/Age in the 2008 survey (n=161)
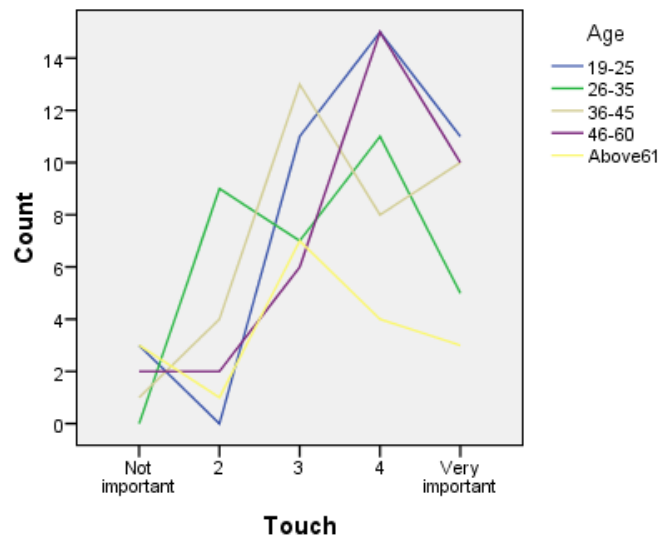
Durability

Figure 4.28 shows that there is no gender difference (see Table 9.25, Appendix 4.3). However, the data showed that there are differences between age groups (see Table 9.26, Appendix 4.3).

Figure 4.28 Durability/Gender in the 2008 survey (n=160)
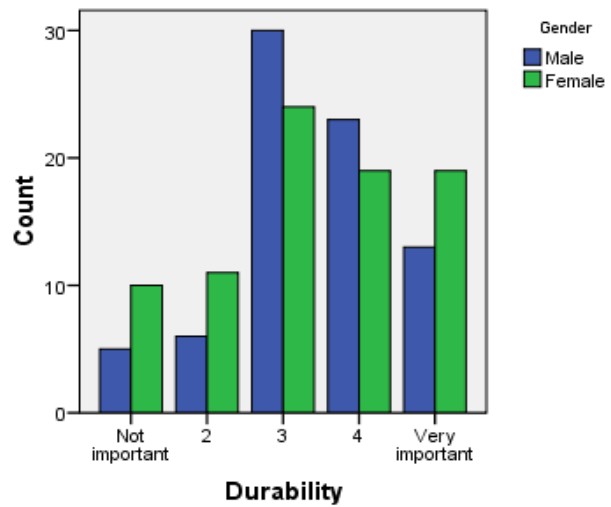
Figure 4.29 Durability /Age in the 2008 survey (n=160)
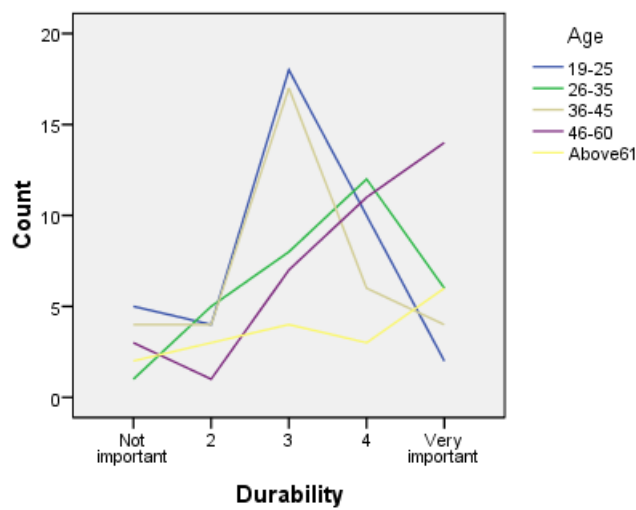
Figure 4.29 shows that the age group '46-60' and '26-35' think 'Durability' is more important when they purchase clothes than the age group '19-25' and '36-45' (see Table 9.27/28/29, Appendix 4.3).

Figure 4.30 Easy care/Gender in the 2008 survey (n=159)
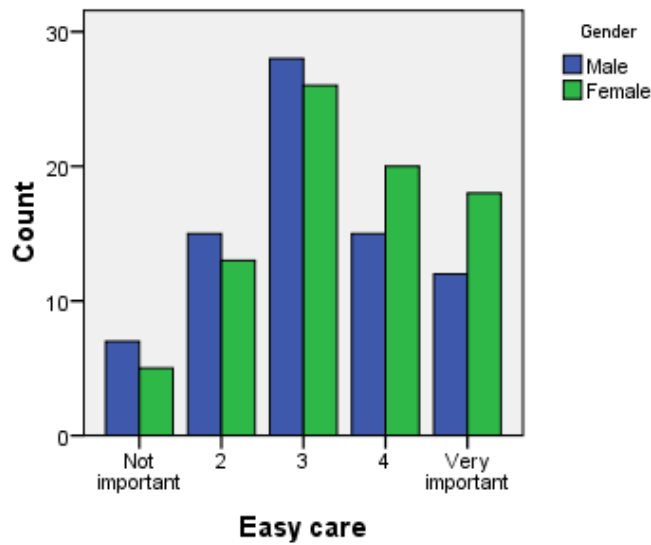
Easy care

Easy care

Figure 4.30 illustrates that there is no gender difference. The age groups also have no differences (see Table 9.30/31, Appendix 4.3).

Brand

The survey results revealed that 'Brand' is the last factor to influence purchase decisions for clothes. There are neither gender nor age group differences (see Figure 4.31/Table 9.32/33, Appendix 4.3).

Figure 4.31 Brand/Gender in the 2008 survey (n=161)

Brand
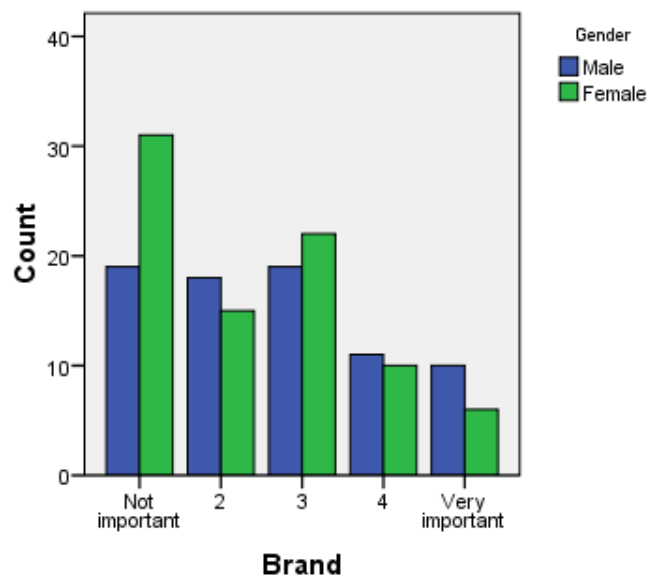
Figure 4.32 How many items p.a./Gender in the 2008 survey (n=162)
Q.10 How many items of outer clothing (excluding underwear and socks) do you buy for yourself per year?
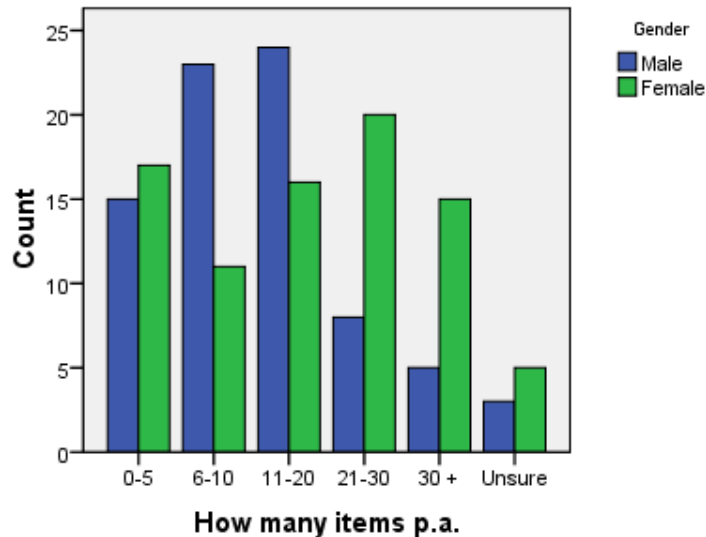
19.8% (n=32) buy 0-5 items of clothing per year, 21% (n=34) buy 6-10 items, 24.7% (n=40) buy 11-20 items and 12.3% (n=20) buy over 30 items per year. Figure 4.32 shows that there is significant gender difference. Females buy more clothes than males (Sig .006) (see Table 10.1, Appendix 4.3).

The survey results showed that there is no significant statistical difference between the 2008 and 2001 survey (see Table 10.9, Appendix 4.3).

Figure 4.33 How many items p.a./Age in the 2008 survey (n=162)
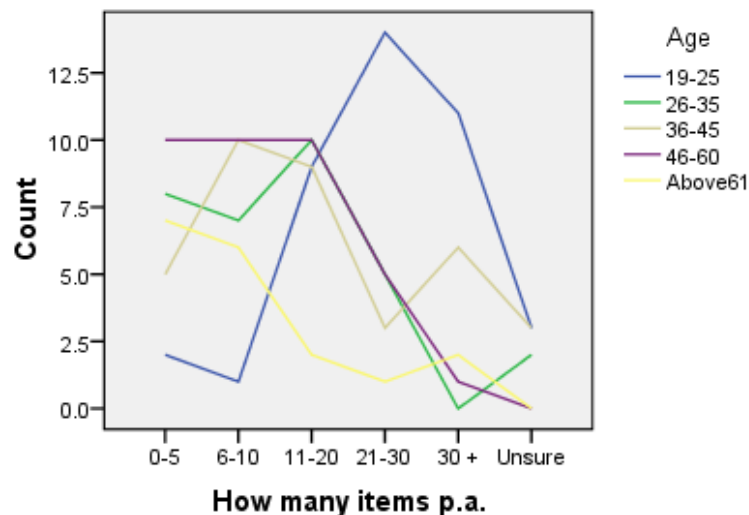
You can also observe the difference between age groups in Figure 4.33 (see Table 10.2, Appendix 4.3). The age group '19-25' (Sig .000) has a quite different buying pattern; they buy more clothes in comparison to the rest of the age groups (see Table 10.3/4/5/6, Appendix 4.3).

The data also revealed that the age group '36-45' buy more clothes than the age groups '46-60' (Sig .021) and 'Above 61' (Sig .032)(see Table 10.7/8, Appendix 4.3).

Figure 4.34 Spend/Gender in the 2008 survey (n=162)
Q.11 How much do you spend on clothing for yourself per year?
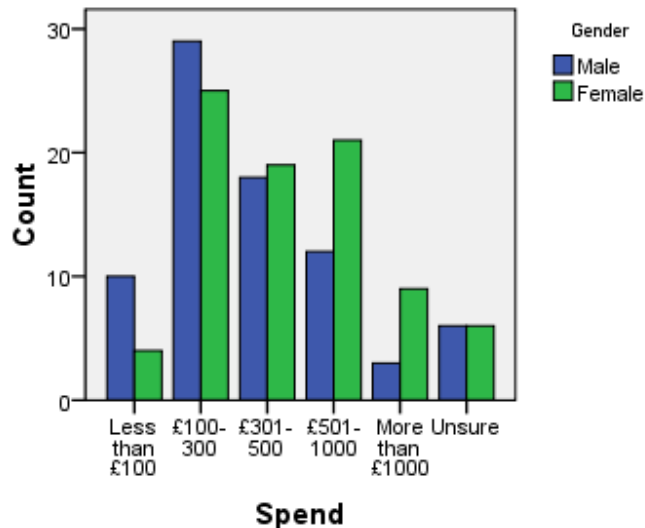
33.3% (n=54) spend £100 to £300 on clothing per year, 22.8% (n=37) spend £301 to £500 and 20.4% (n=33) spend £501 to £1000. This means 76.5% (n=124) are spending between £100 and £1000 on their clothing per annum. The results did not show a specific trend in terms of gender or age group (see Figure 4.34, Table 11.1/2, Appendix 4.3).

The data indicated that there is no significant difference on how much people spend on clothes in 2008 and in 2001 (see Table 11.3, Appendix 4.3).

Figure 4.35 Consider/Gender in the 2008 survey (n=162)
Q.12 Would you consider the environment when you buy clothes?
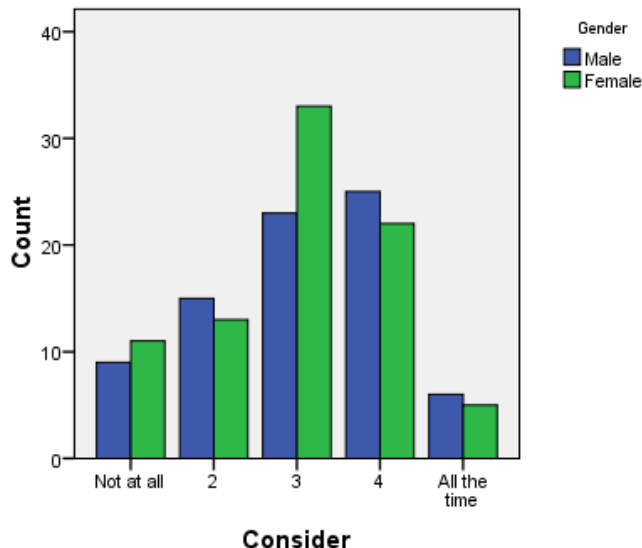
6.8% (n=11) said that they consider the environment all the time when they buy clothes. 34.6% (n=56) of the respondents chose medium scale 3 (see Figure 4.35). That shows their uncertainty in relation to this particular issue. They may never have linked their shopping behaviour and environmental issues before. The data show that there is neither gender nor age group difference (see Table 12.1/2, Appendix 4.3).

There is no difference between the 2008 and the 2001 survey results. 35.8% (n=58) (scale 4 and 5) consider the environment. 6.8% (n=11) (scale 5) consider the

environment all the time in 2008. 29.6% (n=26) of the respondents consider the environment and 9.1% (n=8) did so all the time in 2001 (see Table 12.3, Appendix 4.3).

Figure 4.36 How often eco products bought/Gender in the 2008 survey (n=162)
Q.13 How often do you buy environmentally friendly products?

How often buy eco products
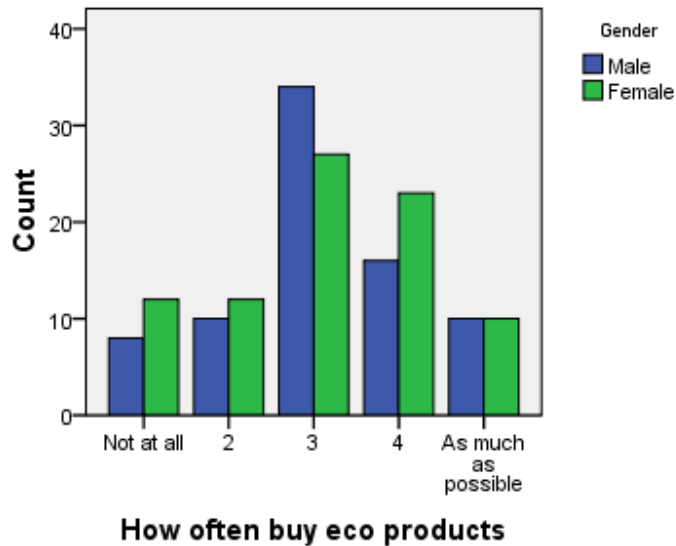
12.3% (n=20) of the respondents buy environmentally friendly products as much as possible and exactly the same number of respondents 12.3% (n=20) do not buy such products at all. The same pattern shown in the results of question 11 was seen as there is a high number of respondents that selected the middle scale 3, 37.7% (n=61). It again allows the interpretation that they do not link their shopping behaviour with environmental issues. The survey results revealed that there is neither gender nor age group difference (see Table 13.1/2, Appendix 4.3). Comparison of the two results suggested that there is no noteworthy difference between the 2008 and 2001 results. 12.3% (n=20) of the respondents buy environmentally friendly products as much as possible in comparison to 14.8% (n=12) who did so in 2001 (see Table 13.3, Appendix 4.3).

Figure 4.37 Organic/Gender in the 2008 survey (n=162)
Q.14 Do you buy organic goods/food?
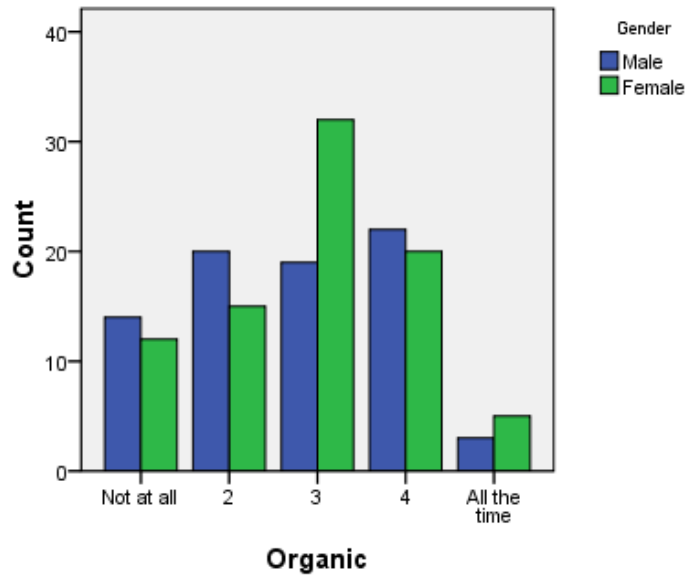
4.9% (n=8) of the respondents buy organic products all the time. The data shows that there is neither significant gender difference nor age group difference (see Table 14.1/2, Appendix 4.3).

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Figure 4.38 Organic/Year (n=247)
Q.14 Do you buy organic goods/food?
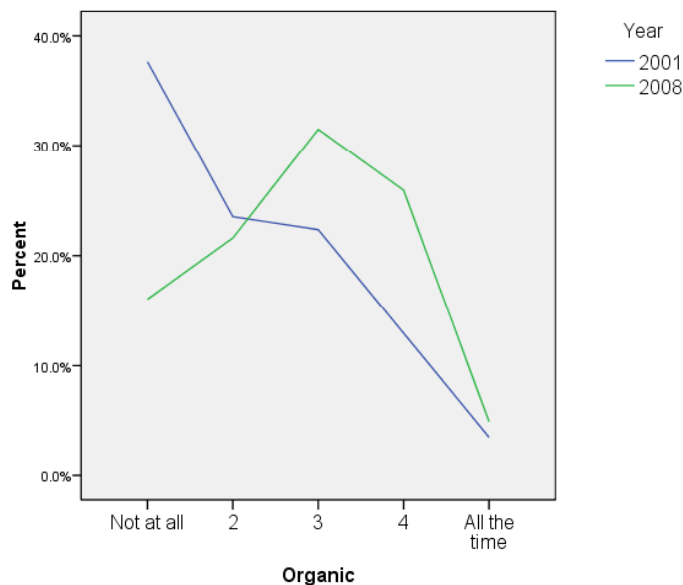
Figure 4.38 clearly shows that there is a difference between the 2008 and the 2001 results. More people said that they buy organic food. 30.8% (n=50) (scale 4 and 5) of the respondents buy organic good/foods in 2008 and 16.4% (n=14) (scale 4 and 5) did so in 2001 (see Table 14.3, Appendix 4.3).

Summary for section three

Section Three aimed to investigate general public shopping behaviours for clothing and environmentally friendly products. 'Colour' and 'Design' are important drivers for people when purchasing clothes, in particular for females and the younger age group of 19 to 25 year olds, followed by 'Quality' which was valued with both genders and all age groups. 'Colour' and 'Design' are the top priorities when people shop for clothes. This is also the case in the 2008 survey. The key drivers for purchasing clothes have remained unchanged in the last seven years.

The age group 46 to 60 consider 'Comfort' and 'Durability' more important than the rest of the age groups. 'Easy care' and 'Brand' were considered less important when they purchase clothes.

Women and the age group 19 to 25 years old buy more clothes than males and other age groups. However, there were no significant differences among the genders and age groups with regards to expenditure on clothes. It means that the age group 19 to 25 buy cheaper clothes than the rest of the age groups.

A very small number of the respondents shopped with environmental concerns in mind: in 2008, 6.8% (n=11) and in 2001, 9.1% (n=8).

It confirms the results of the 2008 survey that the respondents who have bought eco-clothes listed as a reason for doing so 'Quality' rather than 'Environmental concern'. 12.3% (n=20) of the respondents buy environmentally friendly products as much as possible.

More people buy organic goods/foods in 2008 than in 2001. 30.8% (n=50) of the respondents buy organic goods/foods in 2008 and 16.4% (n=14) did so in 2001.

4.5 Conclusion of the street survey

The survey was carried out in order to explore public reactions towards clothes with recycled content, to examine public awareness towards clothes with environmental concerns and to investigate the public's shopping behaviour for clothes as well as environmentally friendly products. It also aimed to identify a potential market for clothes with recycled content. The outcomes of the survey provide fundamental information to clothing retailers and recycled fibre and fabric manufacturers.

The outcomes of the street survey have revealed the following key issues and findings.

Awareness of environmental clothes - Need for more information

The outcomes of survey reveal that the UK public are better informed in 2008 than in 2001. More people know about the fact that fleece jackets can be produced from recycled plastic bottles and they can name companies that are aware of environmental issues. However, there is scope for improvement as those numbers of informed people are still relatively small.

32.7% (n=53) of respondents were aware that a fleece jacket can be produced from recycled plastic bottles, but the same number of respondents (32.7%, n=57) did not know. The age group '46-60' was better informed.

24.7% (n=40) knew a clothing company that is aware of environmental issues. These respondents were well informed which companies were producing what products, for example whether they were using recycled PET or organic cotton. Female and the age group '46-60' were better informed than the other gender and age groups.

17.3% (n=28) have bought clothes which are marketed as environmentally friendly but 58% (n=94) did not know if they have bought such clothes. The main reason was that they have not seen any such clothes where they shop.

The respondents were less informed about companies that produce clothes with recycled content. 9.9% (n=16) of the respondents knew such a company, 6.8% (n=11) have bought clothes with recycled content and 72.8% (n=118) did not know whether they have bought such clothes because they had not noticed them before.

It seems that there is a lack of opportunity for people to make conscious purchasing decisions in terms of whether or not they buy clothes marketed as environmentally friendly. The majority of respondents commented that they have not seen such products where they shop and that they may have bought them without knowing.

Out of the small number of respondents that knew about companies that produce clothes marketed as environmentally friendly, 68% to 70% of them actually purchased such clothes.

General reaction towards clothes with recycled content - good reaction
Reaction towards clothes with recycled content was good in both the 2008 and 2001 surveys. In the 2008 survey 71.6% (n=116) of the respondents have positive reactions towards clothes with recycled content. Within this, 40.7% (n=66) show a strongly positive reaction towards recycled materials for clothing. All age groups have positive reactions but the group '46-60' feel most positive about recycled content in clothing and the age group 'above 61' has the least positive reaction.

Pricing – Should be the same price
The two survey results revealed that the majority of people consider that the price should be the same for clothes with recycled content as for clothes without recycled content.
The 2008 survey revealed that 54.9% (n=89) are prepared to purchase recycled products if the price of the products are the same price, while 22.2% (n=36) of the respondents are prepared to pay up to 10% extra. The majority of the respondents would most likely not purchase the product if the price exceeds more than 10% compared to that of products made from virgin materials.

Clothing purchase behaviour - 'Colour' and 'Design'
The key drivers for a clothing purchase decision are 'Colour' and 'Design' which have been unchanged since 2001. In the 2008 survey these drivers were followed by 'Quality', 'Colour' and 'Design'. The age group '19-25' also buy more clothes in comparison to the rest of the age groups The expenditure for clothes does not differ significantly among the genders and age groups however. This means that the age group '19-25' buy less expensive clothes than the other age groups.
The respondents who actually have bought clothes marketed as environmentally friendly or with recycled content purchased such clothes due to their 'Good quality' and 'Easy care', not because of their being 'Trendy' or due to 'Environmental concern'.

The outcomes of the street survey carried out in 2008 and the comparison with the results from the 2001 street survey are summarised and concluded above. This serves

as an important indicator in suggesting future predictions in the clothing market with recycled content. The limitations of the survey findings are also stated below.

4.6 Limitations of the survey and its findings

The selected survey methods and strategies served the purpose of the studies and they are considered to be the most appropriate methods that could have been applied to this particular study, within the timeframe and resources. Throughout the whole procedure, in planning the survey, designing the questionnaire, selecting respondents, location, analysing and reporting the results, great caution was taken not to be biased. However, there are some limitations within this survey and its findings.

It would reflect a more true generalisation if the data were collected at several major cities in the U.K. However, due to limited resources that was not possible. Therefore the data collection was carried out in Newcastle upon Tyne.

The data of socio-economic status were not collected in this survey. Further research might be required if there was a need to obtain more detailed outcomes such as socio–economic status in relation to detailed age groups or their spending on clothing, as this may differ according to socio-economic status.

In the next section, the potential market for clothes with recycled content was identified and one of the research questions was answered. The correlations of the results of the survey in 2001 and 2008 are also discussed. It details the shift in general public concern towards eco-clothes and shopping behaviour using the primary data that were derived from this survey.

4.7 Discussion of the findings

The objectives of this section is to identify the potential market for clothes with recycled content and provide answers to the overall research question: What are the barriers and drivers for the general public when they choose to buy or not to buy clothes with recycled content?

Contrasting two survey results carried out in 2001 and 2008 discussed in the previous section provides valuable data allowing an analysis of the shift in thinking amongst the general public in the last eight years. The conclusion is stated below.

Potential market for clothes with recycled content

The public survey results as well as comparison analysis with two surveys indicate that there are two age groups that could be a potential targeted market for clothes with recycled content.

The age group 46 to 60

This age group could be a potential market for clothes with recycled content due to their positive reaction and high awareness about clothes and environmental issues.

They stood out in both the 2008 and the 2001 public survey. In the 2001 survey respondents of the age group 46-60 seemed most keen on informing themselves, on eating organic and on recycling. In the 2008 survey more people try to inform themselves about environmental issues and they purchase organic goods/foods. The data did not show any age group difference on these behaviours. However, the age group 46 to 60 were better informed about companies that are dealing with environmental issues than the other age groups in 2008. The positive reaction of this particular age group towards recycled materials along with their greater understanding of environmental issues leads to the conclusion that people are more positive towards recycled materials in clothes if they know more about it.

This age group also showed that they consider 'Comfort' and 'Durability' more than any other age group when they shop for clothes in the 2008 survey. In the 2001 survey they indicated that they required 'Quality' more than any other age group which meant that they might have associated recycled materials with lesser quality.

As mentioned above the age group 46 to 40 has the potential to be keen shoppers for clothes with recycled content as they displayed a positive reaction towards them. However, in order to ensure their positive reaction leads to an actual purchase of such clothes, a campaign that concentrates on the promotion of clothes with recycled content, particularly aspects of 'Comfort', 'Durability' and 'Quality', is required. Furthermore the comparison between the two surveys indicates that availability of products is directly related to the number of people that buy environmentally friendly products. The surveys show that organic food consumption has gone up since 2001, as has the availability of organic produce. Similarly this is true for clothes marketed as environmentally friendly except that the increase is not as pronounced as the availability of such products has not risen as dramatically. The questions investigating whether people have bought environmentally friendly clothes in the past shows that although there is an increase from the 2001 survey, people are to a large extent not aware of

such products. This suggests that increased marketing alongside increased availability would have a positive impact on the number of clothes with recycled content sold.

The age group 19 to 25

The age group 19 to 25 would be a desirable market due to their high quantity consumption of clothes. If recycled materials were to gain a significant share of this particular market, a significant impact would be achieved due to its high quantity. This market in particular should therefore be very attractive to the recycled fibre and fabric manufacturers.

However, the recycled fabrics would face a challenge to satisfy this fashion and cost sensitive market as their prime concern when they shop for clothes are 'Colour' and 'Design'. What is more, they pay less money per item than the rest of the market.

<u>What are the barriers and drivers for general public when they choose to buy or not to buy clothes with recycled content?</u>

The question above was set as a part of the overall research questions that are listed in Chapter One. The public survey outcomes and analysis comparison for both the 2008 and the 2001 survey successfully answered this question.

The survey results indicate that the barriers for the general public not to buy clothes with recycled contents are lack of information and awareness. The drivers for people to purchase such clothes largely depends on the quality of information they receive about the benefit of buying such clothes.

The majority of the respondents were not informed about clothes marketed as environmentally friendly, more so clothes with recycled content; e.g. where to shop, what types of clothes.

There are some comments from the respondents in the 2008 survey which may represent public opinion. These comments clearly indicate a willingness to be better informed with clear and trustworthy information.

'I am unaware of the advantages of recycled/environmentally friendly clothes. Therefore, I am currently not willing to pay a premium price for them. Not at all opposed to buying these clothes but I would have to like them!!' (19-25, Female)

'I distrust most of the companies that make green claims as these claims won't stand up to scrutiny.' (46-60, Female)

'Companies should be doing more proactive advertising for environmentally friendly clothes!' (26-35, Male)

'Not many companies out there that 'mark' environmentally friendly on 'clothes labels'. Needs to be advertised more, i.e. adverts, leaflets, web endorsements to make the idea more 'appealing' to the wider audience'. (19-25, Male)

'More information on environmental issues should be on clothing labels. I prefer natural materials which are sustainable – wool, cotton, etc.' (46-60, Female)

The public survey also revealed that of the respondents who knew about companies that produce clothes marketed as environmentally friendly (although they are small numbers), 68% to 70% of them actually purchased such clothes.

More people inform themselves and buy organic goods/foods but in terms of buying environmentally friendly products and considering the environment when they shop for clothes there has not been any differences in the last eight years. People are much clearer about the benefit of organic goods and foods nowadays but are less assured of the benefits of buying clothes marketed as environmentally friendly.

In the next Chapter (Chapter Five/Industry survey), the barriers and drivers for recycled fabric manufacturers to supply fabrics with recycled content for the UK high street clothing retailers and the barriers and drivers for the UK high street clothing retailers to use fabrics with recycled contents are investigated.

5

CHAPTER FIVE

RESULTS OF INDUSTRY SURVEYS

5.1 Introduction

This section outlines the outcomes of the industry surveys that were carried out late in 2008 and the beginning of 2009, including fifteen interviews.

The results of the industry surveys reveal valuable information including current thinking and views by key players on the future expansion of the market for recycled synthetic materials.

Firstly, the outcomes of five interviews with UK textile recyclers, sustainable fashion consultants and textile (PLA fibre) consultants are discussed in order to find out their views on the current textile waste situation and potential for more sustainable clothing production.

Secondly, the results of five industry surveys including five interviews with Japanese recycled synthetic fibre manufacturers are discussed. Their barriers and drivers to supply fabrics with recycled content to UK high street clothing retailers and their future visions for the use of recycled fabrics are the main focus of discussion.

Thirdly, the outcomes of four industry surveys consisting of five interviews with major high street UK clothing retailers are discussed. Their barriers and drivers to use fabrics with recycled contents, how materials are selected, attitudes towards recycled materials, their use in products and their awareness towards environmental issues as they relate to clothing production are investigated.

The outcomes of interviews carried out in 2005/2006 with five UK clothing companies are compared with the recent 2008/2009 interview results in order to observe any shifts in thinking or practice.

5.2 Industry surveys aims and objectives

The aims of industry surveys are to identify the key players such as textile recyclers, textile consultants, sustainable fashion consultants, recycled fibre manufacturers and high street clothing retailers' views on the use of recycled materials in the clothing sector. In particular, the industry surveys focused on;

Recycled synthetic fibre manufacturers
- To identify the barriers and drivers of the recycling technology influencing the introduction of clothes with recycled content and recycled fibre manufacturers' outlook on the future of their industry.
  - What has become possible due to advanced technology
  - The current recycled fabrics situation (market, quality, production and

cost)

- What are their future visions with regards to their target markets and the use of recycled material?

High street clothing retailers

- To identify attitudes of fabric sourcing personnel towards recycled materials in the UK high street clothing retailers, and barriers and drivers in the use of recycled materials in particular.

-How has materials sourcing and product development changed recently, if at all?

- What are their views on the use of recycled materials in their products?

- What are their attitudes towards the idea of a future slowdown of consumption (slow fashion)?

5.3 Pilot

The pilot studies were carried out in order to define the data collection method, to establish whether the questions were easy to understand, and to find out the actual time needed to complete the interview. In addition, contacting the experts in the area of study prior to the main interviews provided the researcher with further insights and allowed for the preparation of a meaningful discussion with participants for the main study (see Chapter Three, Section 3.6.2.2). Three experts in the field within Northumbria University were contacted and they all agreed to participate in the pilot studies. The details of the participants of the pilot studies are stated in Chapter Three, Section 3.6.2.2.1. Table 3.6.

Changes made to the interview questions after the pilot studies are discussed below.

5.3.1 Changes made to the questions

The first pilot study was conducted with respondent A. The researcher was particularly keen to find out if the right words were used for the questions, especially the filling in questions, and if all the questions made sense to the participants. Respondent A suggested changing some words to the question 'What are the priorities when choosing materials for your company?' and listed the most used priorities used by clothing companies when they select materials.

After the suggested changes were made, respondent B was contacted. The researcher asked the respondent if the wording was clear and easy to understand and whether questions flowed well or not. The respondent was satisfied with the process of the interview and commented that all the relevant priorities that influence the materials selection process were covered in the questionnaire.

With the revised interview questions, the whole interview procedure was tested with respondent C. It was tape recorded and timed in a formal setting.
The interview procedure was understood easily, however a few changes were made to clarify some questions.

Respondent C also suggested not telling the informants that the fabrics contain recycled materials when they handle fabric samples. It was considered that informing respondents that the fabrics have recycled content prior to discussion could affect their reactions towards the fabrics.

Throughout the pilot studies the respondents were asked to examine the question design and the interview procedure as well as the content of the interview. This helped the researcher to confirm and add knowledge she already possessed in the area she was investigating. Furthermore, it was a useful resource of back up information before carrying out the interviews with the actual companies.

5.3.2 Refinements

The pilot study revealed the necessity of finding out the key person dealing with materials selection, as it was suggested that the materials selection may not be purely a designer's job, and that this role might be different from company to company. Therefore, prior to confirming the informant within the organisation, the question 'who is responsible for material selection process?' was always asked in order to appoint the best informants within the companies.

In terms of sourcing materials, the respondents mentioned the fast and short production cycle as well as sourcing and manufacturing abroad, indicating a potential lack of control over the materials selection. As this seemed to be a key issue for the materials selection, the researcher intended to expand on this issue for the main industry survey interviews.

Taking into consideration the issues raised above, the main study was carried out. The outcomes of the main study are discussed below.

5.4 Industry surveys results

In this section, the industry survey results are discussed. There are three parts to the study;

-views of textile recyclers and consultants, in terms of use of recycled synthetic fibre for clothing

-the outlook of recycled synthetic fibre manufacturers on technological developments, their current understanding of the recycled materials in the market and their aspirations for the future of their recycled fabrics

-the current practice of high-street clothing retailers of sourcing materials, their attitude towards recycled materials and future developments in the clothing sector

Through the industry surveys, the drivers and barriers that are preventing the wider use of recycled synthetic fibre are identified and discussed in the conclusion section.

5.4.1 UK textile recyclers, sustainable fashion consultants and fibre (Ingeo) consultant

The literature review (See Chapter Two) clearly identifies issues such as the waste of valuable resources (synthetic fabrics) that end up either in landfills or incinerators, uncertainty with alternative biodegradable polyester and its use in clothing applications and fundamental problems with the consumption rates fuelled by cheap fast fashion.

In order to provide a general overview of available and current sustainable practices in the UK clothing industry, interviews were conducted with the following organisations and people: Two UK textile recyclers; LMB Textile Recycling and BCR Global Textiles Ltd; an independent textile consultant working with NatureWorks LLC that produce Ingeo (biodegradable polyester derived from corn); a sustainability and sustainable technology consultant who works for DEFRA funded Oakdene Hollins Ltd which runs the Centre for Remanufacturing and Reuse; and Dr Kate Fletcher, Reader in Sustainable Fashion at London College of Fashion and also a leading sustainable fashion consultant . They offered alternative views and solutions to the focus of this study as well as valuable up-to-date insights into the use of recycled synthetic materials for clothing. The interviews provide a wider context to the environmental issues

surrounding the clothing industry and potential solutions to the problems. One of the interview transcripts is shown as an example in Appendix 5.2.

As is mentioned in Chapter Two, the independent textile consultant working with NatureWorks LLC (Ingeo) clearly stated that biodegradable polyester derived from corn (PLA) does not have the volume capacity to replace synthetic polyester.

> *"PLA cannot take over synthetic polyester. The production capacity of PLA is currently a small amount (approximately 150,000 tons per year) opposed to 30 million tons of synthetic polyester. PLA has a long long way to go (NatureWorks LLC)."*

It also has low heat resistance and dyeability issues, making it less ideal for use in clothing. The low melting point (170 °C) in particular is problematic; since its appearance is similar to that of cotton fabric, consumers may use a hotter ironing point suited to cotton to iron Ingeo fabric and thus damage the fabric. Although this drawback will be overcome soon through collaboration with Teijin Limited, they have already developed a pilot plant to produce biodegradable plastic for packaging use with a 210 °C melting point. The consultant clarified recent debates around the use of food (corn) for non-food purposes. A comparative example often cited in this debate is the 2008 oil price increase which caused a high demand for bio fuel. This resulted in high food prices and many people in developing countries suffered from food shortages. PLA however could be derived from any plant (not only corn) designated for human consumption and therefore shortages might not be an issue. Further points of concern not refuted in the interview are land availability for growing any type of corn, as well as unease about GM crops. (see Appendix 5.2).

Two textile recyclers were interviewed in order to gain an overview of current UK based recycling practices as well as a first-hand insight into current issues facing garment recycling.

Both textile recyclers acknowledged that clothing waste is increasing recently but the quality of it is decreasing. Because of this, one of them mentioned that it is now difficult to reuse or remake new garments with them. She admitted that synthetic fabrics are of no use to them at all as they cannot be used for wipers due to their non-absorbent nature. They are not able to export synthetic fabrics to developing countries either as those warm climate countries in Africa and South Asia do not want clothes made of synthetic fibre.

> *"Cotton and wool can be recycled. For example, cotton can be used as wipers and wool can be ripped to fibres and re-spun to make yarn again or flocked. But polyester does not absorb therefore we have no real use for polyester. What is more, polyester has no breathability and holds stains. We cannot send polyester clothes to the developing countries as they are often send to warm climate countries in Africa and South Asia. Those countries do not want polyester clothes. We actually do not have any customers for polyester wipers anymore. We do not have any 'real' uses for polyester garments (LMB Textile Recycling)."*

This means that currently they are forced to send synthetics to landfills or incinerators. Other textile recycler commented that it is irresponsible to use synthetic fabrics without a reuse system in place and that there is need to develop recycling technology for synthetic fabrics.

The sustainability and sustainable technology consultant believes that designers should be educated so they can realise the consequences of their choice of materials and understand better what options are available to reduce the environmental impact. She also believes that there is a need to make sure the product cost in terms of environmental, labour and financial cost need to be understood and that maximum use is made out of the garment. She sites Teijin's closed loop system as an example that reclaims all of the material and labour that has gone into production. It is necessary for producers to work on products that have more recyclability; producers need to acknowledge how difficult it is to recycle or reuse blended fabrics and that available recycling polyester systems only take 100% polyester products.

> *"I think design plays a key role in the impact of products and the end of life is not just about clothing but products in general. I think that not enough emphasis is placed on designers, as to what their responsibility actually is and how much responsibility they should be undertaking or bearing in mind.*
> *There is obviously arguments both for and against natural and synthetic fabrics but in terms of the use of fabrics and the materials I think more needs to be done to educate designers as to what it means when they chose a particular fabric and how that impacts on the end of life options that are available to that garment.*
> *For example if you are using natural fabrics e.g. 100% cotton, then that might be more amenable to be broken down to fibres and used for mattresses and so on.*
> *Synthetic fabrics are more amenable to getting back into a closed loop recycling system offered by Teijin. Then you are really reclaiming all that energy and labour that has gone into producing that fabric in the first place. And by cost I don't just mean financial but also environmental cost. Obviously you are using oil and natural*

> *resources. Making sure that that value is hung on to and more use of
> it is made (Oakdene Hollins Ltd).''*

She continued to talk about the government focus on end-of-life management of clothing. The CRR is now working on the corporate wear reuse project and DEFRA's sustainable clothing road map projects both focus on end-of-life issues.
She mentioned that due to extensive energy use at the initial stage of polyester production, applying a closed loop recycling system makes more sense and should be used for fast fashion garments produced by Primark or TopShop.

Dr. Kate Fletcher, Reader in Sustainable Fashion at London College of Fashion and also a leading sustainable fashion consultant, suggested that using recycled materials for party tops is a part of the solution derived from the research she was involved in as they realised that there are different metabolisms depending on different types of garments. She also thinks that there is a potential for high street clothing retailers to use recycled polyester material due to its popularity and its high aesthetic standard. She reckons that there is no stigma attached to polyester fabrics.

> *''There is potential I think yes. I mean M&S has already done that
> (using recycled PET material) a lot and it is introducing it, I think what
> is in its favour is that it does not look like recycled material. So it is
> perceived as another virgin material and then also there is a big shift
> towards polyester. It is now the single most popular fibre, there is not
> the stigma associated with it that there was a few years ago (Dr Kate
> Fletcher).''*

The sustainability and sustainable technology consultant advised people to 'recycle fast fashion and reuse slow fashion.'
The current economic downturn made her uncertain about whether consumers will buy cheaper clothes (fast fashion) or purchase more expensive and long lasting garments (slow fashion). She could not imagine fast fashion markets growing any further, nor could she see Primark or Topshop adopting the slow fashion idea either.
On the other hand, Dr. Kate Fletcher is very positive that this recession may be an opportunity for consumption driven retailers to rethink their business practice. It may be hard to change the direction of the business drastically but she predicts that in a decade sustainability will become a norm. She also mentioned that some companies such as Marks &Spencer and Nike are considering making profits by selling fewer items at a higher cost.

The sustainability and sustainable technology consultant remarked that the thrown away clothing volume is alarming and that much more could be done in this area.

It is clear that government initiatives are running a few projects focused on the end-of-lifecycle of garments and clothing producers need to address issues that have been ignored (or passed on to consumers) until now. Although there has not been any legislation forcing producers to be more responsible, and their current project focuses on the uniform market, this is a meaningful first step for the development of sustainable clothing. Nobody knows with certainty whether consumers will buy fewer, more expensive high quality garments or if they will go for ever cheaper clothes in the current economical climate. However, one thing is certain: consumers as well as retailers are being forced to rethink their daily activities.

In this study, recycled fibre manufacturers' and high street clothing retailers' current practice and future visions for recycled synthetic materials are investigated and the results are discussed in the next section.

5.4.2 Japanese recycled fibres manufacturers
In this section the industry surveys outcomes that include five Japanese recycled synthetic fibre and fabric manufacturers are discussed. The developments of recycling technology, the current situation for recycled synthetic fibre and their future visions are the focus of the discussion.

5.4.2.1 Company background
The background of participating companies includes the profile of the company and the company environmental policy.

5.4.2.1.1 Teijin Fibers Limited.
Teijin group is consists of Teijin Limited and 152 group companies based in Asia, U.S.A. and Europe with 18,819 employees both in Japan and abroad. The group was established in 1918 and was the first company in Japan to produce rayon yarn. Now they have expanded their business into areas other than 'synthetic fibres' such as 'films and plastics', 'pharmaceuticals and home healthcare', 'trading and retail' and 'IT.' Their consolidated net sales recorded 1 trillion and 37 billion yen in the year 2007, 2.7% up in comparison to the year 2006.

Their website makes it clear that they have a strong commitment towards environmental issues and society. Their CSR reports have been available since 2003. In the 2008 CSR report the 'Declaration regarding Sustainable Environment Initiatives' that was set in 2007 is mentioned. This initiative was formed by Teijin's Environmental Management Research Study Group which started in 2006. The initiative has three core commitments: 'Environmental preservation', 'Environmentally friendly design' and 'Environmental Business'. Their aims are to reduce CO_2 emissions by a further 20% from the 1990 level by 2020, focus on products' entire lifecycle (hence applying closed loop recycling system for polyester fibers and bottles productions) and use recycling technology to reduce environmental impact, such as developing bioplastics with a higher heat resistance.

5.4.2.1.2 Toray Industries, Inc.

Toray Industries, Inc. was established in 1926 and the Toray Group employs 38,565 staff both in Japan and abroad. The group has several areas of business including 'Fibres & Textiles', 'Plastics & Chemicals', 'IT-related Products', 'Carbon Fibre Composite Materials', 'Environment & Engineering', 'Life Science & Other Businesses'. Their consolidated net sales were 1,649.7 billion yen and their consolidated operating income was 103.4 billion yen in the 2008 financial year.

Their CSR reports have been available since 2004. Their corporate philosophy mentions "contributing to society through the creation of new values with innovative ideas, technologies and products" and they are aiming to be a global leader in the production of advanced materials by 2016. This aspiration is inherent in the company slogan 'Innovation by Chemistry'.

5.4.2.1.3 Mitsubishi Rayon Textile Co., Limited.

Mitsubishi Rayon Textile Co., Limited was established in 1933 and in 2008 comprised 70 group companies and 7,699 employees worldwide. Their products range from fibres (including acrylic, acetate, polyester and polypropylene), chemicals & plastics, carbon fibres, engineering, construction materials and water treatment systems.

Their consolidated sales in 2007 were 418.5 billion yen and their consolidated operating income was 39.6 billion yen. They have a basic business concept, 'A New Design for Growth', and are aiming to offer unique, superior and socially responsible products and services. They are also planning to improve quality in their CSR activities in order to increase the corporate value of the group.

Their annual CSR reports date back to 1998 and are available online. Their 2009 CSR report outlines their approach towards protecting the environment, reducing CO_2 emissions, their mission to produce safe and high quality products, their support for the community and their protection of employees rights.

5.4.2.1.4 Kurabo Industries Limited.

Kurabo Industries Limited was established in 1888. The consolidated sales 2007 were 160 billion yen and the consolidated profit was 5,536 million yen. They produce 'textiles' (which include yarn, woven and knitted fabrics made of cotton, synthetic and wool) and 'Non-textile' (which include chemical products, real estate utilisation and machine tools) products, and within that textile products have a share of 54.7%. Their 2009 annual environmental report discusses their environmental targets including prevention of global warming, air/water pollution, management of chemical substances, waste reduction and promotion of zero-emissions. Kurabo is committed to producing environmentally friendly products. Their textile and non-textile divisions produce numerous products that are designed for energy conservation, global warming, air/water pollution prevention, ozone layer protection, recycling, effective use of resources, chemical substances, offensive odour control and waste reduction.

5.4.2.1.5 Asahi Kasei Fibers Corporation

The Asahi Kasei Group was established in 1931 and it has eight core companies in different fields that include fibres, chemicals, electronics and healthcare. The consolidated net sales in 2007 were 1,697 billion yen and the operating profit was 128 billion yen. In the group there are 23,854 employees within which 2,517 employees are working for the fibre business. Their main fibre products are spandex, polyester, artificial suede and non-woven fabrics.

CSR reports dating back to 2001 can be viewed online. They have four basic CSR fundamentals that are Compliance, Respect for Employee Individuality, Responsible Care and Corporate Citizenship.

5.4.2.2 Interview results

The results of five interviews with recycled fibre manufacturers are discussed in this section.

5.4.2.2.1 Description of recycled synthetic fibres products

The detailed description of the participating company's products are discussed in this section, including the recycling technology methods, volume of production and its starting date (see Table 5.1) as well as how they differentiate themselves from other competitors.

Table 5.1 Recycled synthetic fibres products

Name of the company	Name of the products	Production method	Production volume	Starting year of production
Teijin Fibers Limited	Eco Circle Fibers® (ECOPET PLUS® within ECOPET®)	Chemical recycling Material recycling	Approx.7,000t (2008) Approx. 5,000t (2007)	2002 1995
Toray Industries, Inc.	Recyclon® Nylon 6	Material recycling	Approx.120t (2008) Approx. 50t (2007) Approx. 20t (2006)	2006
Mitsubishi Rayon Textile Co., Limited	ECORNA® (ECORNA Y®)	Material recycling and filament production	Approx. 730t (2007) Approx. 450t (2006) Approx. 350t (2005)	2002
Kurabo Industries Limited	AFTERPET® GREENPET®	Buying in	Withheld the data	1996 1998/9
Asahi Kasei Fibers Corporation	ECOSENSOR®	Chemical recycling	Approx. 10,500t (2007) Approx. 7,000t (2006) Approx. 3,500t (2005)	2001

Teijin Fibers Limited

Teijin produce recycled polyester fibre from post consumer PET bottles using both materials recycling and chemical recycling. ECOPET® is the brand that covers all recycled polyester products and ECOPET PLUS® is the brand for recycled polyester produced with a chemical recycling system. The brand name ECOPET PLUS® is used for Japan and South East Asia and the brand name Eco Circle Fibers® is used for Europe and U.S.A. Teijin has worked on a joint programme called 'Common Threads Garment Recycling' with Patagonia since 2005 to recycle old garments into new garments using 'fibre to fibre recycling' (chemical recycling) technology.

The production of ECOPET PLUS® was approximately 7,000 tonnes in 2008 and has been produced since 2002. They have been switching their long selling other brands (such as CORTICO, WELKY, MICROFT and WAVERON) with special performance functions (such as quick drying and high moisture absorbency) using recycled material. These performance fibres have a 20% of share within ECOPET PLUS®.

Teijin is involved with biodegradable polyester production. The joint venture with Cargill Dow and Teijin; NatureWorks LLC is marketing PLA-derived Ingeo fibre.

They have also a new type of polyester that has a stretchy character called PTT (Polytrimethlene terephthalate). They have not currently marketed this material as an eco-fabric but this fabric can be recycled.

Their main strength is that they are involved in the polyester recycling business on a larger scale, in fact they are the leading company for the garment recycling world wide.

Toray Industries, Inc.

Toray have been producing Nylon 6 within the brand Recyclon® since 2006 and its production was 120 tonnes in 2008, in other words half of their production capacity. They use industrial waste that is created during the Nylon 6 (virgin fibre) manufacturing process, they return the industrial waste into chips then reproduce Recyclon® using a materials recycling system. Toray explains that there are various thicknesses and cross sections of Nylon 6 fibre. Thus when they change the type of fibre there is always material left inside of the machinery and that material will become the raw material for Recyclon®. Industrial waste can also be created by unexpected process trouble and previous to 2006 they have attempted to recycle this industrial waste into resin, but it is only recently that they have started to use this waste material in fibre production for the clothing market.

What differentiates Toray from other companies is that they produce recycled 'nylon' products, considered to be a difficult fibre to handle in production. This means that their products are still considered high quality as foreign industries are still struggling to obtain the skill and technology to produce high quality nylon. On the other hand, polyester production has been adopted successfully in places such as Korea, Taiwan and China as it is relatively easy to produce. This has led to large numbers of polyester manufacturers and recycled polyester fibre producers in competition with each other. Nylon has a soft touch to the skin and a moisture absorbent character and is most commonly used for making stockings.

Toray has been also working in partnership with Patagonia's 'Common Threads Garment Recycling' programme since the end of 2007 so that they now also recycle their Nylon 6 products using a chemical recycling system.

Mitsubishi Rayon Textile Co., Limited.

ECORNA Y® is a part of the ECORNA® range which Mitsubishi Rayon Textile have been producing since 2002 using material recycling technology. Filament is produced from post consumer PET bottles and ECORNA Y® has Y shaped cross section fibres that improve absorbency and quick drying as it has an increased surface area in comparison to ordinary round cross section fibres. The total production of the ECORNA® range was approximately 730 tonnes in 2007 and within that ECORNA Y® has a 10-15% share.

The distinctiveness of their product lies in the filament produced from a materials recycling system. Filament (long fibre) production needs very strict quality control. On the other hand, producing staple (short) fibre involves cutting and spinning and it is easier to cover up patchy uneven colour caused by batch differences or impurities in raw material. This is not the case for filament production which shows unevenness in colour clearly.

Kurabo Industries Limited.

Kurabo produce several environmental products, and AFTERPET® and GREENPET® are their products containing recycled PET bottles. They do not manufacture recycled plastic bottles fibre, but instead buy them in from other synthetic fibre manufacturers and produce blended fabrics as Kurabo are principally a cotton yarn manufacturer. AFTERPET® has been produced since 1996 and is a blended fabric with cotton and recycled polyester. The content is usually 50% polyester and 50% cotton or 65% polyester and 35% cotton. They do not produce 100% polyester fabrics. GREENPET® has been produced since 1998/9 and it is made with AFTERPET® and another brand fibre product called Shokubutsu Rakuen® which contains cotton and unused parts of bamboo and rush. The content of the fabric is usually polyester 48-49%, cotton 48% and 3-4% bamboo. They also produce blended fabric with natural fibres such as cotton or wool called BIONATURE®. BIONATURE® overcomes the shortcomings of plant based biodegradable polyester such as durability and dyeability, and it will biodegrade under certain conditions.

The characteristic difference between their products and others are that Kurabo has started off as a natural fibre spinning company so that their knowledge and technology

within the company allows them to maximise the merits of natural fibres as well as synthetic fibres as blended fabrics.

Asahi Kasei Fibers Corporation
ECOSENSOR® has been produced since 2001 using chemical recycling technology that requires returning PET products to the raw materials level chemically before remanufacturing fibre. Its production is increasing every year at a rate of 3,500 tonnes per year. The advantage over other recycled fibre products is that the use of chemical recycling enables very high quality fibre production and closed loop recycling.

5.4.2.2.2 Technological developments of recycled synthetic fibres
The interview outcomes reveal how far the recycling technology has developed, its possibilities and its limits.

No quality difference when chemical recycling is applied
If chemical recycling is used it is possible to produce any type of polyester fabrics using recycled material just as it is with virgin material. This is not the case with materials recycling which involves degrading of the material. Chemical recycling entails returning PET products chemically to the molecular level into raw polyester materials and reproducing fibre. It is possible to produce polyester fibre that has no difference from the virgin fibre derived from crude oil.

> *'Normally, quality used to become inferior when recycling is involved, but this is not the case now. No loss of quality means that polyester can be recycled over again (Company D).'*

What is more, recycled polyester produced by chemical recycling will not lose its 'easy to treat' fibre qualities, so that it is possible to add any functions or feel to the fabrics (see Appendix 5.3).
On the other hand, materials recycling involves washing, melting and producing flakes called 'chips' from post consumer PET bottles and reproducing fibre (known for producing a fleece jacket). Fleece fabric is usually made of staple (short) fibre that does not require as high quality raw material as filament (long fibre) production requires. Furthermore, uneven colour may not show on fleece fabric as obviously as on filament fabrics that are usually thinner and smoother.
Company D explains that using materials recycling systems means quality will degrade as every time heat is added to melt PET bottles, and the long chain of the polymer will

break. This breakage will cause fibre to be unstable and the length of the polymer chain is very important if it is to produce high quality polyester fibre. Due to instability caused by material recycling it makes it is difficult to produce fabrics with performance functions as filaments (long fibres) often have complicated structures such as a bumpy surface, odd shaped cross sections or extremely thin yarns which need stable high quality polyester (see Appendix 5.3).

Barriers for garment recycling

A couple of participating companies that are dealing with garment recycling revealed the reasons why they restrict garment collection to only 100% polyester or more than 80% polyester not containing wool, acrylic and polyurethane. Company D explains that if there are any contaminations (other materials other than polyester), more energy and cost will be necessary to get rid of the impurity so that the recycling cannot to be run at maximum efficiency. Wool, acrylic and polyurethane should be avoided as they cause significantly high levels of nitrogen and chlorine which needs to be kept at a certain level in order to keep raw material in a stable condition. The more materials that are included other than polyester, the more waste will be created that can only be used as raw material for cement. However, company D stated that they are aiming to carry out effective polyester recycling which means they have to put restrictions in place (see Appendix 5.3).

The interview with textile recyclers revealed that synthetic fabrics and fabrics with a mix containing synthetic fibres were no use to them and they want the clothing industry to stick to natural fibres. Company B and D thought that the suggestion that the clothing industry should use only natural fibres is one-sided, looking at the issue only from the recyclers' point of view. Company D mentioned that there is already 'fibre to fibre' garment recycling available and they are producing for the mass market. Company C also sees the potential in garment recycling technology.

> *'…it is a big hurdle but we as producers have to improve product recycling technology (Company C).'*

Company D believes that it should be up to consumers whether they want to buy products with 100% natural fibres or not. He supports the idea of creating new types of natural fabrics that can replace polyester if there is consumer demand for such products. He continued that the reason polyester is frequently used is that consumers

want it. Therefore it is more realistic to use synthetic fibres unless there will be legislation to ban the use of them.

Their views about used garments collection (especially about the sorting problems of blended fabrics) are dichotomous. The companies that have already started garment recycling expressed their commitments and optimism with regards to garment recycling and those companies are the ones that use chemical recycling systems. They have developed a labelling system to identify products so that they can be separated easily, and furthermore the end of garment life is incorporated in the garment design itself in the first place.

On the other hand, the companies that are not involved with garment recycling are of the opinion that carrying out garment recycling is difficult. Company A is concerned about separating blended fabrics as an effective separating technology has not yet been developed, making it difficult to recycle garments apart from garments with 100% polyester or high polyester content fabrics. Company E considers that garment recycling and selection will be extremely difficult. Company C stated that it is a big challenge but recycling technology needs to be further developed in the future to overcome this issue.

> *'Currently, it is difficult to recycle used garments. For example, fleece jackets made of 100% polyester are collected and recycled into polyester fibre again, but to separate blended fabrics that were mixed at the fibre stage (unlike the products that are separated as surface fabrics and lining) has not been established at industrial level yet. Because it has not been established yet to separate blended fabrics, even if garments were collected, they would not be develop to the next step (Company A).'*

> *'I think that garments collection will be extremely difficult including selecting garments.*
> *There are movements among the companies that have stamina, concentrating on the issues of how to establish garment collection. In my opinion, I think it is difficult. I think that our company cannot participate in the garment collection business (Company E).'*

> *'It is a big hurdle but we as producers have to improve product recycling technology (Company C).'*

5.4.2.2.3 Quality, cost of recycled fibre and raw materials supply

The quality and cost of the recycled synthetic fibres as well as supply of raw materials were revealed.

There is no quality difference between virgin and recycled fibres produced by chemical recycling as was discussed previously in section 5.4.2.2.2. Strictly speaking there is a difference between virgin and recycled fibre produced by materials recycling, but the recycled fibres are of the standard of quality suitable for clothing.

All of the companies participating in the research said that their products containing recycled fibre are more expensive than the non-recycled equivalent, the difference in price ranging from 10% to up to 50% higher. Company A indicated that if fabric with recycled fibre content is 50% more expensive, it is too expensive for their clients. The price setting strategy varies from company to company. Company E mentioned that they set a price 10 to 20% higher for the recycled fabrics because of their environmental credentials, despite the fact that the cost for recycled yarn itself is just slightly higher than the conventional yarn. Company D mentioned that the recycled yarn is 20 to 30% more expensive but fabric prices depend on quantity so much that one cannot generalise. Company B revealed that their price range for recycled fabrics is 20 to 50% more expensive than the conventional fabrics due to its small quantity production and the high cost of collecting raw materials.

None of the interviewed companies mix recycled and virgin fibre to produce yarn. But some of the companies are mixing both types of yarns to produce fabrics. The reasons for blending recycled yarn and virgin yarn to produce fabrics are mainly for textile design purposes such as adding different textures and adding colour variation, stabilising the quality of fabrics and reducing the cost of the fabrics. The interviews revealed that in Japan, in order to be able to claim the eco-mark, the fabric needs to contain more than 50% of recycled materials. Therefore, recycled fabrics that are targeted to the uniform market often contain more than 55% or 65% of recycled materials as client companies are often demanding fabrics with the eco-mark.

In terms of raw material supply four out of five participants said that it is stable. Some of them mentioned that there is high demand for post consumer PET bottles from China and one of the companies admitted that to maintain a stable supply is difficult due to exports of used bottles to China, (the detailed discussion is stated in Chapter One,

section 1.2.3) However, due to the recent recession, demand for post consumer PET bottles has dropped dramatically as has the price for used PET bottles. Hence, there is currently no shortage of raw materials. In addition they expect there to be more plastic bottle waste, unwanted clothes and industrial waste (see Appendix 5.3).

Some of the companies are expecting that more used garments will be collected as raw materials nationally as well as from the U.S.A..

5.4.2.2.4 Recycled fibres' current markets and potential markets

Company motivation to produce fabric with recycled materials content, their current target markets, their views about potential markets and possibilities to expand into the fashion market are the focus of this section.

Company motivation

All of the interviewed companies commented that the environmental section of their business is profit motivated as this was essential to the sustainability of the business for the long term. They were also strongly committed to environmental issues as companies.

Some of them stated that currently they are selling only to clients who are interested in eco fabrics, hence their promotional strategy is to sell the environmental credentials first. On the other hand, a couple of the interviewees commented that they are flexible in how they promote recycled fabrics by promoting environmental benefits first to the clients who are keen on eco-fabrics while for clients who are not interested in eco fabrics, they will market quality of fabrics first and introduce environmental credentials as added value.

The current target markets

Their prime targets are mainly uniform (schools and companies) and sports wear markets. Companies that have clients abroad are targeting sports apparel markets there. Company A explained that they can sell to any markets but that a strong demand has started from the uniform market as companies are eager to show responsible behaviour and increasingly add environmental good practice into their company policy. This has pushed demand up, as well as the 'Law on Promoting Green Purchasing' that encourages companies to use recycled materials for their uniforms. There is a strong demand for polyester and cotton blend fabrics for uniforms as durability is a key requirement. Furthermore, the uniform market has a low spun production. Once

uniforms are ordered, they will be using the same uniforms for at least two to three years which means the same fabric will be ordered in huge quantities and used for a long time. Company D commented that they are targeting more of the sportswear market as well as their existing uniform markets, interior and industrial material markets. They reckon that fabrics with recycled materials have 50% of the uniform market share (see Appendix 5.3). Company B said that their first target was Western outdoor and sports apparel producers such as Patagonia and The North Face and they are expanding to general clothing markets both in Japan and abroad.

The potential markets

The companies in this study have established a strong presence in the uniform market within Japan and they have started to sell to sportswear and outdoor wear markets in Japan and abroad. They see the potential in casual, inner wear, fashion, general clothing and interior markets, except for one company that insists that their recycled fabrics will be used for uniforms and sportswear markets only. Company A mentioned that recycled fabrics will be expanding into these markets due to high interest in ecology from the general public. Indeed Company B is already selling their recycled products to women's and men's wear markets both in Japan and abroad.

Company D takes a more ambitious long term view. They are well established within the uniform market and have now started to sell to the sports apparel market, from which they are planning to approach general and fashion markets with the aim of eventually replacing all polyester products with recycled polyester.

All of the companies interviewed have tried to target the fashion market previously. Some of them are doing business already in small amounts and feel they are at a very early stage. Some of them are quite positive they will expand into the fashion market as they are receiving more enquiries from apparel companies. A couple of companies mentioned that the department stores in Japan and N.Y. are both keen to promote eco-products; for example, there is an ongoing project with MARUI department that uses recycled fabrics for their suits while Barneys in N.Y. have dedicated one specific floor to promoting eco-products. Company B is currently at the stage of designing fabrics targeting the fashion and apparel markets.

The Japanese manufacturers' views on whether recycled materials should be used for high street fashion garments are dichotomous. The companies that use chemical recycling mentioned that recycled fabrics should also be used for high street fashion

markets and acknowledged that there are issues and challenges to overcome but that sooner or later recycled polyester will expand into these markets due to environmental concerns. On the other hand, companies that are not dealing with chemical recycling displayed more concern and avoided a clear answer by saying 'it is difficult to answer as a company' and 'recycled fabrics are for sportswear and a few niche apparel companies.' They were not confident the women's apparel industry would take on recycled fabrics as they have distinctive fashion cycles.

Companies D and B on the other hand did not see a problem in dealing with fast fashion cycles. Company B commented that it is difficult to deal with the fast cycle of fashion but considers it is a norm they have experience working with in this area. He also pointed out that the fashion market's priority for selecting fabrics is not environmental concern, but rather fashionability, touch, feel, colour and quality. As a result Company B are working on developing recycled fabrics that appeal to fashion apparel markets as they understand it is difficult to sell fabrics purely on their environmental credentials. They value direct contacts with clients so they are actively showing at several International Textile Fairs and they are very positive about expanding their market as they have gotten positive feedback through the Fairs.

> *'Personally, as I am dealing with these recycled fabrics, they should be used for the fashion market. However, in terms of the fashion market, their first priority is not environmental concerns yet unfortunately. Their priority is fashionability, touch, feel, colour, quality and so on and environmental concern comes next. It will be difficult to expand into the fashion market if our sales point of the fabric is only environmental benefits. Therefore we are thinking about how we can produce fashionable and trendy fabrics using this recycled material in order to target the fashion market. And we have already started. ….*
> *We do company visits as well as exhibiting at Premier Vision in February and September. There we can talk to clients directly as there are huge numbers of visitors. The reaction is extremely good (Company B).'*

In terms of developing fabric design, a couple of the companies said they use both in-house facilities and outsourcing and they make choices according to the type of facilities they need for the production. The rest produce yarn or go up to the stage of textile design and then outsource for the production.

All of them use textile designers and it varies whether they are in-house designers, or contracted designers working in-house. They often have technologists who can deal

with yarn design and fabric structure, then textile designers will have inputs with colour and pattern.

Developing fabrics with apparel companies is supported by all of the participating companies. In fact some of them are already developing fabrics with apparel companies. However, whether this leads to actual production or not depends on various factors such as quantity and company policy.

A couple of the companies mentioned that they are already doing business with UK clients as well as the whole of Europe. The rest of the companies said there were a few enquiries but that the demand has not increased much.

The companies mentioned above are doing business with Patagonia and Quick Silver and had enquiries from Marks & Spencer and other major UK apparel companies whose names' they cannot reveal as they have not launched the products yet at the time of interview.

5.4.2.2.5 Manufacture's Future Views

Recycled fibre and fabric manufacturers' future views regarding alternative materials, slow fashion and other issues are the focus of this section.

Alternative materials

All of the informants said that it is not possible for Ingeo to replace oil based synthetic polyester in the future. Company A addressed current problems that PLA (Ingeo) has such low heat resistance, poor dyeability and durability, and urged that these points are basic requirements for clothing applications. Without solving these issues PLA will have little chance of expanding into the mass market. Company E is concerned about food shortage problems as PLA is derived from corn. They think that if PLA is derived from non-food plants and currently wasted materials, PLA could be one of the core materials of the future but would not replace synthetic polyester outright. Company D predicts that the future polyester market will consist of three types of materials that are virgin, recycled and plant based fibres such as PLA.

> *'…it will be difficult unless PLA overcomes the current problems to have basic requirements for clothing. It will be used in the market because it is environmentally friendly but cannot to be used as a product. For example, when organic cotton was sold as no dyed fabric it did not expand to the mass market just because it was better for the environment. It could sell to a particular niche market where there are strong company policies to use eco-fabrics but it will still be in small*

> *quantities. If the aim is to expand the market, satisfying basic performance such as durability, fashionability, functionality needs to be achieved otherwise it will not be developed to the next stage (Company A).'*

> *'Oil is a limited resource, so if you look at it in a long term such as 30 or 50 years, it will certainly change. However, if PLA will replace it or not, personally I do not know (Company B).'*

> *'I do not think it is possible (Company C).'*

> *'I think it will be both. I think it is not possible to replace all polyester demand with PLA derived from plant base. We will have to use virgin and recycled also, so it could be three types or both recycled and PLA may grow as two main materials (Company D).'*

> *'Basically I think it is difficult. Corn is food so that food shortage problems will arise. It will be one of the core materials if non-food and also currently thrown away material will be used. However, I cannot imagine that these materials will replace all polyester use (Company E).'*

Slow fashion

The informants did not really have a strong opinion on slow fashion. One of them expressed her doubt towards fast fashion and stated as a personal opinion that we should have more awareness about caring for clothes. Company D commented that it is up to consumers to decide and that they are aiming to offer high quality fabrics with durability.

Future views

The responses indicated that recycled fabrics are not widely used yet and the recycled fabric business is in the beginning stage.

> *'…first of all there should be the awareness that use of eco-fabrics has to be a long term business strategy rather than a momentary fashion trend (Company A).'*

Company A warns that if there is no demand from consumers, there is no need for apparel companies to use eco-fabrics, so even if fibre and fabric makers are promoting eco-fabrics, development will not continue to the next step. In addition, apparel companies will not buy fabric because of their environmental credentials without satisfying their criteria of price, fashionability and touch.

Chemical recycling (fibre-to-fibre) systems may hold the key as Company D points out that it is now possible to offer any feel and performance function that might be desired by apparel due to this advanced recycling technology. Replacing virgin polyester fabrics that hold special performance functions with recycled fabric is increasingly in demand. Differentiation is key as Company E explains that Japanese fibre and fabric manufacturers need to have added value textiles products in order to compete with Chinese products as yarn made in Japan is more expensive than the yarn made in China. Company D set their future plan to replace existing polyester products with recycled polyester including uniforms, sports apparel, interior and industrial materials such as nets and train seat cushions. They are confident that there is demand for recycled fabrics from companies as there is growing awareness about green purchasing and CSR. He believes that a marketing campaign to raise awareness and create needs among general consumers will lead to recycled fabrics expanding to general clothing and fashion markets. Company B believe that eco-fabrics will be a 'must' in the future since the general consensus is that demand will be increasing in sports as well as fashion markets. Company C is committed to developing garment recycling technology further.

5.4.2.3 Summary

The aims of carrying out industry surveys of Japanese recycled fibre and fabric manufacturers were to identify the barriers and drivers of the recycling technology influencing the introduction of clothes with recycled content and recycled fibre manufacturers' future views. The outcomes answered the research questions successfully and these are discussed below.

• Development of chemical recycling made it possible to produce any types of fabrics with recycled materials. There is no quality difference between virgin and recycled fibres. Chemical recycling has also made it possible to recycle used garments (fibre-to-fibre recycling) which is already being carried out by a few leading companies. However, the fibre-to-fibre recycling technology has limits. Currently it only processes garments containing more than 80% polyester, preferably 100% polyester and not containing wool, acrylic or polyurethane. In theory they can take 50% polyester garments but it requires more energy and cost to get rid of non polyester contents which will then become industrial waste. Therefore in order to carry out effective polyester recycling, this restriction is necessary. There are still other issues such as

collecting and sorting that need to be solved if garment recycling is to expand to a wider range of garments.

• There are no longer quality differences between virgin and recycled fabrics except in cost. Recycled fabrics are 10 to 50% more expensive than the equivalent products with conventional materials. Some of the manufacturers mix recycled and virgin materials (in yarn base not fibre base) in order to reduce cost, and in the case of material recycling stabilize quality and add more variety of colour and design. The price is key to expanding markets for recycled fabrics, so that offering the right price is a prime concern for manufacturers.

• There is a stable raw materials supply for recycled fabrics in post consumer PET bottles, used garments and industrial waste. What is more, the concerns regarding export of raw materials to China has diminished as there is no longer the demand from China which means raw material is available at low cost for Japanese recycled fibre manufacturers.

• The prime markets for recycled fabrics are uniform and sportswear markets. They have tried selling to fashion markets and some of them are already doing business in those markets. It is still very early days however, and manufacturers, in particular the ones involved with chemical recycling technology, are positive towards expansion into fashion and general clothing markets.
They are also open to developing fabrics with apparel companies under certain conditions.

• The recycled fibre and fabric manufacturers are aiming to expand from sports apparel into general clothing and fashion markets. One of the manufacturers is aiming to replace existing polyester with recycled polyester wherever it is used. The selection criteria for fashion markets such as fashionability, feel and touch are vital elements for recycled fabrics to be successful in fashion and general markets and chemical recycling technology can offer these functions. Japanese fibre and fabric manufacturers cannot compete on price with other Asian competitors and hence they need to have added value fabrics in order to succeed in the market.

• Demands from companies are increasing due to CSR and the Green Purchasing Law. Using recycled materials wherever possible will be a norm in the future. On the other

hand demands from general consumers are not yet significant. The demand from general consumers is vital in order to expand to general clothing and fashion markets, and raising awareness to create that demand is necessary.

In the next section, the materials sourcing strategies of UK high street clothing retailers, their views towards use of recycled materials and their future visions are discussed.

5.4.3 UK High-street Clothing Retailers

In this section, the industry survey results, which include five interviews with four major UK high street clothing retailers are discussed. The discussions focus on how they source fabrics, their views towards recycled materials and their future vision in terms of sustainable fashion.

The industry surveys carried out in 2005/6 are also compared to the 2008/9 studies and the outcomes are discussed in this section. The comparison of these two sets of surveys reveal the changes that have taken place in the last three years within the clothing sector material selection process.

The 2005/6 industry surveys were carried out with five companies: Marks & Spencer, Next, Berghaus, KOMODO and Penny Plain. An example of the interview transcripts is available in Appendix 5.5.

5.4.3.1 Company Background

The participating companies' profile and their company policy in their 2008/9 industry survey with regards to environmental and ethical issues as well as direct observation through company visits are discussed.

5.4.3.1.1 Marks & Spencer Group Plc.

The company dates back to 1884 and it currently has 622 UK stores and over 75,000 employees in the UK and abroad. The group's total sales are £9,022 million, within which £4,069 million comes from the clothing and home section.

They have been publishing their policy towards environmental issues since 1990 and it has developed gradually over the last decade. They have been publishing CSR reports on their website since 2001. The annual reports from 1996 and the CSR reports from 2004 to 2008 are available online. They have also published the 'how we do business 2008' report with regards to their progress on the Plan A (see Chapter 2, section 2.3.2) (Marks & Spencer 2009).

The 2004 the CSR report starts off with five CSR issues; 'sustainable raw materials', 'responsible use of technology', 'animal welfare', 'ethical trading' and 'community programme' (Marks & Spencer 2004). More issues are added each year reflecting the changes in society. Throughout all of the reports they maintain three core principles they work with, which are 'Product', 'People' and 'Places'. Under each of the categories 'Product', 'People' and 'Places', there are three columns headed 'what we set out to do', 'how we did' and 'what we aim to do', describing their activity during the year including targets and aspirations they could not achieve. Including success as well as their failure in the reports conveys an impression of trustworthiness to the reports. The style of the reports is clearly targeted towards the general public and special attention is paid to ease of readability and visual layout. There is also consistency in their intention to increase communication between their customers, employees, shareholders, social groups, environmental groups and animal welfare groups by carrying out surveys or having regular meetings (Marks & Spencer 2006: p.7).

They are active promoters of CSR in their business and several activities are signs of their keenness, for example launching a small trial of organic cotton yoga wear called the 'View from Sports' range in 10 stores and 'Marks & Start', a campaign started in 2004 to provide work experience. They have also raised funds for numerous organisations such as 'Breast Cancer Care' (Marks & Spencer 2004: pp.4, 30). In 2006 they launched the 'Look Behind the Label' campaign and started to sell Fairtrade goods. For 2007 they set a target called 'Plan A' where they planned to work with several issues over the next five years, such as tackling 'climate change', sourcing reliable and quality 'raw materials', promoting 'healthy eating', reducing 'waste' and guaranteeing 'fair partner' in the supply chains as well as local communities (Marks & Spencer 2007). Updating their progress on Plan A can also be viewed online divided into five sections of 'Climate change', 'Waste', 'Sustainable raw materials', 'Fair partner' and 'Health' there is also information about the M&S and Oxfam Clothes Exchange programmes (Marks & Spencer 2009).

Their achievements in business are displayed clearly in the waiting area in their main London office. There is a digital display board saying 'selling the largest eco textiles range in the UK' and many awards are displayed in the cabinet also at the time of the company visit. Marks & Spencer is by far the largest leading organisation among the

companies interviewed in this study in terms of initiatives for moving to sustainable business as well as scale of business.

5.4.3.1.2 Arcadia Group Limited.

The Group's dates back to 1900. They are the UK's biggest privately owned clothing retailer with seven high street brands - Burton, Dorothy Perkins, Evens, Miss Selfridge, Topman, Topshop and , including the shopping concept Outfit. They employ 27,000 staff. They operate in over 30 countries through 420 franchise stores worldwide with sales of £1,847 million in 2008.

They are not a member of ETI but they have their own code of conduct which was first published online in January 2007. Also their second (first to be published online) responsibility report from 2008 can be viewed online. In 2007 their new initiative 'Fashion Footprint' was launched by Arcardia's "The Fashion Footprint Group" with the aim of improving and monitoring Arcadia's performance as a socially responsible retailer. The reports contains nine sections that include 'energy efficiency', 'packaging, recycling & waste', 'transport', 'disability discrimination', 'stakeholder engagement', 'garment suppliers', 'brand buying activities', 'employee engagement', and 'charities'. Each section contains what they have done so far and what they set out to achieve in the consecutive year.

They have been late starters in publishing their CSR report compared to the other two major retailers (M & S and Next). However, they have been quite active in promoting their commitment towards corporate responsibility in particular ethical issues for the last couple of years, such as promoting People Tree's collection at their Oxford TopShop branch in March 2007 (Arcardia Group 2008).

Their main office is situated in the very heart of the fashion scene in London just off Oxford Street, where many of their own brand stores are located. The office itself is spread over many floors and visitors can access only certain levels with a visitor's pass and strict security is evident. The waiting area is plain and simple but very well presented with a receptionist. The waiting room as well as the building give away very little about the company.

5.4.3.1.3 River Island (Lewis Trust Group limited.)

River Island is a part of the privately owned Lewis Trust Group. The group run retail stores (River Island), real estate, a wealth management company and several hotels. The group itself has over 10,000 employees but their financial information is not readily

available. River Island has 252 stores and 31 franchises worldwide and their retail history dates back to the 1950s.

In their corporate responsibility statement available on their website, they reveal that they became a member of ETI in June 2008 and put emphasis on the ban on using Uzbekistan cotton due to allegations of child labour. They also have a brief statement concentrating on the environment including reduction in energy consumption, use of renewable energy, reduction of packaging, recycling and the use of biodegradable materials.

Their main office is located on the outskirts of London and the office itself is by far the smallest and simplest in comparison to the rest of the participants. There is a small waiting area in front of the reception desk where a few chairs are located. There is an article about the Group's history on the wall. The waiting area is very uninteresting and different from the company brand image.

5.4.3.1.4 NEXT Retail Limited.

Their retail history dates back to 1982 and they now have over 480 stores in the UK and Ireland, and over 140 franchise stores worldwide. The Group's turnover in 2008 was £3,330 million, £3,055 million of which was from Next Retail and Next Directory. The Group employs 12,340 full time and 34,743 part time staff.

The Corporate Responsibility Reports from 2005 to 2008, their commitment to clothing factories in Africa and the code of practice are available on their website.

The CSR reports are based around issues such as 'suppliers', 'customers and product', 'people, health and safety', 'community' and 'environment' throughout all of the reports. They have 17 people working on CSR issues and one permanent Environmental Manager was appointed in 2005. One of the focal points of the reports are the ethical standards of those who work in the supply chain. The NEXT COP (Code of Practice) was introduced in 1998 and they became members of the Ethical Trading Initiative (ETI) in 2002 (NEXT 2005: p.8) and a member of ETI board in 2007 (Ibid. 2008: p.6). They also mention their awareness of climate change and that they are trying to reduce carbon dioxide (CO_2) emissions through efficient energy use and recycling (Ibid. 2005: pp.27-31). They have addressed their aims as well as ongoing processes. They also mention that they are trialling the use of recycled materials such as polyester and cotton in their school uniforms as well as casual trousers for children (Ibid. 2008: p.24).

Their head office is located in a remote business park in Leicester. The waiting area with one busy receptionist gives very little away. Once inside there is the main open plan, warehouse-like space with offices where the design team, buying team, sourcing team and the manufacturing team all work together.

5.4.3.2 Interview results

The outcomes of five interviews with four major UK high street clothing retailers are discussed in this section. Their strategies for materials sourcing and product development, and attitudes towards use of recycled materials and future views are the focus of the discussion. The 2008/9 interview results are also compared to the 2005/6 interview results.

5.4.3.2.1 Their approach for sourcing materials

Key roles for fabric sourcing personnel and their strategy to select materials are discussed in this section.

Key role for fabric sourcing personnel

The 2008/9 interviews were carried out with personnel who are responsible for the material sourcing process. Most of the participants are working for several brands or sections within the company and have a textile technologist background. The size of the teams within which they operate vary but they all work closely with designers, buyers and manufacturers.

Their strategy to select materials

All of the informants mentioned that they source fabrics by travelling and visiting international fabric fairs in Paris such as Premier Vision and Tex World. However, visiting these textile fairs is generally considered to be for gathering information and not necessary for buying fabrics.

All of the participating retailers except one have various ways of sourcing fabrics through local UK agencies or direct from mills from all over the world. The majority of the clothing companies are quite flexible in terms of who they will work with and there seems to be no hard set rules or restrictions. One of them has their own sourcing offices abroad, in Asia and Europe and all materials are sourced by the company itself. They also mentioned that they often keep their existing working partners such as agents and mills since they have already a good understanding of how they operate.

There do not seem to be any changes in terms of how they source their fabrics. Companies in 2005/6 were already quite flexible in terms of whether they used agents or mills.

They are all on a constant lookout for new fibre and fabrics that are viable. Their products and fabrics personnel are the only designated people within the companies to obtain information for new developments from suppliers and manufacturers, except for one company. This company has a group of specialists who are focusing on fibre and fabrics developments so that they are available if it is necessary.

Comparison between the two studies shows little change, but in the 2008/9 industry surveys one retailer commented that they have another group of people who are designated to look into raw materials and that they are currently using and developing strategies and solutions to shift to more sustainable ways of sourcing raw materials.

All of the companies develop their own fabrics and one of them mentioned that they make up about 20% of all fabrics they use. They use existing mills that have had successful ranges in the past so that they can easily produce large quantities as well as alter colours and finishing, and add to fabrics to differentiate them from the previous seasons. They feel that they should do more of their own fabrics development however, but sometimes the lead time makes it difficult to develop this capability as it needs careful planning beforehand in terms of timescale.

The outcome shows that the priorities for the companies when they choose materials were 'Fabric Quality', Seasonal', 'Textile Design' and 'Stock Availability' (see Table 5.2). Respondent D stated that important keys for selecting fabrics are 'price', 'trend' and 'performance'. However, it does not mean that they go for the top quality fabrics all the time. 'Price' plays a big role. They attempt to obtain the best quality of fabrics within their budget as well as following the design brief that changes from season to season and from brand to brand. Therefore the priorities listed in the questions are interconnected, and some rate stronger than others, depending on the design brief and the brand. Even within the same company the priorities for choosing materials change according to the design brief and the various target markets.

Participants B and C mentioned that they often run trials to test the reaction from their customers and respondent C commented that 'today's market is all about reacting to the market, by buying tighter, on short lead times and repeating on successes.'

*'All areas are important and considered when placing a fabric order.
What we don't know is our consumer demand, prior to putting stock
into store. In many cases we run trials to check our customers
reaction to a new look or style.Today's market is all about reacting to
the market, by buying tighter, on short lead times and repeating on
successes.
… so we have to work very closely with our suppliers. We provide
designs and board for our buying teams, the teams then feed into our
suppliers who produce samples. Orders are then placed on those
samples (Respondent C).'*

Table 5.2 Priorities when choosing materials

	Price	Fabric Quality	Seasonal	Textile Design	Consumer Demand	General Trend	Stock Availability
Respondent A	3	5	5	5	5	5	5
Respondent B	5	5	5	5	5	5	5
Respondent C	5	5	5	5	3	3	5
Respondent D	5	5	5	5	5	5	5
Respondent E	5	5	5	5	5	5	5
Mean	**4.6**	**5**	**5**	**5**	**4.6**	**4.6**	**5**

In the two sets of industry surveys, informants are different although they are both UK
based clothing companies. The 2008/9 industry surveys interview high street clothing
retailers only where as the 2005/6 industry surveys included outdoor wear and small
companies as well as high street retailers.

The outcomes show (see Table 5.3) that every quality listed in the question has
increasingly become important, which reflects the different types of participating
companies. High street retailers have a high demand for all of the qualities listed in the
question. The fact that the 2008/09 study involved only fashion retailers is also visible in
the higher importance attributed to trend and seasonal compared to the 2005/06 study.

Table 5.3 Priorities when choosing materials in 2005/6 and 2008/9

	Price	Fabric Quality	Seasonal	Textile Design	Consumer Demand	General Trend	Stock Availability
Mean 2005/6	**4**	**4.8**	**3.6**	**4.4**	**4.2**	**2.8**	**2.8**
Mean 2008/9	**4.6**	**5**	**5**	**5**	**4.6**	**4.6**	**5**

5.4.3.2.2 Their strategy for developing products

In this section, the 'when' and 'how' decisions were made over the selection of the materials for products are discussed.

Design themes

In terms of developing design themes, they all start to work from information based on show trends, catwalks, cultural trends, travel, research, publications and their own brand direction to create storyboards. Respondent A mentioned that the fabrics sourcing team, as part of the overall design team, is involved with creating new storyboards. The fabric sourcing people put concepts together based on available fabrics and garment designers will feed in fabric and silhouette input.

Respondent E revealed that for product development, designers, buyers, merchandisers and technologists are working as a team and the dynamic of teamwork differs according to each process of product development. Most of the buying teams have buyers and technologists within the team working closely for product development. The strategy of developing design themes and carrying out production development does not seem to have changed since 2005/6. They all work as a team with designers, buyers, merchandisers, technologists and directors, and critical decisions are taken jointly to try to minimise compromise while remaining flexible through negotiation.

Critical decisions

All informants mentioned that critical decisions are taken jointly by a team of designers, buyers, merchandisers, technologists and for some companies design or commercial directors also. It is dependent upon different stages of production as to just who will have the ultimate decision. It seems that they have several meetings so that people in the various roles have opportunities to take part in the discussions about the product they are working on, although the final decision rests with the particular person who has an overview of the company's whole clothing range. This could be the company director, the buyer or the product manager, depending on the company.

> *'Ultimately the buyer makes the decision whether to buy or not, but at each stage different people make different decisions (Respondent A).'*

> *'I obviously make an initial selection when it comes to the fabric. I then show this selection to buyers and design in the specific area – ie trousers and this selection is then shown in reviews to directors,*

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*'It depends on the different stages. But it is a joint decision from the
designers, buyers, merchandisers, technologists (Respondent C).'*

Respondents B and C commented that there should not be any compromise for product
development. Respondent B continued that if everyone does their job correctly there
should be no compromise and therefore an ideal situation emerges. Respondent A
commented that there is not a perfect solution but they should be flexible enough to
work towards the best possible solution, satisfying criteria of availability, price,
performance and suitability.

However, negotiations and discussions are inevitable. For example, the design team
may push the company to commit to a certain type of new style, but as a fabric sourcing
team they will have to minimise risk and carry out a small quantity trial to test the
market response first.

Designer's role

The designer's role within the company starts with the design concept and realising the
trend (which is desirable for their customers), choosing fabrics, garment design and
dealing with manufacturing procedures until all garment samples are handed over to the
sales team. Their role does not stop at the design stage but requires the ability to work
as a team and to deal with other clothing manufacturing processes.

5.4.3.2.3 Key drivers in the use of recycled materials

In this section, the current position of the high street clothing retailers on using materials
with recycled content and the determination of possible reasons for their use (or not) of
such materials are discussed.

All of the companies are using/have used recycled materials in their products recently
(2007/2008). They have used recycled cotton, wool from garments and polyester (PET)
from post consumer plastic bottles. However, it seems that none of them have achieved
great sales so far. In fact two companies are no longer selling products made of
recycled materials. The other two companies are using recycled PET materials. One of
them is using them for school uniforms and the other company is using them for school
uniforms, children's wear, men's wear and women's wear and expanding to suits in the
future. They commented that in the last two to three years there has been a major

change in terms of using recycled materials and they use lots of recycled PET fibre in the furniture section for filling as well as all of the clothing areas. They also addressed sourcing issues as recycled PET is often produced in Asia, not in Europe.

The significant difference in the 2008/9 industry surveys is that all of the partaking companies have used recycled materials recently (in 2007/8), and those were mainly recycled cotton, wool and PET fabrics. Sales however have not been great and some of the companies have already dropped their recycled line. In the 2005/6 industry surveys companies appeared to be quite positive about using recycled materials in their products and some of them were keen to find out about new developments in ecologically friendly fabrics but only a minority had used them before. The informants also displayed less understanding and knowledge of synthetic recycled fabrics.

Except for one company, it seems that eco-fabrics are considered for niche markets only. This may be caused by the recent failure to sell products made of recycled fabrics. The reasons given why they did not sell were price and inferior quality. Inferior quality was in reference to recycled cotton. Respondent E explained that the fact that a material is an eco-fabric does not exempt it from having to satisfy the material selection criteria of price, quality, trend and textile design.
There is no difference between the 2005/6 and 2008/9 studies as all informants mentioned that using eco-fabrics is not currently a high priority, except for one company in both industry surveys. They also stated that they would be happy to use fabrics with recycled content if only the fabric satisfied all of the company's requirements.

Higher price, availability and under development of fabrics are the reasons described by the informants which currently prevent companies from using fabrics with recycled content.
All respondents commented that price is an issue. Respondent E pointed out that recycled polyester yarn is 40 to 50% more expensive so that the price of fabrics or garments made of recycled polyester fabric would be formidable. Respondent D claimed that recycled materials in a fabric is 'not a big selling feature.'
Respondent E also highlighted that there were false claims from manufacturers it was claimed that post consumer recycled PET was used when in fact it was not.
Three respondents commented that they had dyeability issues with recycled and organic cotton fabrics. One of them thought that some of the recycled PET fabric also had quality issues in terms of colour shade.

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The 2008/9 industry surveys revealed that availability, underdeveloped fabrics and especially high cost are the barriers preventing recycled materials being used widely up to now. These barriers were also listed in the 2005/6 industry surveys. There still are dyeability and general quality problems as well as unconvincing eco-claims. The 2005/6 studies suggested that UK consumers are not ready yet and that there is no demand for eco-fabrics because they do not understand the benefit of using them and are not willing to pay extra. The 2008/9 studies revealed that UK consumers are more agreeable and there is demand but they are still unwilling to pay extra.

The results show that 'Company Decision (Mean 4)' is the most important motivator and second is 'Future Legislation (Mean 3.8)' among the companies to use recycled materials.
This is followed by 'Consumer Pressure (Mean 3.2)' and 'Competition (Mean 3.2)'. 'Personal Belief (Mean 2.4)' came last (see Table 5.4).

Table 5.4 Important drivers in the use of recycled materials

	Future Legislation	Competition	Company Decision	Personal Belief	Consumer Pressure
Respondent A	5	3	5	5	3
Respondent B	5	5	5	1	5
Respondent C	4	2	2	2	4
Respondent D	4	4	4	1	1
Respondent E	1	2	4	3	3
Mean	**3.8**	**3.2**	**4**	**2.4**	**3.2**

The 2008/9 results show that 'Company Decision' is the most important motivator followed by 'Future Legislation' to use recycled materials. The 2005/6 industry survey outcomes showed that 'Consumer Pressure' is the most important motivator followed by 'Future Legislation' (see Table 5.5).
These results indicate that UK clothing companies are taking more initiatives to use recycled materials compared to three years ago by acknowledging that 'Company Decision' is the most important factor in changing practice, rather than transferring the main responsibility to the consumer.

Table 5.5 Important drivers in the use of recycled materials in 2005/6 and 2008/9

	Future Legislation	Competition	Company Decision	Personal Belief	Consumer Pressure
Mean 2005/6	3.8	3.4	3.6	3.4	4
Mean 2008/9	3.8	3.2	4	2.4	3.2

5.4.3.2.4 Recent changes for sourcing material

This section establishes if there have been any changes in their materials selection practices in recent years due to increasing awareness about environmental and ethical issues among the general public and clothing retailers.

Compared to three years ago the UK clothing companies are keener to use eco-fabrics but are more price sensitive due to the economical downturn and there seems to be geographical shifts towards suppliers closer to the UK. In terms of people involved in sourcing materials there has not been much change except for one retailer where the teams now have frequent contact with a CSR team. In the 2008/9 studies, two of the respondents mentioned that there have been some changes in types of materials, for example one mentioned that they are trying more eco-fabrics such as bamboo, organic and fair-trade cotton. The other talked about how his company is starting to change their view of material selection. He commented that they are much more actively involved with looking at what raw materials are and where they are coming from and whether they can find better ways of sourcing in a more sustainable way. The rest of respondents focused more on price and geographical shift of their suppliers and that there is more growth in European supply. Most of them mentioned that recent progress in quality in Turkey and lower prices than in other European countries such as Italy means that there is more supply from Turkey. Improvements in quality fabrics, cheaper prices and geographical closeness to the UK makes Turkey attractive.

> '*No, I don't think so. I think there are more European suppliers because of costs in the world but no significant changes. There is a growth in European supply, because if you think about the exchange rate, the time it takes to get products from China, it is almost as easy and as cost effective to buy from Europe (Respondent A).*'

> '*Price I would say is probably the key thing. Turkey has got a much better handwriting now than it used to have for fabric qualities. Their prices are cheaper therefore we need to work less with areas like Italy. The quality of the goods that we can get from further abroad such as Far East has become much better and consequently prices*

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*have become keener. Prices are dropping but we have just come to
the credit crunch. In the last couple of years that is how I would say
it was changing but now we have come to the credit crunch, things
are becoming more difficult, the dollar, euro, so prices are rising
(Respondent B).'*

*'We are trying more eco-fabrics. For example, bamboo, organic
cotton and fair-trade cotton (Respondent C).'*

'Price increasingly important (Respondent D).'

*'…we are much more actively involved with looking at what raw
materials are and where they are coming from and can we find a
better way of sourcing them or a more sustainable route
(Respondent E).'*

It has been the same people such as the fabric sourcing team, designers, buyers,
merchandisers, technologists, managers and directors. They do not seem to have direct
involvement from CSR personnel in terms of materials selection. However, one of the
participating companies mentioned that they have a rather large team of 100
technologists and a CSR team of 50 people, and indicated that there are frequent
presentations and meetings about new developments to feed back to their fabric
sourcing team.

5.4.3.2.5 Retailers views on the current and future trends of PET use in fashion
In this section, retailer's reactions to alternative thinking and their views on future
developments in the clothing sector with regards to environmental issues and recycling
are discussed.

The participating retailers expressed their ideas towards the textile recycler's opinion
that the clothing industry should stick to natural fibres since synthetic fabrics and fabrics
with a mix containing synthetic fibres are no use to textile recyclers.

Respondent D pointed out that '*synthetic fibres have their place.*' And this view is
shared with respondent B, as she commented that blending synthetics increases the
fabric performance, durability and colour fastness. She had doubts as to how realistic it
is to stick to only natural fibres. Respondent A commented that, considering the large
volume of blended fabrics used this represents another challenge that needs to be
overcome. Respondent E pointed out the current shorfalls of the recycling system for
fabrics. For example, natural fibres such as cotton and wool are difficult to upcycle as

the more the fibres are pulled and torn apart, the weaker and shorter the fibres become quality degrades and they become too unstable for clothing applications. Furthermore, there is currently no technology available to extract each fibre from blended fabrics .In terms of designing garments the main focus should be on creating desirable and fit – for-purpose clothes for the consumer. Respondent C emphasised that they should produce garments that can sell, not garments that can be recycled.

> *'I think it is another challenge that we need to overcome. I don't think it can be ignored because there are a lot of blended fabrics. My view is that we need to overcome the challenge and find a way to do it (Respondent A).'*

> *'I think that by having the synthetic it makes the fabric perform better or last longer or take a colour better. I am not quite sure how much power the recyclers would actually have over a decision like that. It is a comment that they passed on but whether they can influence that….I have not seen it yet (Respondent B).'*

> *'We have to make what we can sell, not what we can recycle (Respondent C).'*

> *'From a technical point of view I think they are probably right. It is very difficult. One of the biggest difficulties you have with textiles is how do you take a textile, like a shirt or knitted top and break that down at the end of its life to be able to recycle it. If you have cotton, that is very difficult to recycle. Because the more you pull and tear the fabric apart, the weaker and shorter the fibres are going to be. And essentially what you are going to end up with is a very poor quality fibre that actually is not very good for clothing. If you then start throwing in mixes it is very difficult to extract one type of fibre from another type of fibre. The technology just is not available at the moment to do that. So that is a major difficulty. The problem is when you are actually talking about designing clothing to allow you to recycle it at a later date. You have to take into consideration that somebody has to buy the clothing in the first place. You have to make sure that the clothing is still attractive and is fit for purpose for the consumer, it is not just about being recyclable. Because you have something that is recyclable but that is not fit for purpose the consumer is not going to buy it anyway. So it is just going to sit in the stores and not go anywhere. It is all well and good for the recyclers to say please don't mix fibres, essentially you have to sell garments in the first place to then have something to recycle (Respondent E).'*

Slow fashion

Some of the respondents did not comment greatly as they considered their organisation as too contrary to slow fashion. Respondent B believes that whether garments will be worn longer or not is up to consumers as their company try to produce long lasting quality garments. One of the participants noted that they consider themselves more at the quality end of the market and have always been paying great attention to their products reputation for high quality. They also noted that they are aware of the demand for longer lasting quality garments which customers are prepared to pay a little extra money for.

> *'We do that here anyway. We spend a lot of time making sure our garments are right. Other retailers on the High Street maybe have a different customer base from ours, we have got customers who maybe expect different quality anyway and so all of our garments are built to the same standards, whether it is fast fashion or slow fashion. But there is an argument that says people want products to last longer, they want to buy it once, maybe pay a little bit more money and perhaps make them last much longer. ….we would be very different in our approach. We build product to last (Respondent A).'*

> *'I think within the high street there are various people that specifically work to a slow market, we try to produce a quality garment that will last anyway, irrelevant of whether they consider it to be a slow or not … so if our customer wants to wear it in five or six years that would possibly be more to do with their own taste, rather than whether the fabric or the garment works or not (Respondent B).'*

Future views

One of the companies indicated that they are committed to using recycled materials for their products in the future. The respondent was involved with the project that is aiming to use recycled PET fabrics in trousers and suits by 2012 and commented that the garments made of fabrics containing recycled PET will be in all the ranges. He continued that UK consumers have been more ready to buy recycled and environmentally friendly clothes in the last few years but they are not willing to pay extra for them. Therefore the most current issue is that the company is absorbing the cost of some products while for other products they are passing costs on to consumers. The same company are also starting to collect garments, a project that has not yet been publicised at the time of writing this report. The respondent displayed a detailed understanding of recycling garment issues, in particular with regards to issues around

blended fabrics, and remained positive about future technological developments in this area. He commented that in the current economic situation he cannot predict what will happen for recycled products but that they are continuing to use and sell them.

The rest of the participants do not appear to have any firm commitment to use recycled fabrics. Respondent C commented that they do not know what consumers will purchase before the point of purchase hence their current reactive market approach, buying small, with short lead times. Respondent B was concerned about prices rising in the future due to the credit crunch while respondent A thought that to observe what will happen to recycling in the current economic climate will be interesting.

5.4.3.2.6 Reaction towards currently available fabric samples

In this section, the informants' reaction towards currently available fabrics with recycled content are discussed.

Mitsubushi
No 8-10 Recycled polyester 100%, filament Ecoluna Y 50% / Ecoluna 50%

Respondent B and C felt that these fabrics are not for their companies. Both of them were not impressed with colour, textile design or handle and thought they were for lining fabrics.

Teijin
No 11 Eco Circle Fiber 100%, DWR / R48723
No 12 Eco Circle Fiber 75%, PTT 25%, DWR Cire / R46191
No 13 Eco Circle Fiber 83%, PTT175%, DWR Cire / D4635N
No 14 Eco Circle Fiber 100%, DWR Cire / EC4676
No 15 Eco Circle Fiber 100%, DWR / EC5006

Respondents A and C liked these fabrics and Respondent A knew the products already. Respondent B liked the quality of fabric and mentioned that they could be used for their casual wear section as a light weight jacket due to the polyester content. However, she noted that the weight and content of these types of fabrics, would be competing with similar fabrics from the Far East and hence pricing would play a big role.

[E3] ECOPET®EC100, 'Quick dry' T53117, Circular knitted Jersey, No twist, Printable, Smooth, Polyester 100, recycled rate 100%, Chemical Recycling, 'Fibre to Fibre'
[E4] ECOPET®EC100, 'Quick dry' RE5360, Circular knitted plain, No twist, Printable, Polyester 100, recycled rate 100%, Chemical Recycling, 'Fibre to Fibre'
[E5] ECOPET®EC100, 'Quick dry' RE5361, Circular knitted plain, Strong twist, Printable, Polyester 100, recycled rate 100%, Chemical Recycling, 'Fibre to Fibre'

Respondent C liked these fabrics, particularly the handle of fabric sample E3.
Respondent B commented on these fabrics as having a nice handle and that they could be used for their casual range. However, she noted that these types of fabrics are already sourced by their existing mills directly in the Far East or Turkey.

Kurabo
No 16 AFTER PET 50% Polyester, 50% Cotton
No 17 AFTER PET 65% Polyester, 35% Cotton

Respondent A commented on these fabrics as feeling too synthetic which their customers do not appreciate.
Respondent B was not impressed at all with these fabrics. She did not like the handle of these fabrics and pointed out that these types of fabrics with a high polyester content are for an older age group market.
No 18 GREEN PET 48-9% Polyester, 48% Cotton, 3-4% Bamboo

Respondent B commented that due to the bamboo content it has a nice handle but it looks very classic.

No 19 BIONATURE 50% Polyester, 50% Cotton
No 20 BIONATURE 50% Polyester, 50% Cotton

Respondent B liked the handle of the fabric (see Appendix 5.5).

No 21 RETURN COTTON 99% Cotton, 1% Polyurethane / ST2709
No 22 RETURN COTTON 100% Cotton / HP1075

Respondent B preferred these samples. She described these fabrics as 'more casual' and more suitable for their products, and that it would be interesting to look into the possibility of using these fabrics.

Toray
No 23 Recycle Nylon Recyclon, Nylon 100% (59% Recycled) / NR6723DWR
No 24 Recycle Nylon Recyclon, Nylon 100% (47% Recycled) / NR5386BRT
No 25 Recycle Nylon Recyclon, Nylon 100% (58% Recycled) / NR6721DWR
No 26 Recycle Nylon Recyclon, Nylon 100% (53% Recycled) / NR6722S

Respondent C liked fabric sample No.23 but was not impressed with No.26.
Respondent B asked if they were selling the fabrics as is, because she felt that these fabrics needed a finishing such as a wash.

Retailer's reactions

Generally the respondents did not like the feel of the synthetic handle, and there were objections towards the high content of polyester in the fabrics. Respondent A thought that people do not like buying polyester fabrics. Respondent E also mentioned that usually men do not buy polyester shirts and there are no polyester fabrics with a cotton feel handle. Respondent A advised that synthetic fabrics need to be 'soft', 'drapey' and 'very fluid' so that their feel is just like that of cotton fabrics. He noted that *'synthetic fabrics have to feel a certain way and have to look a certain way.'* His comment on fleece fabric was that it is an exceptional fabric and that although it is 100% polyester it feels soft and light.

The price of recycled fabrics seems to be acceptable if it does not exceed more than 10 to 20% of the equivalent conventional fabric price.

5.4.3.3. Summary

The aims of carrying out the industry surveys with UK high street clothing retailers was to identify the barriers and drivers to use recycled synthetic materials, their strategy to select materials, attitudes of fabric sourcing personnel towards recycled synthetic fabrics, the recent changes in terms of sourcing materials and their future visions. The industry survey results satisfied the aims successfully and the outcomes are discussed in this section.

The industry surveys carried out in 2005/6 and 2008/9 are compared and the changes occurring between two studies are also discussed.

The most significant change in the last three years is that the UK clothing industry is actually using recycled fabrics or have been using them very recently. In particular one retailer's commitment to use recycled fabrics is noteworthy. What is more, they are starting to acknowledge the importance they play in implementing environmental behaviour rather than merely reacting to consumer pressure. The strategy to source fabrics and to develop products has not been changed apart from one retailer mentioning that their future sourcing would focus more on sustainable practice.

• Fabric sourcing teams are responsible for sourcing fabrics for their companies and fabric sourcing managers often hold textile technologist background and work closely with designers, buyers and manufacturers. One company holds a specialists group who are dedicated to sourcing sustainable products and providing information for fabric sourcing teams. They source fabrics by travelling, visiting textile fairs in Paris, from

existing UK agents and mills worldwide. Except for one company that has their own sourcing company, they are flexible enough to source fabrics either through agents or directly from mills, depending on what they are after each season. However, they intend to keep existing agents and mills as they already have an understanding of their needs and consequently they are easier to work with. They develop their own fabrics with existing mills based on previous successful orders, but it does not happen as frequently as they want to due to requirement of a longer time scale.

Priorities for selecting materials are 'Fabric Quality', 'Seasonal', 'Textile Design' and 'Stock Availability', closely followed by 'Price', 'Consumer Demand' and 'General Trend'. It seems that all factors are more or less important and they are closely interlinked to each other.

• Product development and materials selection are carried out through teamwork by fabric sourcing personnel, designers, buyers, technologists, merchandisers and for some companies, directors. The dynamics of the teams change depending upon each stage of product development but critical decisions are always made jointly at numerous meetings in order to minimise risk.

• 'The recognised barriers to the use of recycled materials are high cost, availability and under developed fabrics. 'Company Decision' followed by 'Future legislation' are the important drivers for UK clothing high street retailers to use recycled materials. They have recognised that UK consumers are more ready than they were a couple of years ago but are unwilling to pay extra. The retailers are quite positive about using recycled materials and in fact they have used them recently or are using eco fabrics for their products including recycled PET fabrics, organic cotton, recycled cotton and recycled wool. However, none of them seem to achieve great sales due to higher prices or in some cases lesser quality.

• Only one retailer seem to have a clear direction in terms of use of recycled materials for their garments as they showed a clear commitment to continue and expand the range that used recycled materials in the future. They also revealed their new recycling garments project and demonstrated an understanding of alternative slow fashion ideas. However, uncertainty about the future is evident due to the current economic downturn and they are particularly concerned about fabric costs increasing.

• UK high street clothing retailers are not impressed with currently available recycled synthetic fabrics. They could see some of the fabrics being used for their products, but those fabrics are so plain that the price would be the key issue. There were objections to what was described as the synthetic feel of the fabrics, although these were not directly related to the amount of synthetic content in the fabric but rather the finishing and design of the fabrics. The synthetic feel was rated higher in some natural blended fabrics than in 100% synthetic fabrics. The handle of recycled synthetic fabrics needs to improve to feel more 'soft', 'drapey' and 'very fluid' just like a 'cotton fabric handle' in order to expand the market into general clothes and high street markets.

In the next section, the limitations of the industry survey, and cross analyses are discussed.

5.5 Limitations

The nature of qualitative research limits itself to small-scale studies as it involves in-depth study and analysis (see Chapter Three, Section 3.3.1). The selection of the methods (face-to-face interview, document analysis and direct observations including fabric handling and company visits) used were most suited for the purposes of the study as the research topics were sensitive and complex, and therefore the study could not be carried out with other data collection methods such as a postal survey. The detailed discussions about the industry survey methodology is stated in Chapter Three, Section 3.6.2.

In this study, the number of participating companies and informants was small due to limitations of time and resources. However, it covered major UK high street retailers of various types in terms of size, target market and their interest towards environmental issues (see Chapter Three, Section 3.6.2.3/Appendix 3.1). That makes this study particularly trustworthy as it enables a cross analysis of different cases. The data were collected and analysed carefully to increase the validity and reliability of this study (see Chapter Three, Section 3.6.2.7).

In the next section, industry surveys with Japanese recycled fibre and fabric manufacturers, UK high street clothing retailers and the comparisons of the two studies (2005/6 and 2008/9) with UK clothing companies are cross analysed and results are discussed.

5.6 Cross analysis and conclusion of the industry surveys

The outcomes of the cross analysis of the industry surveys are discussed in this section. The drivers and barriers for use of recycled synthetic fabrics for recycled fibre manufacturers and UK high street clothing retailers are identified.

Alternative biodegradable polyester PLA (Ingeo)

Drivers

• It is worthwhile to develop effective and sustainable ways of using recycled polyester fabrics as alternative materials such as PLA derived from corn needs further development (low melting point and dyeability) for the use of clothing applications. PLA (Ingeo) may become one of the core materials for polyester production along with recycled and virgin polyester if existing current issues are resolved. However, the industry surveys revealed that replacing current demand for synthetic polyester with PLA is likely to be impossible.

Use of closed loop recycling

Drivers

• Garments recycling; 'fibre-to-fibre' technology is available and some companies have produced new garments using this technology already for the mass market. Furthermore, recycled fibre manufacturers in Japan have enthusiasm for further development of garment recycling technology. They are open to long-term relationships with retailers for joint developments and are already doing that in some cases. Long-term makes it possible to invest into future development.

• Closed loop recycling systems should be used for high volume clothing markets as a part of the solution, consultants in the field of sustainable fashion believe. There are also strong initiatives from the UK government to focus on end of life management of clothing through DEFRA 's projects such as the 'sustainable clothing road map', 'the corporate wear reuse project' and the recently launched 'sustainable clothing action plan (SCAP)'.

Barriers

• Current garment recycling technology has its limitations. It can effectively recycle 80 to 100% polyester garments without wool, acrylic and polyurethane content. Currently only the polyester part of the garment can be recycled whereas the other blended material is discarded as industrial waste.

•Collecting and sorting used garments is not done on a large scale and is currently only done by a small number of clothing companies and producers that are collecting their own products.

• Differences in opinions are evident with regards to blended fabrics.
UK textile recyclers want the clothing industry to use only natural fibres as synthetic and synthetic blended fabrics are no use to them, and believe it is irresponsible not to put the infrastructure and technology in place so that synthetic fabrics can be reused.
The sustainable technology expert urges clothing producers to increase recyclability of their products as well as educating themselves about the complexity of blended fabrics.
The recycled fibre manufacturers and the high street clothing retailers believe that polyester holds and important place and it is impossible to use only natural fibres.
Blending synthetic fibre also improves fabric performance and their priority as a business is to produce with selling in mind, not recycling.

Quality of recycled polyester fabrics
Drivers
• There is no longer a quality difference between recycled and virgin polyester any more due to chemical recycling systems that involve returning PET products chemically at the molecule level into raw polyester materials and fibre. Therefore, it is now possible to produce any types of polyester fabric from recycled polyester with the same ability to add functionality as with virgin polyester. What is more, polyester can be recycled endlessly.

Barriers
• Negative perception is created by low quality recycled polyester fabrics.
There are low quality recycled polyester products as well as falsely claimed recycled fabrics in the market that lead clothing retailers to be sceptical about using recycled fabrics. The recycled fibre manufacturers explain that quality will degrade eventually using materials recycling systems and they pay particular attention to obtaining high grade flakes from post consumer PET bottles. Currently synthetic fabrics are largely sourced from Asia due to the price which makes quality control and verification of eco-claims even more difficult. The recycled fibre manufacturers that produce low quality recycled polyester fabrics are damaging the future market.

• Some of the UK retailers think that recycled materials are for niche markets only. Recent trials using recycled materials in their products did not achieve great sales and the retailers are pointing out that one of the reasons is lesser quality (dyeability).

Cost of recycled synthetic fabrics
Drivers
• A 10 to 20% higher price for recycled fabrics seems to be acceptable.
The recycled fibre and fabrics manufacturers are making efforts to reduce the cost by mixing recycled and virgin yarn.

• The price of recycled polyester may come down due to the slump in the Chinese market for post consumer PET bottles.
In 2007-8 high oil prices made the Chinese industry purchase vast amounts of post consumer PET bottles which pushed the price for used bottles up. However, the recent recession made the Chinese industry slow down resulting in a dramatic drop in prices. Hence, this price drop in raw materials will affect the price of recycled polyester yarn.
Barriers
• Recycled synthetic fabrics are more expensive than the equivalent non recycled fabrics.
The manufacturers pointed out that their fabrics are 10 to 50% higher than their non-recycled equivalent. The retailers confirmed that recycled polyester yarn is currently 40-50% more expensive and that although UK consumers are more ready for eco-fabrics they would not pay more for them.
Although current indications are that prices for recycled materials will come down due to a drop in demand for recycled PET and oil prices, the price for virgin polyester will equally come down and the current economic downturn worldwide will most likely lead to increased competition affecting prices further.

Desirability of recycled polyester fabrics
Drivers
• The flexibility of polyester could be key. The recycled fibre and fabric manufacturers commented that polyester's popularity is based on its easy to treat character. It means that it could be possible to achieve a comparative hand feel to cotton fabric - 'soft', 'drapey' and 'very fluid' - which is desired by UK clothing retailers. The sustainable fashion consultant recognises its popularity and the potential for a high aesthetic

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standard of recycled polyester fabrics to expand into wider fashion markets, and considers that there is no stigma attached to polyester fabrics.

• There is high interest from both the manufacturers and the clothing retailers. The manufacturers want to expand their market into the fashion and general clothing arenas and the clothing retailers are keen to use more eco-fabrics. The clothing retailers are open to sourcing fabrics from anyone as long as they offer what the retailers expect in terms of quality. This also depends upon the recycled fibre and fabric manufacturers dealing with the faster cycle of the fashion market. In fact, they are already doing business with a few fashion and general clothing companies.

• Availability of raw materials is stable enough to supply the mass market. There is no need for false claims as there will be plenty of post consumer PET bottles available at reasonable prices due to the lower demand for PET bottles during the current economic downturn. The manufacturers are also expecting to collect more used garments.

Barriers
• Currently available recycled synthetic fabrics need to improve their fabric handle and textile design. The UK high street clothing retailers seem not like the feel of the synthetic handle and they are not impressed with a high polyester content fabric. The retailers believe that consumers do not like purchasing polyester fabrics. Currently available recycled synthetic fabrics are designed for uniforms and sports apparel markets as these are the manufacturer's current main target markets. It is necessary for the manufacturers to produce high content recycled polyester fabric as the uniform market wants fabrics with an eco-mark that applies to fabrics with more than 50% recycled material content. Furthermore, the manufacturers themselves set the limit for fabric content for garment recycling that is more than 80% polyester content, preferably closer to 100% polyester garments. Hence, it is expected they will produce high content polyester fabrics in the first place if they want to push the idea of a closed loop recycling system.

• Environmental credentials are not a high priority when selecting fabrics. The recycled fibre and fabrics manufacturers pointed out that fashionability, touch, feel, colour and quality are the important drivers for fashion markets, not environmental concerns. Indeed, UK high street clothing retailers acknowledged the fact that their priorities are price, quality, trend and textile design and these factors cannot be ignored for the sake

of environmental benefits. They consider that using recycled materials is not a big selling feature.

• There is a lack of understanding of the UK high street market from the Japanese recycled fibre and fabric manufacturers. They do not have in-depth understanding of the UK high street clothing retailers' requirement for their fabrics. This is evident in their presentation of their products. Samples for example are not treated (unwashed fabrics straight from the mill have a rough feel). This is most likely due to the fact that they are used to selling on environmental credentials in Japan due to current legislation that favours recycled fabrics for use in corporate wear. The clothing retailer believes that Turkish fabric suppliers are gaining ground in the UK clothing retail markets due to their increased understanding of their preferred style and design of fabrics. The quality of Turkish fabric has improved in recent years and their price is more attractive than other European countries such as Italy. The UK clothing retailers pointed out that geographical closeness makes communication more effective.

Company environmental commitment
Drivers
• The Japanese recycled fibre and fabric manufacturers' environmental commitments are strong. They all have a strong company policy to commit to environmental issues but yet the environmental section of their business is profit motivated.

• Positive changes in UK retailer thinking. The results revealed that 'Company Decision' is the most important driver for UK clothing retailers to use recycled materials followed by 'Future Legislation', while it was 'Consumer Pressure' three years ago followed by again 'Future Legislation'. These results suggest the changes in their thinking. The clothing retailers are now thinking it is up to them to decide whether they use recycled materials or not, rather than requiring consumer pressure to change their practices as it was three years ago.

• There is a leading figure in the market the other companies could learn from. The UK clothing industry shows clear indications of their commitment towards environmental and ethical issues, although the level of commitment varies from company to company. One of the retailers shows their strong commitment through clear targets to achieve sustainable business practice and are joining in garment recycling projects. Their move

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influences the rest of the clothing retailers' thinking and can be a trigger to take action as they are the current centre of the attention.

Barriers

• Less action is observed. The UK clothing retailers publish CSR reports and their initiatives towards environment and ethical issues on their website. However, this study revealed that less action and enthusiasm really exists in practice except for one retailer in terms of using recycled fabrics. Furthermore, their materials selection processes have not been changed in last three years in terms of changing towards more sustainable practices and there is no evidence of CSR personnel's involvement except one retailer.

As this study already suggested, more direction and commitment from the top of the companies may be needed in order to influence the materials selection process.

<u>**Future views**</u>

Due to the current economic downturn, there is uncertainty how the clothing market will shift in the near future. The sustainable technology consultant and the recycled fibre and fabric manufacturers consider whether or not consumers will buy cheaper or more expensive clothes, or a few garments with high quality, is for consumers to decide; in other words, they do not know. However, the sustainable technology consultant is almost certain that high street fast fashion retailers will not take up the slow fashion idea. Indeed, some of the clothing retailers that consider themselves as a fast fashion retailer have not much to say about slow fashion and commented that it is up to consumers to wear clothes longer or not. This indicates an unwillingness to take responsibility, similar to that highlighted in the 2005/06 study with regards to using environmentally friendly materials where the decision making was attributed to the consumer rather than the company.

The sustainable fashion consultant believes that this recession is a good opportunity for consumption driven retailers to reconsider how they do business and possibly changing towards sustainable business, as has been happening in some of the leading clothing retailers already. In fact, one of the participating retailers noted that they see themselves more at the quality end of the market as their products have a reputation for high quality. They also showed high interest towards the recycled fabric market in relation to this recession.

The Japanese recycled fibre and fabric manufacturers have positive perspectives for recycled fabrics regardless of the current economic downturn.

They believe fabrics with environmental credentials will be vital and will be expanding to fashion and general clothing markets in the future as there are increasing interests from these markets and some of the leading companies are already using them.

The manufacturers pointed out that the recycled fabric business is at the very beginning as they are not widely used yet and they believe a key to success is a long term commitment from the clothing retailers to use recycled fabrics. In order to have a long term business strategy to use recycled fabrics, there should be a strong demand from consumers otherwise it will not go any further. One of the manufacturers believes that consumer demand is critical and it is necessary to raise awareness among consumers to create a need for recycled fabrics, and by doing so the demand will expand to the fashion and general clothing markets.

Conclusion

Recycling technology has developed significantly and high advanced chemical recycling technology has pushed recycling a step further by demolishing the quality issue completely. It is only a matter of time before recycled polyester fabric will expand to other markets to replace virgin polyester, if the price will come down to the market acceptance level.

However, this technological development also brought another new challenge to the Japanese recycled fibre manufacturers which is garment recycling.

This study identified various issues such as blended fabrics and the collecting and sorting of used garments. In order to expand garment recycling into wider products than the current limited array, these issues need to be overcome.

It seems that future technological developments may offer a solution through developing technology to separate blended fabrics without creating industrial waste or improving synthetic fabric handle to better imitate the one of cotton so that fabrics could contain higher percentages of polyester fibre. The study revealed that the UK high street clothing retailers will not stop using blended fabric unless there is an alternative with similar performance characteristics.

There is also a need to improve textile design, feel and colour as these factors are the priority of buyers, rather than environmental credentials, in the fashion market. Currently available recycled synthetic fabrics are produced for sports apparel and uniform markets, hence they cannot convince high street clothing retailers. The study has shown that the manufacturers do not have a sufficient understanding of the selection criteria used by the fashion markets and might not present their materials most advantageously. However, they are manageable issues that can be overcome

easily by the manufacturers once they will start to target fashion and general clothing markets more consistently.

The UK high street clothing retailers have knowledge about environmental issues and sustainability within the clothing sector. However, there is little evidence that they are taking drastic action (except for one retailer) to improve the situation apart from ethical issues which are treated more seriously. The high street clothing retailers may need government legislation for them to take further steps to use recycled fabrics for their products as there is evidence that they may have developed a scepticism that could put them off environmentally products over false claims of recycled fabrics and its quality through their recent trials.

The Japanese recycled fibre and fabrics manufacturers need to differentiate their high quality recycled fabrics from other lesser quality recycled fabrics as it may harm their potential market by giving false perceptions that recycled is of lesser quality similar to what happened at the beginning of the nineties (see Chapter Two). They will have to promote the differences to the UK high street clothing retailers as lesser quality recycled fabrics recently have put off UK clothing retailers from using recycled fabric.

The industry surveys revealed that the idea of slow fashion has not penetrated the recycled fibre and fabric manufacturers or UK high street clothing retailers yet. With economic slowdown, consumption will also slow down, perhaps favouring the slow fashion movement. However, this situation is somewhat forced and once there ceases to be any restrictions on buying slow consumption may lose its appeal. However, it is certain that this current economic downturn will provide UK consumers as well as high street clothing retailers with an opportunity to revaluate their daily practice.

In the next chapter, the findings from the literature review, public survey and industry surveys are discussed to draw the conclusion of the research. Future recommendations to the recycled fibre and fabric manufacturers and the UK high street clothing industry to extend the use of recycled synthetic fabrics and suggestions for further research are stated.

6

CHAPTER SIX

CONCLUSIONS and RECOMMENDATIONS

6.1 Introduction

This chapter outlines the conclusion of this research project, provides a discussion of the research findings and sets out the contribution to knowledge. Recommendations and suggestions for further research intended to be of particular relevance to recycled fibre and fabric manufacturers and clothing retailers are provided. The limitations of this research project are also described.

6.2 Discussions and correlation of findings

The aims of the research were to investigate the key drivers and barriers for using recycled synthetic material in the clothing industry through obtaining consumer and retailer viewpoints and to provide recommendations for companies to encourage the wider use of recycled materials for their products.

There are other studies in the area of sustainable clothing. The most recognised studies are the ones carried out by Kate Fletcher (see section 2.3.3) and also by DEFRA (see section 2.3.2). Fletcher's work is more focused on people's perception in changing how they consume clothes whereas DEFRA's work, while similar, concentrates more on the whole lifecycle of clothes. This study covers similar categories but is differentiated through its focus on a particular material (recycled synthetic) and a specific stage of product development (material selection).

The high street clothing retailers and consumers in the UK are aware of the need to act to reduce their environmental impact and attempts towards more sustainable production are evident, though far from being adopted on a large scale or in the mass market. The purpose of this research is to contribute to the process of encouraging a more widespread awareness and use of recycled synthetic fabric into the general clothing market by demonstrating the commercial possibilities to help recycled fibre and fabrics manufacturers to produce fabrics that are better suited for the fashion market leading to wider use of the recycled materials. Furthermore, it should encourage UK high street clothing retailers to address the perceived barriers to using recycled synthetic materials.

The research has focused on the 'materials selection' process (see Chapter Two, section 2.3.3.1), which has been identified as the vital first step for developing sustainable products. The study was exploratory in nature, employing a literature review, street survey and industry surveys (including document analysis, semi-structured interviews and direct observation).

The main discussions and correlation of findings are outlined below.

Technical developments in polyester recycling technology

Recent developments in polyester recycling technology by Japanese companies which allow closed loop recycling of PET without loss of quality means that it is technically possible to implement a cradle-to-cradle model within synthetic fibre manufacture and clothing production without loss of valuable resources (see Chapter Two, section 2.2.1.2). The recycled fibre and fabric manufacturers stated that they are at a starting point. Their enthusiasm to expand the recycled synthetic fabric markets is an indication that they recognize the general and fashion markets as viable markets for product expansion and that it will be possible to produce fabrics with recycled content that general and fashion markets will readily use for their products. Chemical recycling is particularly suited for use by the fashion industry as it has the potential to deliver the qualities expected by this market as well as allowing fibre-to-fibre recycling.

Furthermore, interviews with these companies revealed that there is a strong drive and optimism to push these new technologies which currently are being exploited in niche markets into general clothing markets. The companies interviewed were actively looking for long-term partners to develop the technology and fabrics further and to expand the use of their products (see Chapter Five, section 5.4.2.2.5).

The need to improve desirability of recycled fabrics: colour, design and tactile quality

The research outcomes strongly suggest that improvements in colour, design and tactile qualities of recycled fabrics are vital in order for them to be used in general and fashion markets. Price is currently an issue but that is partly due to the fact that recycled materials are only used in small quantities. Increased production volume in this market would reduce prices and with improvements in design and colour the products could be sold easily alongside non-recycled clothes.

The comparison of the two surveys also revealed that people purchase clothes based on 'Colour' and 'Design' followed by 'Quality' but not environmental concern, regardless of their awareness of environmental issues (see Chapter Four, section 4.4.2.3). The survey outcomes clearly suggest that the key purchasing decisions are independent of public awareness of environmental issues, and even when the general

public become more aware, their key drivers for purchasing clothes are not notably affected. This suggests that the clothing industry should sell clothes with recycled content in exactly the same way as it would sell clothes without any environmental benefits, on design style and at the right price for the right market. Furthermore the survey revealed that 'value for money' is not the highest priority when people shop (see Chapter Four, section 4.4.2.3) and that there might be an acceptable price increase if all of the other criteria are satisfied.

The industry surveys revealed that UK high street retailers are not satisfied with currently available fabrics with recycled content in terms of fabric design and cost (see Chapter Five, section 5.4.3.2.6).

If the fabric is very simple and has synthetic content, price alone will be the decision making factor and on that the Japanese recycled fibre and fabric producers cannot compete.

For Japanese recycled fibre and fabric manufacturers, it is vital to develop products which have added value as they cannot compete on price with other Asian competitors. Therefore, there may be potential to move manufacturing plants where they could reduce the labour cost and also understand desirable fabric design. There are clear indications that if they develop desirable fabrics for general and fashion clothes markets there are opportunities for them to gain worldwide markets, since not many producers can offer closed loop model recycling and recycling without loss of quality (see Chapter Five, section 5.4.2.2.2). Indeed quality is currently one of the biggest objections retailers have towards using recycled fibre.

Currently the prime markets for recycled fabrics are the sports apparel and uniform markets. Available fabrics designed with these markets in mind are in some cases too simple or too raw (without finishing) to be used for the general and fashion markets.

Some of the retailers suggested that they avoid fabrics with a synthetic feel (see Chapter Five, section 5.4.3.2.6). A closer look at their comments with regard to currently available fabrics during the industry surveys revealed that they are trying to avoid a synthetic look and feel but that this is not necessarily always directly linked to the actual content of the fabric. For example, certain cotton blended fabrics were rejected because of their synthetic feel while other 100% synthetic fabrics were rated quite highly. This clearly suggests that synthetic content in itself is not necessarily a barrier as long as the fabrics are of a high quality.

Clearly tactile quality is an important deciding factor and retailers were keen to point out that there is a real lack of understanding from the fabric producer side in terms of what the retailers want, and there is a need to improve communications in order to develop desirable fabrics with recycled content. The industry surveys showed that the retailers clearly favoured fabrics produced by companies involved with chemical recycling (see Chapter Five, section 5.4.3.2.6). It is also these companies that are most confident about entering the general clothing and fashion markets. In fact some of the recycled synthetic manufacturers are already working on developing fabrics for general and fashion clothes markets.

However, in order to produce fabrics specifically developed to satisfy the fashion market they need long-term commitments from the retailers. Currently short lead-times and small volume demand from the fashion market (see Chapter Five, section 5.4.3.2.1) means it is difficult for recycled fibre manufacturers to offer a quality product at an acceptable price.

Barriers for garments recycling

Garments (fibre-to-fibre) recycling became possible due to the advanced chemical recycling systems introduced by Teijin, using chemical recycling technology. This technology has been used by Patagonia in its 'Common Threads Garment Recycling' project, which has resulted in new garment production. This is the ultimate cradle-to-cradle approach as the used garments can be recycled endlessly and stay in the industrial loop forever.

However, this research revealed that the high street retail production is driven by what will sell, not what will be recycled; this is unlike the sports apparel companies carrying out garment recycling, where recyclability is incorporated into the initial stage of garment design.

In order to establish garment recycling in general and fashion clothing markets, there is another huge challenge: how to deal with blended fabrics. McDonough and Braungart (2002) state that blended fabrics are a 'monstrous hybrid' yet they also acknowledged the fact that it is not realistic to go back to only natural fibres (see Chapter Two, section 2.2.). By contrast the high street retailers dislike highly synthetic fabrics and see the benefit of blending synthetic and natural fibres as they become cheaper and more durable (see Chapter Five, section 5.4.3.2.5). However, recycling blended fabric prevent an effective polyester recycling.

This study revealed that current garment recycling takes more than 80 per cent of polyester content, though 100 per cent would be preferable. The recycled fibre manufacturers explained that technically they could work with 50 per cent polyester content fabric, but it is not an ideal recycling situation as it would use more energy and create more industrial waste (see Chapter Five, section 5.4.2.2.2).

Readiness of UK consumers for clothes with recycled content

The literature review, street surveys and industry surveys revealed that the general public are keener on eco-clothes now than at the beginning of the millennium. Although retailers have started to react to this increased public confidence in eco-clothes, the developments lack momentum. The survey results revealed that the retailers acknowledged the fact that a company decision to use recycled materials is the vital driver and realise that the responsibility lies with them rather than the public.

The interviews revealed that the UK general public are more ready for clothes with recycled content now but are not on the whole willing to pay extra (see Chapter Five, section 5.4.3.2.5). The survey revealed that more than half of the respondents think that the price should be the same, 20% would pay up to 10% more but less than 10% are willing to pay up to 20% more than for the non-recycled equivalent. The survey revealed that only a small proportion of the market currently consists of committed consumers who pay more than a 20% premium (see Chapter Four, section 4.4.2.1) and the majority of high street retailers consider that recycled clothes are for this niche market.

While retailers are right in identifying the existence of a niche market for these type of garments, they have clearly failed to market their products with recycled content to this niche – which the street survey indicates may consist of consumers who are prepared to pay more (even up to 20% more). However, the survey revealed that consumers are by and large not aware of clothes with recycled content, so they are not consciously avoiding such clothes. 90 per cent did not know any companies that produce clothes with recycled content. Furthermore, 73 per cent do not know if they have bought clothes with recycled materials (see Chapter Four, section 4.4.2.2).
The interview revealed that even one of the retailers thought it was difficult to spot their eco-clothes in the shops (see Appendix 5.4).

Increased drive to use recycled fabrics but not yet firmly established

There has been an increase in the use of recycled fabrics by UK high street retailers who have been trialling these fabrics with varying degrees of success. Clothing retailers conclude that eco-clothes are only for niche markets because their recent trials with eco-fabrics have not been a great success. They believe that the high prices and low quality of some of the recycled cotton products are the reason for this (see Chapter Five, section 5.4.3.2.3).

Although only one of the companies interviewed expressed a sustained commitment towards increasing the range of clothes with recycled content they offer, the industry survey revealed that UK high street retailers no longer see environmentally responsible behaviour as solely a consumer responsibility and are considering recycled fabrics for their products (see Chapter Five, section 5.4.3.2.3).

Barriers for sourcing recycled synthetic materials

In terms of sourcing recycled fabrics, this study revealed two major barriers: high cost and lack of communication (Chapter Five, sections 5.4.3.2.3/6).

In terms of cost, it is impossible for recycled fabrics producers in Japan to compete on price alone due to high labour costs in comparison to their competitor countries. It may be necessary for Japanese manufacturers to relocate to other parts of the world in order to reduce production costs and increase their competitiveness in the market. The surveys indicate that retailers are willing to accept cost increases of up to 20% but are not able to extend beyond that. Collecting and sorting costs for the raw materials will not fluctuate with oil prices. In terms of lack of communication, longer distances make direct communication less frequent and may lead to misunderstandings.
The research revealed that UK high street retailers are open and flexible in terms of sourcing fabrics as long as their sourcing criteria are satisfied (see Chapter Five, section 5.4.3.2.1). In other words, they are eager to obtain the best possible fabrics for their products in terms of cost, fabric design and tactile qualities.

Designers' roles are often discussed in terms of selecting materials and designing garments, but the personnel who are responsible for material sourcing often have a

textile technology, rather than a design, background. The industry surveys and the literature review both indicate that there is a need to educate designers with regard to developing more sustainable clothes (see Chapter Two, section 2.3.3.1, Chapter Five, section 5.4.1). However the focus of this should be widened to target all staff involved in product development. In the case of one company in particular this already happens. Specialist knowledge with regards to CSR is fed directly into these teams by a dedicated CSR team which in effect then becomes part of the sourcing and product development and have a real impact.

However this is an isolated case as the outcomes of the industry surveys revealed that just one of the participating clothing retailers is driven by environmental concerns when sourcing materials, while others are not focused on incorporating eco-design into their product development (Chapter Five, section 5.4.3.2.3/4). The industry surveys also evidenced that their materials sourcing practice has not changed in the last four years in terms of who is involved in the process (Chapter Five, section 5.4.3.2.4).
What is more, each company seems to have a different sourcing strategy to secure their materials or products. Some companies have their own sourcing company exclusively dealing with their sourcing. In this case it may be comparatively easy to follow the company's decision making process and if and when they decide to use recycled materials. It also makes it easy to determine the origin of the chosen materials and to influence company policy. However, the industry surveys also revealed that it proves more difficult for the companies that buy products directly from the clothing manufacturers as a finished garment to influence and oversee the sourcing, as the retailers have little or no involvement until the garments are ready to be sold.

Clothing retailers, particularly during the current economic downturn, are keen to base any new material sourcing practices on cost savings. They are going through radical changes, such as sourcing from Europe, switching from air freight to sea freight, and using more aerodynamic, energy saving vehicles (Chapter Two, section 2.3.2). The participating informants believe that company decision-making is the key driver to changing materials sourcing practices (Chapter Five, section 5.4.3.2.3).

Implementing sustainable sourcing practices needs reliable information and knowledge to support them. Therefore indicating clearly the company direction to all who are involved in sourcing and developing products, and supplying those personnel with

simple, clear and reliable information that encourages them to source eco-fabrics is essential.

Opportunity to convert existing waste to high quality raw recycled synthetic material to be used in high street clothing in the UK

This study focused on high quality synthetic materials that end up in landfills and incinerators as high volume waste: namely plastic PET bottles and polyester garments. The study revealed that there are no end markets for both plastic bottles and clothes with synthetic fibre content nationally, as plastic bottles waste has largely been exported for recycling and synthetic fabrics cannot even be exported for reuse or recycling. Instead they end up in landfills or incinerators (see Chapter One, section 1.2.4).

If high street clothing retailers take up this high quality raw material, significant environmental benefit could be achieved due to their high turnover of garments. Furthermore, if recycled synthetic materials are used in the women's19 to 25 years old market, the most significant environmental benefit will be achieved as the survey revealed that this market consume the greatest volume of clothes (see Chapter Four, section 4.4.2.3). Based on the LCA analysis and in relation to the garment types discussed in the literature review (see Chapter Two, section 2.3.3), the clothes consumed by this group have the highest manufacturing impact as they are less frequently worn and washed before being thrown away.

Sustainable research and retailer initiatives underway

Numerous initiatives are underway to reduce waste going to landfills and to make fashion cycles more sustainable, for example 'Waste Strategy', DEFRA's 'Sustainable Clothing Roadmap Project' and 'Sustainable Clothing Action Plan (SCAP). Major UK clothing retailers such as Marks & Spencer, Arcadia Group, Tesco and Sainsbury's are participating in these projects (see Chapter Two, section 2.3) which in itself might serve as proof of good intentions. However, companies need to implement action plans to actually move into sustainable product development.

Breaking everyday routines and business practices to implement new ways of sustainable thinking is not an easy task and takes considerable time and effort.

Companies that choose to react to consumer demand and provide desirable products with added environmental credentials would most likely gain support and trust from the general public, and they would be the first ones to take a share of the consumer market for such products.

Other possibilities for sustainable clothes development

This research focused on recycled synthetic materials but it is not suggesting that this is the only way to produce sustainable clothes. Instead it is proposed as a part of the solution. There are numerous other possible solutions available, two of which were discussed briefly; biodegradable polyester derived from renewable resources and slow fashion that proposes less buying and more expensive quality garments. It is important to acknowledge the complexity of sustainability within the clothing industry, taking into account various different markets, age groups, purchasing behaviours, product lifecycles and numerous other factors before rushing into embracing one cure for all.

Biodegradable polyester

Using biodegradable polyester derived from plants has numerous benefits. It is a renewable resource unlike crude oil and it needs less energy for the fibre production in comparison to the polyester produced from oil. Furthermore, it has been popular among scholars and is often recommended as the future alternative material replacing non-renewable synthetic polyester (see Chapter Two, section 2.2.1.1). The producers of this material are working on improvements to material performance such as melting point and dyeability so it can be more effectively used for clothing applications (see Chapter Five, section 5.4.1).

It seems that this material could offer everything to sustainable clothes production. However, this research revealed a gap in understanding the viability of this particular material between scholars and fibre producers. The existing literature focused on GM and land availability issues as well as the need of certain conditions for PLA to biodegrade (most likely in the form of a facility). On the other hand, fibre producers are more concerned about its production capacity as its current production is only a fraction of synthetic polyester. The producer listed low melting point, dyeability and cost as issues preventing it from being used widely for clothing applications (see Chapter Two, section 2.2.1.1 and Chapter Five, section 5.4.1).

This particular material is a good example of how complicated it is to assess the overall suitability of materials for eco-clothes production and how easy it often is to jump to hasty conclusions.

<u>Slow fashion</u>

This study reveals that the idea of slow fashion is a more promising way forward for sustainability (Chapter Two, section 2.3.3). Indeed, wearing clothes until they fray and enjoying quality garments for a longer period of time are the most sustainable options. But while this slow fashion concept might have been put into practice by a small number of dedicated individuals, there is no concrete evidence that the UK high street clothing retailers are incorporating this idea into their product development practices.

Pursuing slow fashion means reduced production at higher cost which raises questions of job losses as well as how to convince consumers to accept higher prices and consume less. Ironically the current economic climate has brought on a slump in consumption and with it, job losses. Retailers are currently pushing prices up due to the weakness of sterling and this may inadvertently encourage the slow fashion practices of buying less and keeping for longer. To what extent this will be sustained once the economic situation reverses is questionable.

The survey conducted as part of this study reveals that certain age groups value durability in clothes differently however. In particular the age group 46-60 look for durability when purchasing clothes and pay more per item of clothing than younger groups (see Chapter Four, section 4.4.2.3). This suggests that there might be specific age groups that would respond better to the idea of slow fashion than others.

6.3 Conclusions

This research has investigated the potential for wider use of recycled synthetic materials in UK high street clothing markets and it successfully fulfilled the three research aims set for this research (see Chapter one, section 1.3).

Firstly, it identified current developments in technological synthetic material recycling and the research results revealed that it is now possible to produce recycled synthetic fibre of the same quality as the fibre produced with virgin materials using chemical

recycling technology. However, using chemical recycling for producing recycled synthetic fibre is limited to a few countries and companies so that the production volume is small and price is high.

Secondly, it scrutinised the materials sourcing process used by UK high street clothing retailers with particular regard to recycled synthetic fabrics.
All of the participating retailers have attempted to use recycled materials for their products but did not achieve great success due to high prices and underdeveloped products. They claimed they would use recycled materials if the price, colour and design are right for their products. They explained that using recycled materials is not a priority and that the currently available recycled synthetic materials are not satisfying their requirements, particularly in price, fabric design and tactile quality.

Lastly, this research identified UK consumer attitudes towards environmentally friendly clothing and clothing with recycled content. The outcomes of the research clearly showed the positive attitudes towards clothes with recycled content among the UK public. However, the majority do not know where to buy environmentally friendly clothes or if they exist. This is largely due to the fact that people buy clothes because of their colour and design; they are not concerned about environmental issues when they buy clothes.

It means that the retailers need to produce clothes with recycled content with desirable colour and design in order to expand the use of recycled synthetics into the UK high street market. The recycled fabric manufacturers need to understand the demands of the UK high street and produce fabrics that satisfy these market requirements.

6.4 Summary of the key contribution

A key contribution of this research project has been to identify the worldviews and outlooks of both Japanese (leading-edge technology) fibre and fabric manufacturers and contrast these with those of UK clothing retailers. As the researcher herself is Japanese, she has been able to communicate directly across language barriers to gain insights into the key barriers and drivers affecting the wider introduction of recycled polyester fibres in order to try to better understand ways of bringing these different organisations together on a mutual basis of self interest; suggesting short and long-term eco and business strategies.

The research has identified that the key factor for Japanese manufacturers is the need to create recyclable synthetic fabrics that have excellent tactile qualities, which will appeal to the multidisciplinary teams that source fabric for clothing product development. Retailers need to recognise that it is possible to specify 100% recyclable fabrics through a strategy to incorporate them into new products that do not compete on a price crunch basis but on added value by design, whilst being more eco and socially responsible.

Surprisingly, the research has revealed that, despite the initial expectation by fabric sourcing expects that only natural fibres yield the tactile qualities needed to satisfy consumers, the converse is now also true in certain situations where 100% recyclable fabric also satisfies this sourcing expectation.

As well as identifying barriers and drivers for wider use of recycled synthetic fabrics by UK high street retailers in their products the research provides a clear understanding of long term unchanged key drivers for UK consumers when purchasing clothes, their current reactions and attitudes towards clothes with recycled content, thus assisting the evaluation of the potential market for recycled synthetic materials.

6.5 Recommendations

In this section, recommendations for the recycled fibre and fabric manufacturers and the high street clothing retailers are stated. It is hoped that these recommendations will support the implementation of the wider usage of recycled synthetic materials in the UK high street clothing markets.

6.5.1 Recycled fibre and fabric manufacturers

The future recommendations for the recycled fibre and fabric manufacturers are as follows. There is a need:

> To carry out market research to obtain in depth understanding for developing fabrics that appeal to the UK high street fashion market that are the right colour, design and in particular tactile quality;

To develop drapy, soft and fluid feeling fabrics that contain more than 80% polyester fibre by using textile technology to design the fibre cross section or by adding functions in order to work towards a cradle-to-cradle model and garment recycling;

To provide desirable fabrics that will diminish the need to compete on price with other competitors. It is also possible in the short term to include certain percentages of recycled materials in products, as is being done with organic cotton. However, if blended with more than 50% of virgin fibre, they will lose the eco-mark in Japan;

To develop relationships with worldwide renowned textile/fashion designers who hold in depth understandings of both English and Japanese culture and markets (such as Elly Kishimoto) to attract high street clothing retailers and customers;

To continue to develop garment recycling technology so that the restriction of the garments that can be recycled will be reduced in the future;

To develop a quality standard mark, ensuring the source of materials and their quality, as UK high street clothing retailers are sceptical about eco-fabrics claims due to their previous poor experiences with false claims, eco credentials and low quality;

To have better communication with the UK high street clothing retailers. There is also a need to have contact with not only one discipline but all disciplines that are involved in the product development, as each member of the team will play a part in the sourcing;

The fibre/fabric industry needs to make extra efforts to inform the clothing industry with reliable, trustworthy, simple and clear information. The information should be widely available and easy to access, for example through disseminating information at international textiles fairs (e.g. Premier Vision and Tex World) and publishing

articles in textile trend magazines such as 'Ecotextile News',
'International Textiles' and 'Textile View', where the clothing industry
obtains the latest trends and fabric information.

6.5.2 Clothing retailers

Future recommendations for the UK high street clothing retailers concerning the use of
recycled synthetic materials for their products are stated below. There is a need:

To have better communications with the fibre and fabric producers
and a long term commitment to use recycled fabrics may be
necessary, as this would help recycled fibre and fabric manufacturers
to develop fibre and fabrics specifically for high street retailers (they
have been doing this successfully in the outdoor market);

To scrutinise fabrics with environmental credentials claims to make
sure they are of suitable quality and not falsely claiming to be recycled
fabrics, otherwise future markets will be compromised when
consumers yet again experience lesser quality products and associate
them with products with recycled materials. It is important to look at a
development of clothes with recycled content as a long-term
undertaking rather than just 'ticking the boxes'. A sceptical public
would make it more difficult to secure future markets for clothes with
recycled content and should be avoided at all costs;

To define the target markets for their eco-clothes range, whether
targeting the existing niche market of 10-15% with higher prices or
aiming at wider markets where significant environmental benefits lie;

Price range should not exceed more than 20% in the case of targeting
niche markets, otherwise the price should be the same. However,
adding value with good design may extend the price range;

To set up different marketing strategies according to their defined
target markets, for example for the niche clearly marked 'garments' or
a specified area for them to be visible and easy to find;

To know the lifecycle of their products and what type of garments they are producing so that they will know what stage is causing the biggest environmental impact. This supports an investigation into the feasibility of replacing existing demands for 100% polyester fabric with recycled polyester fabric, rather than looking to develop new products and markets for recycled polyester;

To create demand among the UK public for eco-clothes by launching a campaign to inform the general public about the necessity and the benefits of using recycled materials, and the availability of high quality recycled polyester fabric;

For CSR personnel to get involved in material sourcing more actively and to constantly educate, advise and inform the product development team. The information and advice coming from one of their staff will be more trusted and positively influence the culture of the organisation. The information and advice will more likely be accepted by the staff, which will help to eliminate scepticism;

To continue to look for new developments allowing for more sustainable clothing production.

6.6 Limitations of the research

In this study, each process was carried out with great attention and care in designing the research, determining research methods, selecting data collection methods, selecting samples/informants, collecting data and analysing data in order to reduce the risk of bias. However, it is impossible to eliminate bias completely and it is necessary to be aware of the limitations of the research findings (see Chapter Three). The limitations are listed below;

In order to develop sustainable products, it is vital to take into consideration the whole product lifecycle. However, this research focuses only on the initial stage of product development - the materials selection process - due to the limitations of time and

resources and because this process was deemed to be the most informative;

For the primary data collection, the street survey and industry survey were used as they were considered the most suitable data collection methods in order to fulfil the research objectives. Although the sample size and number of the informants are relatively small due to the limitations of time and resources, they were deemed sufficient within the scope of this study;

The public survey was carried out in the city centre of Newcastle upon Tyne with a high percentage of students. Further studies may need to define the target age group in relation to socio-economic status so that it would allow the identification of potential markets more precisely;

The number of participating companies for the industry survey interview was small and only one or two informants who are responsible for materials sourcing were interviewed from each company, not other disciplines such as buyers, designer and merchandisers. However, the data were collected from various types of companies in terms of their size, target market and their level of involvement in CSR issues, which makes this study particularly valid.

6.7 Suggestions for further research

This research project set out to obtain a better understanding of the development of end-markets for recycled synthetic materials in the clothing industry in terms of technological barriers, consumer attitudes and retailers perceptions. The research revealed that the UK high street clothing retailers have in the last 5 years become more aware of environmental and ethical issues but so far this has only had limited effects on product development. The research outcomes indicate future opportunities for the wider use of recycled synthetic materials in the clothing industry. In order to successfully take advantage of this opportunity, further in-depth research might be needed. Suggestions for further research in this field are listed below:

Examine how the points of contact are made between UK high street clothing retailers and Japanese recycled fibre and fabrics manufacturers in order to improve their communications and deepen the understanding of each other's requirements;

Investigate how materials sourcing is perceived from designers, buyers and merchandisers points of view, their reactions towards recycled fabrics and investigate the best possibilities to implement the use of fabric with recycled content;

Investigate CSR personnel responsibilities and roles within the clothing retailers, in order to explore the possibilities for disseminating information more effectively;

Investigate an effective way of informing UK high street clothing retailers as well as the UK general public with regards to the waste created from their daily activities;

Observe the influence of the current economic downturn on the high street clothing retailers in terms of garment price, consumption rate and incorporating sustainability into their business practice;

Investigate ways to develop the UK infrastructure for non biodegradable waste such as plastic bottles and synthetic fibre, rather than relying on waste export.

This research was initially motivated by a desire to uncover why recycled synthetic materials, in particular recycled polyester (PET), has not yet been widely used in the clothing industry. The outcomes of the research showed a complex web of interrelated factors that influence the use of recycled materials in the clothing industry, allowing to an extent the prediction of future trends in environmentally friendly textiles and (most importantly) the drawing up of future recommendations.

Recent changes in the social and economical climate, as well as changes in the way the clothing retailers operate, have been scrutinised within this study and provide fertile ground for further research. It is interesting to note that recent developments (in terms

of technology and markets) suggest a positive climate for clothing retailers looking into using recycled synthetic materials in their products and implementing sustainable strategies. This research has shown that recent technological advances have overcome previous barriers to producing good quality recycled polyester materials.

As well as the valuable outcomes derived from this research, the collected data and information summarised in this thesis should hopefully provide a useful source of information for future research in the area of study, in terms of designing research, use of different data collection methods, and existing knowledge.

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Appendix 3.1: List of the contacted companies for the industry survey interview

*Companies are listed in alphabetical order.

Company name & Website address	Their interest	Social Respon-sibility	Organic products	Recycled products	Interview	Reason to decline
Arcadia Group Limited /Burton, Dorothy Perkins, Evans, Miss Selfridge, Topman, Topshop, Wallis http://www.arcadiagroup.co.uk/	Hi street Clothes Retailer	•	•	•	**YES –** No tape	
George (at ASDA) http://www.asda.co.uk/	Super market	•	•		**N/A**	Send email 4 times – no reply
Marks and Spencer Group plc http://www.marksandspencer.com/	Hi street Clothes Food Retailer	•	•		**YES** –with tape	
Matalan						Send a letter – no reply
New Look						Received an email – no resource for the request, see the website
NEXT http://www.next.co.uk	Clothes Retailer	•		•	**YES**	
OASIS http://www.oasis-stores.com/	Clothes Retailer				**N/A**	Send email 3 times – no reply
Peacock						Send email 3 times – no reply
Primark						Send email 3 times – no reply
Principles http://www.principles.co.uk	Clothes Retailer				**N/A**	Received an email – no resource for the request.
River Island http://www.riverisland.com	Clothes Retailer	•			**N/A**	
Tesco Clothing http://www.tesco.co.uk	Supermarket	•	•	•	**N/A**	Send email 3 times – no reply
Tu at Sainsbury	Supermarket					Received an email saying that HQ will be in touch – not happened

Appendix 3.2: Sample of letter sent to UK companies for industry survey interview

8th December 2008

Dear Fabric Sourcing Manager,

Request for support – Conducting an interview regarding the materials selection process

I am a PhD student at Northumbria University, investigating the key drivers and barriers to use and not to use fabrics with recycled materials content within the UK clothing industry.

I would like to carry out an interview with the person who is responsible for fabric sourcing for women's wear.
I would like to find out if there have been any changes to the material selection process in the last couple of years. I am also investigating how the UK clothing industry will react to fabrics with recycled materials content which are currently available.

I am closely working with four Japanese leading recycled fibre manufacturers TEIJIN, MITSUBISHI,TORAY and KURABO. Arcadia group, Berghaus, M&S and
River Island agreed to participate with the research so far.
You will have a chance to see the latest fabric samples and a summary of the research findings will be available upon your request.

Your participation is vital for this research therefore I would be grateful if you could participate by answering some questions. It should only take about half an hour of your time.

I look forward to hearing from you.

Best regards,

Yukie Nakano

Appendix 3.3: Fabric samples used for the interview

Mitsubushi
No 8 Recycled polyester 100%, filament Ecoluna Y 50% / Ecoluna 50%
No 9 Recycled polyester 100%, filament Ecoluna Y 50% / Ecoluna 50%
No 10 Recycled polyester 100%, filament Ecoluna Y 50% / Ecoluna 50%

Teijin
No 11 Eco Circle Fiber 100%, DWR / R48723
No 12 Eco Circle Fiber 75%, PTT 25%, DWR Cire / R46191
No 13 Eco Circle Fiber 83%, PTT175%, DWR Cire / D4635N
No 14 Eco Circle Fiber 100%, DWR Cire / EC4676
No 15 Eco Circle Fiber 100%, DWR / EC5006
E1 – ECOPET®EC100, TO1619, Polyester 65/Cotton 35, Polo-Shirts, recycled rate
65%, Chemical Recycling, Filament yarn, 'Fibre to Fibre'
E2 – ECOPET, G45355, Polyester 90/Cotton 10, Polo-Shirts, recycled rate 55%,
Material Recycling, Stable Fibre, 'PET bottles to Fibre'
E3 – ECOPET®EC100, 'Quick dry' T53117, Circular knitted Jersey, No twist, Printable,
Smooth, Polyester 100, recycled rate 100%, Chemical Recycling, 'Fibre to Fibre'
E4 – ECOPET®EC100, 'Quick dry' RE5360, Circular knitted plain, No twist, Printable,
Polyester 100, recycled rate 100%, Chemical Recycling, 'Fibre to Fibre'
E5 – ECOPET®EC100, 'Quick dry' RE5361, Circular knitted plain, Strong twist,
Printable, Polyester 100, recycled rate 100%, Chemical Recycling, 'Fibre to Fibre'
E6 – ECOPET®EC100, RE5361, Circular knitted, Polyester 100, recycled rate 100%,
Chemical Recycling, Filament yarn, 'Fibre to Fibre',
Recycled from E7
E7 – T45F03, Normal polyester fabric, Circular knitted, E7 was recycled to E6
E8 –KSE1101, Jersey, Polyester95/Cotton5, Recycled rate 50%

Kurabo
No 16 AFTER PET 50% Polyester, 50% Cotton
No 17 AFTER PET 65% Polyester, 35% Cotton
No 18 GREEN PET 48-9% Polyester, 48% Cotton, 3-4% Bamboo
No 19 BIONATURE 50% Polyester, 50% Cotton
No 20 BIONATURE 50% Polyester, 50% Cotton
No 21 RETURN COTTON 99% Cotton, 1% Polyurethane / ST2709
No 22 RETURN COTTON 100% Cotton / HP1075

Toray
No 23 Recycle Nylon Recyclon, Nylon 100% (59% Recycled) / NR6723DWR
No 24 Recycle Nylon Recyclon, Nylon 100% (47% Recycled) / NR5386BRT
No 25 Recycle Nylon Recyclon, Nylon 100% (58% Recycled) / NR6721DWR
No 26 Recycle Nylon Recyclon, Nylon 100% (53% Recycled) / NR6722S

Appendix 4.1: The final questionnaire

Do you choose outer clothes by yourself, or not?	**Yes**	DATE:……………………………
Is your occupation related to fashion/textiles/clothing retailers?	**No**	
Are you dealing with environmental issues as part of your occupation?	**No**	TIME:……………………………

Section 1

1.1 / How many items of outer clothing (excluding underwear and socks) do you buy for yourself per year?

1. 0-5
2. 6-10
3. 11-20
4. 21-30
5. More than 30
6. Unsure

1.2 / How much do you spend on clothing for yourself per year?

1. Less than £100 p.a.
2. £100-£300
3. £301-£500
4. £501-£1000
5. More than £1000
6. Unsure

1.3 / Think about the last outer clothing (excluding underwear and socks) you purchased. Please tell us what influenced your decision? (Please circle the appropriate number according to your degree of preference. 1 to 5.)

	Not important				Very important
Was it durability?	1	2	3	4	5
Was it comfort?	1	2	3	4	5
Did you like the design?	1	2	3	4	5
Did you like the colour?	1	2	3	4	5
Did you like the touch?	1	2	3	4	5
Was it easy care?	1	2	3	4	5
Was it value for money?	1	2	3	4	5
Was it good quality?	1	2	3	4	5
Did you like the fabric?	1	2	3	4	5
Was it brand?	1	2	3	4	5
Is there another reason? (Please specify)	1	2	3	4	5

1.4 / Would it surprise you to know that fleece garments can be made from recycled plastic bottles?
(Please circle the appropriate number according to your degree of preference. 1 to 5.)

	1	2	3	4	5	
Not at all					Very much

1.5 / If you are told that your clothes are made from recycled materials. What would be your reaction?
(Please circle the appropriate number according to your degree of preference. 1 to 5.)

	1	2	3	4	5	
Not positive					Very positive

1.6 / How much extra would you be prepared to pay for a garment made from recycled materials compared to new materials?

1. Should be less
2. Same price
3. Up to 10%
4. Up to 20%
5. More than 20%

1.7/ Do you know of any clothing companies who are concerned with environmental issues?

1. Yes (Please specify)_____
2. No

1.8 / Have you bought <u>clothes</u> which are marketed as "environmentally friendly"?

1. Do not know (go to Q2.1)
2. Yes (Please specify)_____ (go to Q1.9)
3. No (Please explain why not)_____ (go to Q2.1)

1.9 / Please tell us what influenced your decision to purchase clothes which are marketed as "environmentally friendly"? (Please circle the appropriate number according to your degree of preference. 1 to 5.)

	Not at all				Very much
Was it good quality?	1	2	3	4	5
Was it trendy?	1	2	3	4	5
Did you like the design?	1	2	3	4	5
Did you like the colour?	1	2	3	4	5
Did you like the touch?	1	2	3	4	5
Was it easy care?	1	2	3	4	5
Was it value for money?	1	2	3	4	5
Was it an environmental concern?	1	2	3	4	5
Is there another reason? (Please specify)	1	2	3	4	5

_____(go to Q2.1)

Section 2

2.1/ Do you know of any clothing companies that are producing clothes with <u>recycled content?</u>

₁ Yes (Please specify)_____

₂ No

2.2 / Have you bought clothes with recycled content?

₁ Do not know (go to Q2.4)
₂ Yes (Please specify)_____(go to Q2.3)
₃ No (Please explain why not)_____ (go to Q2.4)

2.3 / Please tell us what influenced your decision to purchase clothes with recycled materials content?
(Please circle the appropriate number according to your degree of preference. 1 to 5.)

	Not at all			**Very much**	
Was it good quality?	1	2	3	4	5
Was it trendy?	1	2	3	4	5
Did you like the design?	1	2	3	4	5
Did you like the colour?	1	2	3	4	5
Did you like the touch?	1	2	3	4	5
Was it easy care ?	1	2	3	4	5
Was it value for money?	1	2	3	4	5
Was it an environmental concern?	1	2	3	4	5
Is there any other reason? (Please specify)	1	2	3	4	5

_____

2.4 / Would you consider the environment when you buy clothes?
(Please circle the appropriate number according to your degree of preference. 1 to 5.)

1	2	3	4	5
Not at all				**All the time**

2.5 / How often do you buy environmentally friendly products?
(Please circle the appropriate number according to your degree of preference. 1to 5)

1	2	3	4	5
Not at all				**As much as possible**

2.6 / Do you try to inform yourself about environmental issues, or not?
(Please circle the appropriate number according to your degree of preference. 1 to 5)

<div style="margin-left:3em">

1	2	3	4	5
Not at all				**All the time**

</div>

2.7 / Do you buy organic goods / food?

<div style="margin-left:3em">

1	2	3	4	5
Not at all				**All the time**

</div>

Section 3

3.1 / Please tick the boxes as appropriate.

₁ Male   ₂ Female

3.2 / Which age category do you fall under?

₁ Under 18
₂ 19-25
₃ 26-35
₄ 36-45
₅ 46-60
₆ Above 61

Optional Section / Comments
Any other comments?

This is the end of questionnaire.
Thank you very much for your time and efforts to answer!

Excluded those who fall under the following categories:

- They have not made their choice of outer clothes themselves.
- Their occupation is related to fashion/textiles/clothing retail.
- Their occupation deals directly with environmental issues.

In total we should have:

144 respondents. (72 males and 72 females.)

An age split as follows:

19-25	= 32	16 males and 16 females
26-35	= 32	16 males and16 females
36-45	= 32	16 males and 16 females
46-60	= 32	16 males and 16 females
Above 61	= 16	8 males and 8 females

Appendix 4.3: Details of statistical data

Table 1.3.1   Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	78	48.1	48.1	48.1
	Female	84	51.9	51.9	100.0
	Total	162	100.0	100.0	

Table 1.3.2   Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	19-25	40	24.7	24.7	24.7
	26-35	32	19.8	19.8	44.4
	36-45	36	22.2	22.2	66.7
	46-60	36	22.2	22.2	88.9
	Above61	18	11.1	11.1	100.0
	Total	162	100.0	100.0	

Question 1

Table 1.1 plasticb * gender Crosstabulation

			gender		Total
			Male	Female	Male
plasticb	Not at all	Count	23	30	53
		% of Total	14.2%	18.5%	32.7%
	2	Count	8	4	12
		% of Total	4.9%	2.5%	7.4%
	3	Count	14	9	23
		% of Total	8.6%	5.6%	14.2%
	4	Count	10	11	21
		% of Total	6.2%	6.8%	13.0%
	Very much	Count	23	30	53
		% of Total	14.2%	18.5%	32.7%
Total		Count	78	84	162
		% of Total	48.1%	51.9%	100.0%

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Table 1.2 plasticb * age Crosstabulation

			age					Total
			19-25	26-35	36-45	46-60	Above61	19-25
plasticb	Not at all	Count	9	8	10	19	7	53
		% of Total	5.6%	4.9%	6.2%	11.7%	4.3%	32.7%
	2	Count	1	6	1	2	2	12
		% of Total	.6%	3.7%	.6%	1.2%	1.2%	7.4%
	3	Count	6	6	4	7	0	23
		% of Total	3.7%	3.7%	2.5%	4.3%	.0%	14.2%
	4	Count	5	4	8	2	2	21
		% of Total	3.1%	2.5%	4.9%	1.2%	1.2%	13.0%
	Very much	Count	19	8	13	6	7	53
		% of Total	11.7%	4.9%	8.0%	3.7%	4.3%	32.7%
Total		Count	40	32	36	36	18	162
		% of Total	24.7%	19.8%	22.2%	22.2%	11.1%	100.0%

Table 1.3 plastic3 * age Crosstabulation **/**Chi-Square Tests

			age		Total
			19-25	46-60	19-25
plastic3	1	Count	10	21	31
		% of Total	13.2%	27.6%	40.8%
	3	Count	6	7	13
		% of Total	7.9%	9.2%	17.1%
	5	Count	24	8	32
		% of Total	31.6%	10.5%	42.1%
Total		Count	40	36	76
		% of Total	52.6%	47.4%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.802(a)	2	**.003**
Likelihood Ratio	12.228	2	.002
Linear-by-Linear Association	11.409	1	.001
N of Valid Cases	76		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.16.

Table 1.4 plastic3 * age Crosstabulation**/** Chi-Square Tests

			age		Total
			36-45	46-60	36-45
plastic3	1	Count	11	21	32
		% of Total	15.3%	29.2%	44.4%
	3	Count	4	7	11
		% of Total	5.6%	9.7%	15.3%
	5	Count	21	8	29
		% of Total	29.2%	11.1%	40.3%
Total		Count	36	36	72
		% of Total	50.0%	50.0%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.771(a)	2	**.008**
Likelihood Ratio	10.047	2	.007
Linear-by-Linear Association	8.569	1	.003
N of Valid Cases	72		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.50.

Table 1.5 plastic3 * age Crosstabulation/ Chi-Square Tests

			age		Total
			46-60	Above61	46-60
plastic3	1	Count	21	9	30
		% of Total	38.9%	16.7%	55.6%
	3	Count	7	0	7
		% of Total	13.0%	.0%	13.0%
	5	Count	8	9	17
		% of Total	14.8%	16.7%	31.5%
Total		Count	36	18	54
		% of Total	66.7%	33.3%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.591(a)	2	**.037**
Likelihood Ratio	8.584	2	.014
Linear-by-Linear Association	1.890	1	.169
N of Valid Cases	54		

a 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.33.

Table 1.6 Year * Plastic Bottles Crosstabulation / ANOVA

			Plastic Bottles					
			Not at all	2	3	4	Very much	Total
Year	2008	Count	53	12	23	21	53	162
		% within Year	32.7%	7.4%	14.2%	13.0%	32.7%	100.0%
	2001	Count	22	7	8	17	40	94
		% within Year	23.4%	7.4%	8.5%	18.1%	42.6%	100.0%
	Total	Count	75	19	31	38	93	256
		% within Year	29.3%	7.4%	12.1%	14.8%	36.3%	100.0%

Plastic Bottles	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.194	1	11.194	4.027	**.046**
Within Groups	705.989	254	2.779		
Total	717.184	255			

Question 2

Table 2.1   Reaction * gender Crosstabulation/ Chi-Square Tests

			gender		Total
			Male	Female	Male
Reaction	Not positive	Count	1	2	3
		% of Total	.6%	1.2%	1.9%
	2	Count	2	2	4
		% of Total	1.2%	1.2%	2.5%
	3	Count	25	14	39
		% of Total	15.4%	8.6%	24.1%
	4	Count	21	29	50
		% of Total	13.0%	17.9%	30.9%
	Very positive	Count	29	37	66
		% of Total	17.9%	22.8%	40.7%
Total		Count	78	84	162
		% of Total	48.1%	51.9%	100.0%

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	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.471(a)	4	.242
Likelihood Ratio	5.520	4	.238
Linear-by-Linear Association	1.650	1	.199
N of Valid Cases	162		

a 4 cells (40.0%) have expected count less than 5. The minimum expected count is 1.44.

Table 2.2   age * Reaction Crosstabulation/ Chi-Square Tests

			Reaction					Total
			Not positive	2	3	4	Very positive	Not positive
age	19-25	Count	0	1	11	17	11	40
		% of Total	.0%	.6%	6.8%	10.5%	6.8%	24.7%
	26-35	Count	0	1	10	7	14	32
		% of Total	.0%	.6%	6.2%	4.3%	8.6%	19.8%
	36-45	Count	0	1	6	13	16	36
		% of Total	.0%	.6%	3.7%	8.0%	9.9%	22.2%
	46-60	Count	0	0	8	9	19	36
		% of Total	.0%	.0%	4.9%	5.6%	11.7%	22.2%
	Above61	Count	3	1	4	4	6	18
		% of Total	1.9%	.6%	2.5%	2.5%	3.7%	11.1%
Total		Count	3	4	39	50	66	162
		% of Total	1.9%	2.5%	24.1%	30.9%	40.7%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	34.617(a)	16	**.004**
Likelihood Ratio	24.628	16	.077
Linear-by-Linear Association	.024	1	.877
N of Valid Cases	162		

a 11 cells (44.0%) have expected count less than 5. The minimum expected count is .33.

Table 2.3   Year * Reaction Crosstabulation / ANOVA

			Reaction					
			Not positive	2	3	4	Very positive	Total
Year	2008	Count	3	4	39	50	66	162
		% within Year	1.9%	2.5%	24.1%	30.9%	40.7%	100.0%
	2001	Count	6	4	12	24	48	94
		% within Year	6.4%	4.3%	12.8%	25.5%	51.1%	100.0%
	Total	Count	9	8	51	74	114	256
		% within Year	3.5%	3.1%	19.9%	28.9%	44.5%	100.0%

Reaction					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.119	1	.119	.109	.742
Within Groups	276.319	254	1.088		
Total	276.438	255			

Question 3

Table 3.1 gender * Extra pay Crosstabulation /Chi-Square Tests

			Extra pay					Total
			Should be less	Same price	Up to 10%	Up to 20%	More than 20%	Should be less
gender	Male	Count	11	43	17	6	1	78
		% of Total	6.8%	26.5%	10.5%	3.7%	.6%	48.1%
	Female	Count	12	46	19	6	1	84
		% of Total	7.4%	28.4%	11.7%	3.7%	.6%	51.9%
Total		Count	23	89	36	12	2	162
		% of Total	14.2%	54.9%	22.2%	7.4%	1.2%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.034(a)	4	1.000
Likelihood Ratio	.034	4	1.000
Linear-by-Linear Association	.003	1	.956
N of Valid Cases	162		

a 2 cells (20.0%) have expected count less than 5. The minimum expected count is .96.

Table 3.2 age * Extra pay Crosstabulation/ Chi-Square Tests

			Extra pay					Total
			Should be less	Same price	Up to 10%	Up to 20%	More than 20%	Should be less
age	19-25	Count	8	22	6	3	1	40
		% of Total	4.9%	13.6%	3.7%	1.9%	.6%	24.7%
	26-35	Count	3	21	7	1	0	32
		% of Total	1.9%	13.0%	4.3%	.6%	.0%	19.8%
	36-45	Count	3	17	9	6	1	36
		% of Total	1.9%	10.5%	5.6%	3.7%	.6%	22.2%
	46-60	Count	5	19	10	2	0	36
		% of Total	3.1%	11.7%	6.2%	1.2%	.0%	22.2%
	Above61	Count	4	10	4	0	0	18
		% of Total	2.5%	6.2%	2.5%	.0%	.0%	11.1%
Total		Count	23	89	36	12	2	162
		% of Total	14.2%	54.9%	22.2%	7.4%	1.2%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.551(a)	16	.558
Likelihood Ratio	15.836	16	.464
Linear-by-Linear Association	.001	1	.979
N of Valid Cases	162		

a 13 cells (52.0%) have expected count less than 5. The minimum expected count is .22.

Table 3.3 Year * Extra pay Crosstabulation / ANOVA

			Extra pay					
			Should be less	Same price	Up to 10%	Up to 20%	More than 20%	Total
Year	2008	Count	23	89	36	12	2	162
		% within Year	14.2%	54.9%	22.2%	7.4%	1.2%	100.0%
	2001	Count	12	41	29	5	4	91
		% within Year	13.2%	45.1%	31.9%	5.5%	4.4%	100.0%
Total		Count	35	130	65	17	6	253
		% within Year	13.8%	51.4%	25.7%	6.7%	2.4%	100.0%

Extra pay					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.551	1	1.551	2.008	.158
Within Groups	193.872	251	.772		
Total	195.423	252			

Question 4

Table 4.1 gender * eco-companies Crosstabulation/ Chi-Square Tests

			eco-companies		Total
			Yes	No	Yes
gender	Male	Count	11	67	78
		% of Total	6.8%	41.4%	48.1%
	Female	Count	29	55	84
		% of Total	17.9%	34.0%	51.9%
Total		Count	40	122	162
		% of Total	24.7%	75.3%	100.0%

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.071(b)	1	**.003**		
Continuity Correction(a)	8.006	1	.005		
Likelihood Ratio	9.358	1	.002		
Fisher's Exact Test				.003	.002
Linear-by-Linear Association	9.015	1	.003		
N of Valid Cases	162				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 19.26.

Table 4.2 Listed companies

Do you know of any clothing companies who are concerned with environmental issues?			
38 respondents			
M&S	n=16 (9.8%)	Seasalt	n=1
PeopleTree	n=6 (3.7%)	NEXT	n=1
Howies	n=6 (3.7%)	Warehouse	n=1
TopShop	n=4 (2.5%)	Gap	n=1
NewLook	n=4 (2.5%)	AnyaHindmarch	n=1
DorothyPerkins	n=2 (1.2%)	Laura Ashley	n=1
Berghaus	n=1		
Rohan	n=1	Charity shops	n=1
Greenfibres	n=1	Coop	n=1
Patagonia	n=1	Traidcraft	n=1

Table 4.3 age * eco-companies Crosstabulation/ Chi-Square Tests

			eco-companies		Total
			Yes	No	Yes
age	36-45	Count	4	32	36
		% of Total	5.6%	44.4%	50.0%
	46-60	Count	14	22	36
		% of Total	19.4%	30.6%	50.0%
Total		Count	18	54	72
		% of Total	25.0%	75.0%	100.0%

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.407(b)	1	**.006**		
Continuity Correction(a)	6.000	1	.014		
Likelihood Ratio	7.746	1	.005		
Fisher's Exact Test				.013	.006
Linear-by-Linear Association	7.305	1	.007		
N of Valid Cases	72				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.00.

Table 4.4 age * eco-companies Crosstabulation/ Chi-Square Tests

			eco-companies		Total
			Yes	No	Yes
age	46-60	Count	14	22	36
		% of Total	25.9%	40.7%	66.7%
	Above61	Count	2	16	18
		% of Total	3.7%	29.6%	33.3%
Total		Count	16	38	54
		% of Total	29.6%	70.4%	100.0%

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.441(b)	1	**.035**		
Continuity Correction(a)	3.208	1	.073		
Likelihood Ratio	4.959	1	.026		
Fisher's Exact Test				.057	.033
Linear-by-Linear Association	4.359	1	.037		
N of Valid Cases	54				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.33.

Table 4.5 Year * Eco-companies Crosstabulation / Chi-Square Tests

			Eco-companies		
			Yes	No	Total
Year	2008	Count	40	122	162
		% within Year	24.7%	75.3%	100.0%
	2001	Count	9	80	89
		% within Year	10.1%	89.9%	100.0%
	Total	Count	49	202	251
		% within Year	19.5%	80.5%	100.0%

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.771[a]	1	**.005**		
Continuity Correction[b]	6.871	1	.009		
Likelihood Ratio	8.446	1	.004		
Fisher's Exact Test				.005	.003
Linear-by-Linear Association	7.740	1	.005		
N of Valid Cases	251				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 17.37.

b. Computed only for a 2x2 table

Question 5

Table 5.1 gender * Bought Eco-clothes Crosstabulation/ Chi-Square Tests

			Bought Eco-clothes			Total
			Do not know	Yes	No	Do not know
gender	Male	Count	50	9	19	78
		% of Total	30.9%	5.6%	11.7%	48.1%
	Female	Count	44	19	21	84
		% of Total	27.2%	11.7%	13.0%	51.9%
Total		Count	94	28	40	162
		% of Total	58.0%	17.3%	24.7%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.837(a)	2	.147
Likelihood Ratio	3.913	2	.141
Linear-by-Linear Association	.858	1	.354
N of Valid Cases	162		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.48.

Table 5.2 age * Bought Eco-clothes Crosstabulation/ Chi-Square Tests

			Bought Eco-clothes			Total
			Do not know	Yes	No	Do not know
age	19-25	Count	24	6	10	40
		% of Total	14.8%	3.7%	6.2%	24.7%
	26-35	Count	19	3	10	32
		% of Total	11.7%	1.9%	6.2%	19.8%
	36-45	Count	17	6	13	36
		% of Total	10.5%	3.7%	8.0%	22.2%
	46-60	Count	22	9	5	36
		% of Total	13.6%	5.6%	3.1%	22.2%
	Above61	Count	12	4	2	18
		% of Total	7.4%	2.5%	1.2%	11.1%
Total		Count	94	28	40	162
		% of Total	58.0%	17.3%	24.7%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.339(a)	8	.315
Likelihood Ratio	9.832	8	.277
Linear-by-Linear Association	.850	1	.356
N of Valid Cases	162		

a 2 cells (13.3%) have expected count less than 5. The minimum expected count is 3.11.

Table 5.3 Year * Bought Eco-clothes Crosstabulation / ANOVA

			Bought Eco-clothes			
			Do not know	Yes	No	Total
Year	2008	Count	94	28	40	162
		% within Year	58.0%	17.3%	24.7%	100.0%
	2001	Count	32	3	54	89
		% within Year	36.0%	3.4%	60.7%	100.0%
	Total	Count	126	31	94	251
		% within Year	50.2%	12.4%	37.5%	100.0%

Bought Eco-clothes

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	19.359	1	19.359	24.523	.000
Within Groups	196.562	249	.789		
Total	215.920	250			

Question 6

Table 6.1 gender * Recycled-companies Crosstabulation/ Chi-Square Tests

			Recycled-companies		Total
			Yes	No	Yes
gender	Male	Count	7	71	78
		% of Total	4.3%	43.8%	48.1%
	Female	Count	9	75	84
		% of Total	5.6%	46.3%	51.9%
Total		Count	16	146	162
		% of Total	9.9%	90.1%	100.0%

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.138(b)	1	.711		
Continuity Correction(a)	.012	1	.915		
Likelihood Ratio	.138	1	.710		
Fisher's Exact Test				.796	.459
Linear-by-Linear Association	.137	1	.712		
N of Valid Cases	162				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.70.

Table 6.2 age * Recycled-companies Crosstabulation/ Chi-Square Tests

			Recycled-companies		Total
			Yes	No	Yes
age	19-25	Count	4	36	40
		% of Total	2.5%	22.2%	24.7%
	26-35	Count	3	29	32
		% of Total	1.9%	17.9%	19.8%
	36-45	Count	3	33	36
		% of Total	1.9%	20.4%	22.2%
	46-60	Count	4	32	36
		% of Total	2.5%	19.8%	22.2%
	Above61	Count	2	16	18
		% of Total	1.2%	9.9%	11.1%
Total		Count	16	146	162
		% of Total	9.9%	90.1%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.199(a)	4	.995
Likelihood Ratio	.200	4	.995
Linear-by-Linear Association	.035	1	.852
N of Valid Cases	162		

a 5 cells (50.0%) have expected count less than 5. The minimum expected count is 1.78.

Table 6.3 Listed companies

Do you know of any clothing companies that are producing clothes with recycled content?			
15 respondents			
M&S	n=6 (3.7%)	Berghaus	n=1
Artic	n=2 (1.2%)	Howies	n=1
Patagonia	n=1	Muji	n=1
Rohan	n=1	NEXT	n=1
North Face	n=1	PRIMARK	n=1

Question 7

Table 7.1 gender * Bought Recycled-clothes Crosstabulation/ Chi-Square Tests

			Bought Recycled-clothes			Total
			Do not know	Yes	No	Do not know
gender	Male	Count	60	7	11	78
		% of Total	37.0%	4.3%	6.8%	48.1%
	Female	Count	58	4	22	84
		% of Total	35.8%	2.5%	13.6%	51.9%
Total		Count	118	11	33	162
		% of Total	72.8%	6.8%	20.4%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.302(a)	2	.116
Likelihood Ratio	4.378	2	.112
Linear-by-Linear Association	2.439	1	.118
N of Valid Cases	162		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.30.

Table 7.2 age * Bought Recycled-clothes Crosstabulation/ Chi-Square Tests

			Bought Recycled-clothes			Total
			Do not know	Yes	No	
age	19-25	Count	29	3	8	40
		% of Total	17.9%	1.9%	4.9%	24.7%
	26-35	Count	26	1	5	32
		% of Total	16.0%	.6%	3.1%	19.8%
	36-45	Count	22	2	12	36
		% of Total	13.6%	1.2%	7.4%	22.2%
	46-60	Count	25	4	7	36
		% of Total	15.4%	2.5%	4.3%	22.2%
	Above61	Count	16	1	1	18
		% of Total	9.9%	.6%	.6%	11.1%
Total		Count	118	11	33	162
		% of Total	72.8%	6.8%	20.4%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.739(a)	8	.365
Likelihood Ratio	9.076	8	.336
Linear-by-Linear Association	.187	1	.665
N of Valid Cases	162		

a 6 cells (40.0%) have expected count less than 5. The minimum expected count is 1.22.

Question 8

Table 8.1 Gender * inform Crosstabulation / Chi-Square Tests

			inform					Total
			Not at all	2	3	4	All the time	
Gender	Male	Count	4	6	29	29	10	78
		% of Total	2.5%	3.7%	17.9%	17.9%	6.2%	48.1%
	Female	Count	2	7	26	38	11	84
		% of Total	1.2%	4.3%	16.0%	23.5%	6.8%	51.9%
	Total	Count	6	13	55	67	21	162
		% of Total	3.7%	8.0%	34.0%	41.4%	13.0%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.944[a]	4	.746
Likelihood Ratio	1.958	4	.743
Linear-by-Linear Association	.817	1	.366

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.944[a]	4	.746
Likelihood Ratio	1.958	4	.743
Linear-by-Linear Association	.817	1	.366
N of Valid Cases	162		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 2.89.

Table 8.2 Age * inform Crosstabulation / ANOVA

			inform					
			Not at all	2	3	4	All the time	Total
Age	19-25	Count	1	2	18	15	4	40
		% of Total	.6%	1.2%	11.1%	9.3%	2.5%	24.7%
	26-35	Count	3	3	11	14	1	32
		% of Total	1.9%	1.9%	6.8%	8.6%	.6%	19.8%
	36-45	Count	0	5	10	14	7	36
		% of Total	.0%	3.1%	6.2%	8.6%	4.3%	22.2%
	46-60	Count	1	2	8	19	6	36
		% of Total	.6%	1.2%	4.9%	11.7%	3.7%	22.2%
	Above61	Count	1	1	8	5	3	18
		% of Total	.6%	.6%	4.9%	3.1%	1.9%	11.1%
	Total	Count	6	13	55	67	21	162
		% of Total	3.7%	8.0%	34.0%	41.4%	13.0%	100.0%

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.887	4	1.222	.673	.612
Within Groups	285.236	157	1.817		
Total	290.123	161			

Table 8.3 Year * Inform Crosstabulation / ANOVA

			Inform					
			Not at all	2	3	4	All the time	Total
Year	2008	Count	6	13	55	67	21	162
		% within Year	3.7%	8.0%	34.0%	41.4%	13.0%	100.0%
	2001	Count	4	17	31	22	11	85
		% within Year	4.7%	20.0%	36.5%	25.9%	12.9%	100.0%
	Total	Count	10	30	86	89	32	247
		% within Year	4.0%	12.1%	34.8%	36.0%	13.0%	100.0%

Inform	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.851	1	4.851	4.969	**.027**
Within Groups	239.197	245	.976		
Total	244.049	246			

Question 9

Table 9.1 gender * Colour Crosstabulation/ Chi-Square Tests

			Colour					Total
			1	2	3	4	5	1
gender	Male	Count	3	5	8	37	25	78
		% of Total	1.9%	3.1%	4.9%	22.8%	15.4%	48.1%
	Female	Count	0	1	6	24	53	84
		% of Total	.0%	.6%	3.7%	14.8%	32.7%	51.9%
Total		Count	3	6	14	61	78	162
		% of Total	1.9%	3.7%	8.6%	37.7%	48.1%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.577(a)	4	**.001**
Likelihood Ratio	20.205	4	.000
Linear-by-Linear Association	15.594	1	.000
N of Valid Cases	162		

a 4 cells (40.0%) have expected count less than 5. The minimum expected count is 1.44.

Table 9.2 Age * Colour Crosstabulation/ Chi-Square Tests

			Colour					Total
			Not important	2	3	4	Very important	Not important
Age	19-25	Count	1	0	3	9	27	40
		% of Total	.6%	.0%	1.9%	5.6%	16.7%	24.7%
	26-35	Count	0	1	2	17	12	32
		% of Total	.0%	.6%	1.2%	10.5%	7.4%	19.8%
	36-45	Count	0	0	3	15	18	36
		% of Total	.0%	.0%	1.9%	9.3%	11.1%	22.2%
	46-60	Count	1	1	3	16	15	36
		% of Total	.6%	.6%	1.9%	9.9%	9.3%	22.2%
	Above 61	Count	1	4	3	4	6	18
		% of Total	.6%	2.5%	1.9%	2.5%	3.7%	11.1%
Total		Count	3	6	14	61	78	162
		% of Total	1.9%	3.7%	8.6%	37.7%	48.1%	100.0%

Table 9.3 Descriptives / ANOVA

Colour

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
19-25	40	4.52	.847	.134	4.25	4.80	1	5
26-35	32	4.25	.718	.127	3.99	4.51	2	5
36-45	36	4.42	.649	.108	4.20	4.64	3	5
46-60	36	4.19	.920	.153	3.88	4.51	1	5
Above61	18	3.56	1.338	.315	2.89	4.22	1	5
Total	162	4.27	.904	.071	4.13	4.41	1	5

Colour

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.778	4	3.195	4.221	**.003**
Within Groups	118.808	157	.757		
Total	131.586	161			

Table 9.4 Descriptives / ANOVA

Colour	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
19-25	21	4.86	.359	.078	4.69	5.02	4	5
26-35	16	4.44	.629	.157	4.10	4.77	3	5
36-45	20	4.60	.598	.134	4.32	4.88	3	5
46-60	18	4.44	.705	.166	4.09	4.79	3	5
Above61	9	4.00	1.118	.373	3.14	4.86	2	5
Total	84	4.54	.685	.075	4.39	4.68	2	5

Colour	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.139	4	1.285	3.007	**.023**
Within Groups	33.753	79	.427		
Total	38.893	83			

Table 9.5 Descriptives / ANOVA

Colour	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
19-25	21	4.86	.359	.078	4.69	5.02	4	5
Above61	9	4.00	1.118	.373	3.14	4.86	2	5
Total	30	4.60	.770	.141	4.31	4.89	2	5

Colour	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.629	1	4.629	10.309	**.003**
Within Groups	12.571	28	.449		
Total	17.200	29			

Table 9.6 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
Colour	19-25	40	4.52	.847	.134
	Above61	18	3.56	1.338	.315

		Levene's Test for Equality of Variances		t-test for Equality of Means						
							Mean Differen ce	Std. Error Differen ce	95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)			Lower	Upper
Col our	Equal variances assumed	10.571	.002	3.344	56	.001	.969	.290	.389	1.550
	Equal variances not assumed			2.829	23.350	.009	.969	.343	.261	1.678

Table 9.7 Gender * Design Crosstabulation/ Chi-Square Tests

			Design					
			Not important	2	3	4	Very important	Total
Gender	Male	Count	6	4	12	27	29	78
		% of Total	3.7%	2.5%	7.4%	16.7%	17.9%	48.1%
	Female	Count	0	0	13	23	48	84
		% of Total	.0%	.0%	8.0%	14.2%	29.6%	51.9%
	Total	Count	6	4	25	50	77	162
		% of Total	3.7%	2.5%	15.4%	30.9%	47.5%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.846[a]	4	**.005**
Likelihood Ratio	18.738	4	.001
Linear-by-Linear Association	10.983	1	.001
N of Valid Cases	162		

a. 4 cells (40.0%) have expected count less than 5. The minimum

expected count is 1.93.

Table 9.8 Gender * Design Mean

Gender	Mean	N	Std. Deviation
Male	3.88	78	1.195
Female	4.42	84	.748
Total	4.16	162	1.021

Table 9.9 Age * Design Crosstabulation / ANOVA

			Design					
			Not important	2	3	4	Very important	Total
Age	19-25	Count	2	0	2	9	27	40
		% of Total	1.2%	.0%	1.2%	5.6%	16.7%	24.7%
	26-35	Count	0	1	3	12	16	32
		% of Total	.0%	.6%	1.9%	7.4%	9.9%	19.8%
	36-45	Count	0	0	11	11	14	36
		% of Total	.0%	.0%	6.8%	6.8%	8.6%	22.2%
	46-60	Count	2	1	6	13	14	36
		% of Total	1.2%	.6%	3.7%	8.0%	8.6%	22.2%
	Above61	Count	2	2	3	5	6	18
		% of Total	1.2%	1.2%	1.9%	3.1%	3.7%	11.1%
	Total	Count	6	4	25	50	77	162
		% of Total	3.7%	2.5%	15.4%	30.9%	47.5%	100.0%

Age	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	21.913	4	5.478	3.207	**.015**
Within Groups	268.210	157	1.708		

Age	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	21.913	4	5.478	3.207	**.015**
Within Groups	268.210	157	1.708		
Total	290.123	161			

Table 9.10 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
Design	19-25	40	4.48	.987	.156
	Above61	18	3.61	1.378	.325

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Design	Equal variances assumed	4.889	.031	2.718	56	.009	.864	.318	.227	1.501
	Equal variances not assumed			2.398	25.168	.024	.864	.360	.122	1.606

Table 9.11 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
Design	26-35	32	4.34	.787	.139
	Above61	18	3.61	1.378	.325

		Levene's Test for Equality of Variances		t-test for Equality of Means						
							Mean Differen ce	Std. Error Differen ce	95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)			Lower	Upper
Desi gn	Equal variances assumed	9.161	.004	2.401	48	.020	.733	.305	.119	1.346
	Equal variances not assumed			2.073	23.38 6	.049	.733	.353	.002	1.463

Table 9.12 Gender * Quality Crosstabulation / Chi-Square Tests

			Quality					
			Not important	2	3	4	Very important	Total
Gender	Male	Count	1	1	8	39	28	77
		% of Total	.6%	.6%	5.0%	24.2%	17.4%	47.8%
	Female	Count	0	2	21	31	30	84
		% of Total	.0%	1.2%	13.0%	19.3%	18.6%	52.2%
	Total	Count	1	3	29	70	58	161
		% of Total	.6%	1.9%	18.0%	43.5%	36.0%	100.0%

Table 9.13 Age * Quality Crosstabulation / Chi-Square Tests

			Quality					
			Not important	2	3	4	Very important	Total
Age	19-25	Count	0	1	11	19	9	40
		% of Total	.0%	.6%	6.8%	11.8%	5.6%	24.8%
	26-35	Count	0	0	4	13	15	32
		% of Total	.0%	.0%	2.5%	8.1%	9.3%	19.9%
	36-45	Count	1	2	10	13	10	36
		% of Total	.6%	1.2%	6.2%	8.1%	6.2%	22.4%
	46-60	Count	0	0	2	17	16	35
		% of Total	.0%	.0%	1.2%	10.6%	9.9%	21.7%
	Above61	Count	0	0	2	8	8	18
		% of Total	.0%	.0%	1.2%	5.0%	5.0%	11.2%
	Total	Count	1	3	29	70	58	161
		% of Total	.6%	1.9%	18.0%	43.5%	36.0%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.530[a]	16	.159
Likelihood Ratio	22.575	16	.126
Linear-by-Linear Association	4.147	1	.042
N of Valid Cases	161		

a. 11 cells (44.0%) have expected count less than 5. The minimum
expected count is .11.

Table 9.14 Gender * Comfort Crosstabulation / Chi-Square Tests

			Comfort					
			Not important	2	3	4	Very important	Total
Gender	Male	Count	0	2	14	39	23	78
		% of Total	.0%	1.2%	8.6%	24.1%	14.2%	48.1%
	Female	Count	1	3	18	27	35	84
		% of Total	.6%	1.9%	11.1%	16.7%	21.6%	51.9%
	Total	Count	1	5	32	66	58	162
		% of Total	.6%	3.1%	19.8%	40.7%	35.8%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.151[a]	4	.188
Likelihood Ratio	6.561	4	.161
Linear-by-Linear Association	.054	1	.817
N of Valid Cases	162		

a. 4 cells (40.0%) have expected count less than 5. The minimum
expected count is .48.

Table 9.15 Age * Comfort Crosstabulation / ANOVA

			Comfort					
			Not important	2	3	4	Very important	Total
Age	19-25	Count	0	1	13	12	14	40
		% of Total	.0%	.6%	8.0%	7.4%	8.6%	24.7%
	26-35	Count	0	2	4	14	12	32
		% of Total	.0%	1.2%	2.5%	8.6%	7.4%	19.8%
	36-45	Count	0	1	12	15	8	36
		% of Total	.0%	.6%	7.4%	9.3%	4.9%	22.2%
	46-60	Count	0	1	1	16	18	36
		% of Total	.0%	.6%	.6%	9.9%	11.1%	22.2%
	Above61	Count	1	0	2	9	6	18
		% of Total	.6%	.0%	1.2%	5.6%	3.7%	11.1%
	Total	Count	1	5	32	66	58	162
		% of Total	.6%	3.1%	19.8%	40.7%	35.8%	100.0%

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17.421	4	4.355	2.507	**.044**
Within Groups	272.702	157	1.737		
Total	290.123	161			

Table 9.16 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
Comfort	19-25	40	3.98	.891	.141
	46-60	36	4.42	.692	.115

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Comfort	Equal variances assumed	2.226	.140	-2.394	74	.019	-.442	.184	-.809	-.074
	Equal variances not assumed			-2.426	72.494	.018	-.442	.182	-.805	-.079

Table 9.17 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
Comfort	36-45	36	3.83	.811	.135
	46-60	36	4.42	.692	.115

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Comfort	Equal variances assumed	.579	.449	-3.284	70	.002	-.583	.178	-.938	-.229
	Equal variances not assumed			-3.284	68.311	.002	-.583	.178	-.938	-.229

Table 9.18 Gender * Value for money Crosstabulation / Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.410[a]	4	.171
Likelihood Ratio	6.676	4	.154
Linear-by-Linear Association	1.216	1	.270
N of Valid Cases	161		

a. 2 cells (20.0%) have expected count less than 5. The minimum
expected count is 2.39.

Table 9.19 Age * Value for money Crosstabulation / ANOVA

			Value for money					
			Not important	2	3	4	Very important	Total
Age	19-25	Count	3	2	8	11	16	40
		% of Total	1.9%	1.2%	5.0%	6.8%	9.9%	24.8%
	26-35	Count	1	2	4	14	11	32
		% of Total	.6%	1.2%	2.5%	8.7%	6.8%	19.9%
	36-45	Count	0	4	8	16	8	36
		% of Total	.0%	2.5%	5.0%	9.9%	5.0%	22.4%
	46-60	Count	0	3	7	15	10	35
		% of Total	.0%	1.9%	4.3%	9.3%	6.2%	21.7%
	Above61	Count	1	1	2	5	9	18
		% of Total	.6%	.6%	1.2%	3.1%	5.6%	11.2%
	Total	Count	5	12	29	61	54	161
		% of Total	3.1%	7.5%	18.0%	37.9%	33.5%	100.0%

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.586	4	.896	.491	.743
Within Groups	284.973	156	1.827		
Total	288.559	160			

Table 9.20 Gender * Fabric Crosstabulation / Chi-Square Tests

			Fabric					
			Not important	2	3	4	Very important	Total
Gender	Male	Count	3	3	21	29	20	76
		% of Total	1.9%	1.9%	13.1%	18.1%	12.5%	47.5%
	Female	Count	0	1	25	32	26	84
		% of Total	.0%	.6%	15.6%	20.0%	16.2%	52.5%
	Total	Count	3	4	46	61	46	160
		% of Total	1.9%	2.5%	28.8%	38.1%	28.8%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.890[a]	4	.299
Likelihood Ratio	6.086	4	.193
Linear-by-Linear Association	1.879	1	.170
N of Valid Cases	160		

a. 4 cells (40.0%) have expected count less than 5. The minimum
expected count is 1.43.

Table 9.21 Age * Fabric Crosstabulation / ANOVA

			Fabric					
			Not important	2	3	4	Very important	Total
Age	19-25	Count	1	1	13	13	12	40
		% of Total	.6%	.6%	8.1%	8.1%	7.5%	25.0%
	26-35	Count	0	0	13	12	7	32
		% of Total	.0%	.0%	8.1%	7.5%	4.4%	20.0%
	36-45	Count	0	3	12	12	9	36
		% of Total	.0%	1.9%	7.5%	7.5%	5.6%	22.5%
	46-60	Count	1	0	4	17	12	34
		% of Total	.6%	.0%	2.5%	10.6%	7.5%	21.2%
	Above61	Count	1	0	4	7	6	18
		% of Total	.6%	.0%	2.5%	4.4%	3.8%	11.2%
	Total	Count	3	4	46	61	46	160
		% of Total	1.9%	2.5%	28.8%	38.1%	28.8%	100.0%

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.025	4	2.006	1.115	.352
Within Groups	278.950	155	1.800		
Total	286.975	159			

Table 9.22 Gender * Touch Crosstabulation / Chi-Square Tests

			Touch					
			Not important	2	3	4	Very important	Total
Gender	Male	Count	7	11	22	24	14	78
		% of Total	4.3%	6.8%	13.7%	14.9%	8.7%	48.4%
	Female	Count	2	5	22	29	25	83
		% of Total	1.2%	3.1%	13.7%	18.0%	15.5%	51.6%
	Total	Count	9	16	44	53	39	161
		% of Total	5.6%	9.9%	27.3%	32.9%	24.2%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.455[a]	4	.076
Likelihood Ratio	8.710	4	.069
Linear-by-Linear Association	7.853	1	.005
N of Valid Cases	161		

a. 2 cells (20.0%) have expected count less than 5. The minimum
expected count is 4.36.

Table 9.23 Age * Touch Crosstabulation / ANOVA

			Touch					
			Not important	2	3	4	Very important	Total
Age	19-25	Count	3	0	11	15	11	40
		% of Total	1.9%	.0%	6.8%	9.3%	6.8%	24.8%
	26-35	Count	0	9	7	11	5	32
		% of Total	.0%	5.6%	4.3%	6.8%	3.1%	19.9%
	36-45	Count	1	4	13	8	10	36
		% of Total	.6%	2.5%	8.1%	5.0%	6.2%	22.4%
	46-60	Count	2	2	6	15	10	35
		% of Total	1.2%	1.2%	3.7%	9.3%	6.2%	21.7%
	Above61	Count	3	1	7	4	3	18
		% of Total	1.9%	.6%	4.3%	2.5%	1.9%	11.2%
	Total	Count	9	16	44	53	39	161
		% of Total	5.6%	9.9%	27.3%	32.9%	24.2%	100.0%

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17.421	4	4.355	2.507	**.044**
Within Groups	272.702	157	1.737		
Total	290.123	161			

Table 9.24 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
Touch	46-60	35	3.83	1.098	.186
	Above61	18	3.17	1.295	.305

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Touch	Equal variances assumed	.574	.452	1.955	51	.056	.662	.339	-.018	1.342
	Equal variances not assumed			1.853	29.852	.074	.662	.357	-.068	1.391

Table 9.25 Gender * Durability Crosstabulation / Chi-Square Tests

			Durability					Total
			Not important	2	3	4	Very important	
Gender	Male	Count	5	6	30	23	13	77
		% of Total	3.1%	3.8%	18.8%	14.4%	8.1%	48.1%
	Female	Count	10	11	24	19	19	83
		% of Total	6.2%	6.9%	15.0%	11.9%	11.9%	51.9%
Total		Count	15	17	54	42	32	160
		% of Total	9.4%	10.6%	33.8%	26.2%	20.0%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.092[a]	4	.278
Likelihood Ratio	5.148	4	.272
Linear-by-Linear Association	.375	1	.540
N of Valid Cases	160		

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	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.092[a]	4	.278
Likelihood Ratio	5.148	4	.272
Linear-by-Linear Association	.375	1	.540

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.22.

Table 9.26 Age * Durability Crosstabulation / ANOVA

			Durability					Total
			Not important	2	3	4	Very important	
Age	19-25	Count	5	4	18	10	2	39
		% of Total	3.1%	2.5%	11.2%	6.2%	1.2%	24.4%
	26-35	Count	1	5	8	12	6	32
		% of Total	.6%	3.1%	5.0%	7.5%	3.8%	20.0%
	36-45	Count	4	4	17	6	4	35
		% of Total	2.5%	2.5%	10.6%	3.8%	2.5%	21.9%
	46-60	Count	3	1	7	11	14	36
		% of Total	1.9%	.6%	4.4%	6.9%	8.8%	22.5%
	Above61	Count	2	3	4	3	6	18
		% of Total	1.2%	1.9%	2.5%	1.9%	3.8%	11.2%
	Total	Count	15	17	54	42	32	160
		% of Total	9.4%	10.6%	33.8%	26.2%	20.0%	100.0%

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	23.091	4	5.773	3.391	**.011**
Within Groups	263.884	155	1.702		
Total	286.975	159			

Table 9.27 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
Durability	19-25	39	3.00	1.051	.168
	26-35	32	3.53	1.077	.190

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		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper	
Durability	Equal variances assumed	1.296	.259	-2.095	69	.040	-.531	.254	-1.037	-.025	
	Equal variances not assumed			-2.090	65.670	.040	-.531	.254	-1.039	-.024	

Table 9.28 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
Durability	19-25	39	3.00	1.051	.168
	46-60	36	3.89	1.214	.202

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper	
Durability	Equal variances assumed	1.486	.227	-3.397	73	.001	-.889	.262	-1.410	-.367	
	Equal variances not assumed			-3.378	69.545	.001	-.889	.263	-1.414	-.364	

Table 9.29 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
Durability	36-45	35	3.06	1.110	.188
	46-60	36	3.89	1.214	.202

	Levene's Test for Equality of Variances		t-test for Equality of Means							
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Durability Equal variances assumed	.800	.374	-3.011	69	.004	-.832	.276	-1.383	-.281
Equal variances not assumed			-3.015	68.747	.004	-.832	.276	-1.382	-.281

Table 9.30 Gender * Easy care Crosstabulation / Chi-Square Tests

			Easy care					
			Not important	2	3	4	Very important	Total
Gender	Male	Count	7	15	28	15	12	77
		% of Total	4.4%	9.4%	17.6%	9.4%	7.5%	48.4%
	Female	Count	5	13	26	20	18	82
		% of Total	3.1%	8.2%	16.4%	12.6%	11.3%	51.6%
	Total	Count	12	28	54	35	30	159
		% of Total	7.5%	17.6%	34.0%	22.0%	18.9%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.310[a]	4	.679
Likelihood Ratio	2.320	4	.677
Linear-by-Linear Association	2.125	1	.145
N of Valid Cases	159		

a. 0 cells (.0%) have expected count less than 5. The minimum

expected count is 5.81.

Table 9.31 Age * Easy care Crosstabulation / ANOVA

			Easy care					
			Not important	2	3	4	Very important	Total
Age	19-25	Count	4	11	16	4	5	40
		% of Total	2.5%	6.9%	10.1%	2.5%	3.1%	25.2%
	26-35	Count	3	5	11	9	4	32
		% of Total	1.9%	3.1%	6.9%	5.7%	2.5%	20.1%
	36-45	Count	2	6	11	7	8	34
		% of Total	1.3%	3.8%	6.9%	4.4%	5.0%	21.4%
	46-60	Count	1	3	13	12	6	35
		% of Total	.6%	1.9%	8.2%	7.5%	3.8%	22.0%
	Above61	Count	2	3	3	3	7	18
		% of Total	1.3%	1.9%	1.9%	1.9%	4.4%	11.3%
	Total	Count	12	28	54	35	30	159
		% of Total	7.5%	17.6%	34.0%	22.0%	18.9%	100.0%

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	15.894	4	3.974	2.245	.067
Within Groups	272.533	154	1.770		
Total	288.428	158			

Table 9.32 Gender * Brand Crosstabulation / Chi-Square Tests

			Brand					
			Not important	2	3	4	Very important	Total
Gender	Male	Count	19	18	19	11	10	77
		% of Total	11.8%	11.2%	11.8%	6.8%	6.2%	47.8%
	Female	Count	31	15	22	10	6	84
		% of Total	19.3%	9.3%	13.7%	6.2%	3.7%	52.2%
	Total	Count	50	33	41	21	16	161
		% of Total	31.1%	20.5%	25.5%	13.0%	9.9%	100.0%

262

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.123[a]	4	.390
Likelihood Ratio	4.155	4	.385
Linear-by-Linear Association	2.517	1	.113
N of Valid Cases	161		

a. 0 cells (.0%) have expected count less than 5. The minimum

expected count is 7.65.

Table 9.33 Age * Brand Crosstabulation / ANOVA

			Brand					
			Not important	2	3	4	Very important	Total
Age	19-25	Count	16	5	8	5	6	40
		% of Total	9.9%	3.1%	5.0%	3.1%	3.7%	24.8%
	26-35	Count	6	13	8	3	2	32
		% of Total	3.7%	8.1%	5.0%	1.9%	1.2%	19.9%
	36-45	Count	13	5	11	4	3	36
		% of Total	8.1%	3.1%	6.8%	2.5%	1.9%	22.4%
	46-60	Count	9	5	13	5	3	35
		% of Total	5.6%	3.1%	8.1%	3.1%	1.9%	21.7%
	Above61	Count	6	5	1	4	2	18
		% of Total	3.7%	3.1%	.6%	2.5%	1.2%	11.2%
	Total	Count	50	33	41	21	16	161
		% of Total	31.1%	20.5%	25.5%	13.0%	9.9%	100.0%

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.317	4	.579	.316	.867
Within Groups	286.242	156	1.835		
Total	288.559	160			

Question 10

Table 10.1 Gender * how many items p.a. Crosstabulation / Chi-Square Tests

			how many items p.a.						
			0-5	6-10	11-20	21-30	30 +	Unsure	Total
Gender	Male	Count	15	23	24	8	5	3	78
		% of Total	9.3%	14.2%	14.8%	4.9%	3.1%	1.9%	48.1%
	Female	Count	17	11	16	20	15	5	84
		% of Total	10.5%	6.8%	9.9%	12.3%	9.3%	3.1%	51.9%
	Total	Count	32	34	40	28	20	8	162
		% of Total	19.8%	21.0%	24.7%	17.3%	12.3%	4.9%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.403[a]	5	**.006**
Likelihood Ratio	16.893	5	.005
Linear-by-Linear Association	6.221	1	.013
N of Valid Cases	162		

a. 2 cells (16.7%) have expected count less than 5. The minimum
expected count is 3.85.

Table 10.2 Age * how many items p.a. Crosstabulation / ANOVA

			how many items p.a.						
			0-5	6-10	11-20	21-30	30 +	Unsure	Total
Age	19-25	Count	2	1	9	14	11	3	40
		% of Total	1.2%	.6%	5.6%	8.6%	6.8%	1.9%	24.7%
	26-35	Count	8	7	10	5	0	2	32
		% of Total	4.9%	4.3%	6.2%	3.1%	.0%	1.2%	19.8%
	36-45	Count	5	10	9	3	6	3	36
		% of Total	3.1%	6.2%	5.6%	1.9%	3.7%	1.9%	22.2%
	46-60	Count	10	10	10	5	1	0	36
		% of Total	6.2%	6.2%	6.2%	3.1%	.6%	.0%	22.2%
	Above61	Count	7	6	2	1	2	0	18
		% of Total	4.3%	3.7%	1.2%	.6%	1.2%	.0%	11.1%
	Total	Count	32	34	40	28	20	8	162
		% of Total	19.8%	21.0%	24.7%	17.3%	12.3%	4.9%	100.0%

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	51.087	5	10.217	6.668	.000
Within Groups	239.037	156	1.532		
Total	290.123	161			

Table 10.3 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
how many items p.a.	19-25	40	4.00	1.177	.186
	26-35	32	2.62	1.362	.241

265

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
how many items p.a.	Equal variances assumed	1.544	.218	4.594	70	.000	1.375	.299	.778	1.972
	Equal variances not assumed			4.519	61.615	.000	1.375	.304	.767	1.983

Table 10.4 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
how many items p.a.	19-25	40	4.00	1.177	.186
	36-45	36	3.11	1.545	.258

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
how many items p.a.	Equal variances assumed	4.554	.036	2.838	74	.006	.889	.313	.265	1.513
	Equal variances not assumed			2.798	65.146	.007	.889	.318	.254	1.523

Table 10.5 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
how many items p.a.	19-25	40	4.00	1.177	.186
	46-60	36	2.36	1.125	.188

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper
how many items p.a.	Equal variances assumed	.439	.510	6.189	74	.000	1.639	.265	1.111	2.166
	Equal variances not assumed			6.204	73.717	.000	1.639	.264	1.113	2.165

Table 10.6 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
how many items p.a.	19-25	40	4.00	1.177	.186
	Above61	18	2.17	1.339	.316

Table 10.7 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
how many items p.a.	36-45	36	3.11	1.545	.258
	46-60	36	2.36	1.125	.188

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper
how many items p.a.	Equal variances assumed	3.048	.085	2.354	70	.021	.750	.319	.115	1.385
	Equal variances not assumed			2.354	63.972	.022	.750	.319	.114	1.386

Table 10.8 Group Statistics / Independent Samples Test

	Age	N	Mean	Std. Deviation	Std. Error Mean
how many items p.a.	36-45	36	3.11	1.545	.258
	Above61	18	2.17	1.339	.316

		Levene's Test for Equality of Variances		t-test for Equality of Means						
							Mean Differen ce	Std. Error Differen ce	95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)			Lower	Upper
how many items p.a.	Equal variances assumed	.944	.336	2.209	52	.032	.944	.428	.087	1.802
	Equal variances not assumed			2.318	38.803	.026	.944	.407	.120	1.769

Table 10.9 Year * How many items p.a. Crosstabulation / ANOVA

			How many items p.a.						
			0-5	6-10	11-20	21-30	30 +	Unsure	Total
Year	2008	Count	32	34	40	28	20	8	162
		% within Year	19.8%	21.0%	24.7%	17.3%	12.3%	4.9%	100.0%
	2001	Count	19	24	19	14	3	7	86
		% within Year	22.1%	27.9%	22.1%	16.3%	3.5%	8.1%	100.0%
	Total	Count	51	58	59	42	23	15	248
		% within Year	20.6%	23.4%	23.8%	16.9%	9.3%	6.0%	100.0%

How many items p.a.					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.411	1	2.411	1.128	.289
Within Groups	525.650	246	2.137		
Total	528.060	247			

Question 11

Table 11.1 Gender * spend Crosstabulation / Chi-Square Tests

			spend						
			Less than £100	£100-300	£301-500	£501-1000	More than £1000	Unsure	Total
Gender	Male	Count	10	29	18	12	3	6	78
		% of Total	6.2%	17.9%	11.1%	7.4%	1.9%	3.7%	48.1%
	Female	Count	4	25	19	21	9	6	84
		% of Total	2.5%	15.4%	11.7%	13.0%	5.6%	3.7%	51.9%
	Total	Count	14	54	37	33	12	12	162
		% of Total	8.6%	33.3%	22.8%	20.4%	7.4%	7.4%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.138[a]	5	.149
Likelihood Ratio	8.383	5	.136
Linear-by-Linear Association	4.468	1	.035
N of Valid Cases	162		

a. 0 cells (.0%) have expected count less than 5. The minimum

expected count is 5.78.

Table 11.2 Age * spend Crosstabulation / ANOVA

			spend						Total
			Less than £100	£100-300	£301-500	£501-1000	More than £1000	Unsure	
Age	19-25	Count	2	11	11	7	4	5	40
		% of Total	1.2%	6.8%	6.8%	4.3%	2.5%	3.1%	24.7%
	26-35	Count	4	8	6	9	1	4	32
		% of Total	2.5%	4.9%	3.7%	5.6%	.6%	2.5%	19.8%
	36-45	Count	1	13	12	5	3	2	36
		% of Total	.6%	8.0%	7.4%	3.1%	1.9%	1.2%	22.2%
	46-60	Count	2	12	7	11	3	1	36
		% of Total	1.2%	7.4%	4.3%	6.8%	1.9%	.6%	22.2%
	Above61	Count	5	10	1	1	1	0	18
		% of Total	3.1%	6.2%	.6%	.6%	.6%	.0%	11.1%
	Total	Count	14	54	37	33	12	12	162
		% of Total	8.6%	33.3%	22.8%	20.4%	7.4%	7.4%	100.0%

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	19.544	5	3.909	2.254	.052
Within Groups	270.579	156	1.734		
Total	290.123	161			

Table 11.3 Year * spend Crosstabulation / ANOVA

			spend						
			Less than £100	£100-300	£301-500	£501-1000	More than £1000	Unsure	Total
Year	2008	Count	14	54	37	33	12	12	162
		% within Year	8.6%	33.3%	22.8%	20.4%	7.4%	7.4%	100.0%
	2001	Count	4	27	23	24	7	7	92
		% within Year	4.3%	29.3%	25.0%	26.1%	7.6%	7.6%	100.0%
	Total	Count	18	81	60	57	19	19	254
		% within Year	7.1%	31.9%	23.6%	22.4%	7.5%	7.5%	100.0%

spend

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.185	1	2.185	1.224	.270
Within Groups	449.992	252	1.786		
Total	452.177	253			

Question 12

Table 12.1 Gender * consider Crosstabulation / Chi-Square Tests

			consider					
			Not at all	2	3	4	All the time	Total
Gender	Male	Count	9	15	23	25	6	78
		% of Total	5.6%	9.3%	14.2%	15.4%	3.7%	48.1%
	Female	Count	11	13	33	22	5	84
		% of Total	6.8%	8.0%	20.4%	13.6%	3.1%	51.9%
	Total	Count	20	28	56	47	11	162
		% of Total	12.3%	17.3%	34.6%	29.0%	6.8%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.192[a]	4	.701
Likelihood Ratio	2.199	4	.699
Linear-by-Linear Association	.248	1	.619
N of Valid Cases	162		

a. 0 cells (.0%) have expected count less than 5. The minimum
expected count is 5.30.

Table 12.2 Age * consider Crosstabulation / ANOVA

			consider					Total
			Not at all	2	3	4	All the time	
Age	19-25	Count	5	8	11	14	2	40
		% of Total	3.1%	4.9%	6.8%	8.6%	1.2%	24.7%
	26-35	Count	6	9	9	7	1	32
		% of Total	3.7%	5.6%	5.6%	4.3%	.6%	19.8%
	36-45	Count	3	5	16	8	4	36
		% of Total	1.9%	3.1%	9.9%	4.9%	2.5%	22.2%
	46-60	Count	1	5	14	13	3	36
		% of Total	.6%	3.1%	8.6%	8.0%	1.9%	22.2%
	Above61	Count	5	1	6	5	1	18
		% of Total	3.1%	.6%	3.7%	3.1%	.6%	11.1%
	Total	Count	20	28	56	47	11	162
		% of Total	12.3%	17.3%	34.6%	29.0%	6.8%	100.0%

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.455	4	1.614	.893	.470
Within Groups	283.668	157	1.807		
Total	290.123	161			

Table 12.3 Year * Consider Crosstabulation / ANOVA

| | | | Consider |
			Not at all	2	3	4	All the time	Total
Year	2008	Count	20	28	56	47	11	162
		% within Year	12.3%	17.3%	34.6%	29.0%	6.8%	100.0%
	2001	Count	12	18	32	18	8	88
		% within Year	13.6%	20.5%	36.4%	20.5%	9.1%	100.0%
	Total	Count	32	46	88	65	19	250
		% within Year	12.8%	18.4%	35.2%	26.0%	7.6%	100.0%

Consider	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.537	1	.537	.424	.515
Within Groups	314.267	248	1.267		
Total	314.804	249			

Question 13

Table 13.1 Gender * how often buy eco products Crosstabulation / Chi-Square Tests

| | | | how often buy eco products |
			Not at all	2	3	4	As much as possible	Total
Gender	Male	Count	8	10	34	16	10	78
		% of Total	4.9%	6.2%	21.0%	9.9%	6.2%	48.1%
	Female	Count	12	12	27	23	10	84
		% of Total	7.4%	7.4%	16.7%	14.2%	6.2%	51.9%
	Total	Count	20	22	61	39	20	162
		% of Total	12.3%	13.6%	37.7%	24.1%	12.3%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.823[a]	4	.588
Likelihood Ratio	2.834	4	.586
Linear-by-Linear Association	.060	1	.807

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.823[a]	4	.588
Likelihood Ratio	2.834	4	.586
Linear-by-Linear Association	.060	1	.807
N of Valid Cases	162		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.63.

Table 13.2 Age * how often buy eco products Crosstabulation / ANOVA

			how often buy eco products					
			Not at all	2	3	4	As much as possible	Total
Age	19-25	Count	4	8	16	7	5	40
		% of Total	2.5%	4.9%	9.9%	4.3%	3.1%	24.7%
	26-35	Count	2	5	13	8	4	32
		% of Total	1.2%	3.1%	8.0%	4.9%	2.5%	19.8%
	36-45	Count	6	6	10	9	5	36
		% of Total	3.7%	3.7%	6.2%	5.6%	3.1%	22.2%
	46-60	Count	2	3	16	9	6	36
		% of Total	1.2%	1.9%	9.9%	5.6%	3.7%	22.2%
	Above61	Count	6	0	6	6	0	18
		% of Total	3.7%	.0%	3.7%	3.7%	.0%	11.1%
	Total	Count	20	22	61	39	20	162
		% of Total	12.3%	13.6%	37.7%	24.1%	12.3%	100.0%

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.614	4	3.404	1.932	.108
Within Groups	276.509	157	1.761		
Total	290.123	161			

Table 13.3 Year * How often buy eco products Crosstabulation / ANOVA

			How often buy eco products					
			Not at all	2	3	4	As much as possible	Total
Year	2008	Count	20	22	61	39	20	162
		% within Year	12.3%	13.6%	37.7%	24.1%	12.3%	100.0%
	2001	Count	7	16	27	19	12	81
		% within Year	8.6%	19.8%	33.3%	23.5%	14.8%	100.0%
	Total	Count	27	38	88	58	32	243
		% within Year	11.1%	15.6%	36.2%	23.9%	13.2%	100.0%

How often buy eco products

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.167	1	.167	.122	.727
Within Groups	328.130	241	1.362		
Total	328.296	242			

Question 14

Table 14.1 Gender * organic Crosstabulation / Chi-Square Tests

			organic					
			Not at all	2	3	4	All the time	Total
Gender	Male	Count	14	20	19	22	3	78
		% of Total	8.6%	12.3%	11.7%	13.6%	1.9%	48.1%
	Female	Count	12	15	32	20	5	84
		% of Total	7.4%	9.3%	19.8%	12.3%	3.1%	51.9%
	Total	Count	26	35	51	42	8	162
		% of Total	16.0%	21.6%	31.5%	25.9%	4.9%	100.0%

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.561[a]	4	.335
Likelihood Ratio	4.600	4	.331
Linear-by-Linear Association	.698	1	.403
N of Valid Cases	162		

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.561[a]	4	.335
Likelihood Ratio	4.600	4	.331
Linear-by-Linear Association	.698	1	.403

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 3.85.

Table 14.2 Age * organic Crosstabulation / ANOVA

			organic					Total
			Not at all	2	3	4	All the time	
Age	19-25	Count	6	8	12	12	2	40
		% of Total	3.7%	4.9%	7.4%	7.4%	1.2%	24.7%
	26-35	Count	6	6	10	8	2	32
		% of Total	3.7%	3.7%	6.2%	4.9%	1.2%	19.8%
	36-45	Count	6	10	9	8	3	36
		% of Total	3.7%	6.2%	5.6%	4.9%	1.9%	22.2%
	46-60	Count	3	6	15	11	1	36
		% of Total	1.9%	3.7%	9.3%	6.8%	.6%	22.2%
	Above61	Count	5	5	5	3	0	18
		% of Total	3.1%	3.1%	3.1%	1.9%	.0%	11.1%
	Total	Count	26	35	51	42	8	162
		% of Total	16.0%	21.6%	31.5%	25.9%	4.9%	100.0%

Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.184	4	.546	.298	.879
Within Groups	287.940	157	1.834		
Total	290.123	161			

Table 14.3 Year * Organic Crosstabulation / ANOVA

			Organic					
			Not at all	2	3	4	All the time	Total
Year	2008	Count	26	35	51	42	8	162
		% within Year	16.0%	21.6%	31.5%	25.9%	4.9%	100.0%
	2001	Count	32	20	19	11	3	85
		% within Year	37.6%	23.5%	22.4%	12.9%	3.5%	100.0%
	Total	Count	58	55	70	53	11	247
		% within Year	23.5%	22.3%	28.3%	21.5%	4.5%	100.0%

Organic

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	20.691	1	20.691	15.550	**.000**
Within Groups	325.997	245	1.331		
Total	346.688	246			

Appendix 5.1: The interview protocol

Japanese recycled fibres manufacturers

1_What is your role in the company?

2_What tonnage do you produce per year? What about 2005?

3_What is your market share? What percentage?

4_Could you explain your products? (starting date/materials or chemical recycling, long or staple fibre) The fabric samples that you send,

5_Which markets are your prime target (ECOPET PLUS)?

6_Is it possible to produce any type of fabric structure using recycled materials just like it is with virgin polyester?

7_Do you have in house weaving facilities or do you outsource?

8_Do you use textile designers to develop fabrics?

9_Have you ever tried to target the fashion market with recycled content fabrics e.g. high-street clothing retailers? If not, why not?

10_Where do you see the potential use for your recycled fabrics? Which sector?

11_There is an argument that fashion garments for the high street fashion market should be made from recycled materials, could you tell me your view? Can you see potential for this to happen? If not, why not and what are or would be the key drivers for you to target the fashion market?

12_Is recycled fabric now cheaper than fabric with virgin materials? How does recycled fibre compare with virgin fibre? Cost? Quality?

13_Is it feasible to mix a small percentage of recycled materials with virgin materials just like organic cotton used to when it first started entering the market? If so, what should be the percentage?

14_Do you have a stable supply of waste materials so that you can supply recycled materials to the mass-market?

15_Is there an increase of resource supply recently? Where from?

16_Is the environmental section of your business profit motivated or is it justified by alternative company strategies? How much importance is placed on the environmental credentials of your business specifically the fibre promotion?

17_How do you differentiate yourself from your competitors?

18_Is there an increased demand from the UK clothing industry?

19_Do you think that Ingeo will replace oil based synthetic polyester in the future?

UK high-street clothing retailers

Question 1   Could you describe your company:
              - What is your role in the company?
              - Which products are you dealing with?
              - What is your target market?
              - What size is the company?
              - How many people are in the design team?
(N.B. Some of the questions may be answered prior to the interview.)

Question 2   How do you choose materials (e.g. fairs or agency?)
              - How many agencies do you have?
              - Do you use only limited agencies or are you open to anyone?
              - If they use only limited agencies, ask to explain the reason behind it.
              - Do you have enough time to find out about the materials?
              - Is there someone else doing it for you?
              - What are the priorities when choosing materials for your company?
               (e.g. price, performance, looks or trend)

Please circle the appropriate number according to your degree of preference, 1 to 5.					
	Not Important				Very Important
Price	1	2	3	4	5
Fabric quality (e.g. performance, touch)	1	2	3	4	5
Seasonal (e.g. colour, weight)	1	2	3	4	5
Textile Design (e.g. construction, colour, print)	1	2	3	4	5
Consumer demand	1	2	3	4	5
General Trend (e.g. catwalk, in-street)	1	2	3	4	5
Stock availability	1	2	3	4	5
Other (please specify)	1	2	3	4	5

Question 3   How do you develop a design theme or project?

              - Could you draw a diagram showing your typical design processes by
               stages?
              - Who makes critical decisions at each stage?
              - Fairs – what do you decide/discussion? E.g. overview or short list the
               fabrics/companies?
              - Joint decision making – each stage – what debate with your colleagues
               e.g.   price? Design?
              - What is the biggest area of compromise?
              - What is the designer's role in your company?

Question 4   Would you consider using recycled materials in your products?
              What priority does eco-design take in your organisation?
              Can you think of any reasons why recycled materials are not used widely
              yet in the clothing industry?

Participants will be asked to fill in this questionnaire.

Name	
Occupation	
Company	

Do you know of any clothing companies who are using eco-textiles (e.g. recycled/ organic)?
Please list them below.

_____

_____

_____

_____

_____

What are important drivers to use recycled materials in your companies products?

	Not important				Very important
Future Legislation	1	2	3	4	5
Competition	1	2	3	4	5
Company Decision	1	2	3	4	5
Personal Belief	1	2	3	4	5
Consumer Pressure	1	2	3	4	5
Other (Please specify below)	1	2	3	4	5

Question 5 Have there been any changes in terms of materials selection last a couple of years?

Question 6 Who are the different people involved in the selection process? Is it the same people than three years ago?

Question 7 These are examples of fabrics currently available. How would you describe them?

Appendix 5.2: An example of textile recyclers and consultants interviews

NatureWorks LLC /Ingeo	
Informant	▮▮▮▮▮▮▮▮ an independent textile consultant
Methods	face-to-face interview
Proposed Date/Time	7th October 2008 at RITE conference

Questions:

What is your role in the company?
I am an independent textile consultant and have been working with NatureWorks LLC on the technical aspects of processing Ingeo fibre (particularly colouration – dyeing and finishing) with downstream partners e.g. fabric producers, dyers, dye and chemical auxiliary suppliers, universities.

Is it possible to produce any type of fabric structure using recycled materials just like it is with virgin material?
Yes, it is possible. Recycled materials can produce any fabric structure.

Do you think that PLA (poly lactic acida) will replace oil based synthetic polyester?
PLA cannot take over synthetic polyester. The production capacity of PLA is currently small amount (approximately 150,000 tons per year) opposed to 30 million tons of synthetic polyester. PLA has a long long way to go.

Aren't there also issues about how much land we need to produce Ingeo to replace 30 million tons of synthetic polyester?
The source material at present for PLA is animal feedstock quality maize corn: this is readily available but it is not the only potential source – other sources could include e.g. biomass (starch is the material we are extracting and this is available from many source options), so I'm not sure that the land availability question would necessarily be an issue.
Ingeo's low melting point (170 °C) is also an issue for clothing applications. Ingeo's hand feel is similar to the one of cotton, therefore consumers may easily mistake Ingeo garments for cotton garments. If they wash or iron Ingeo garments applying cotton temperatures, it will damage the Ingeo garment. PLA garments have their own care label for washing / ironing: these need to be adhered to and customers do need to read care labels e.g. you would not treat a silk garment like a cotton, and similarly with PLA.
I have heard that high melting point Ingeo fibres haves been developed.
NatureWorks / Teijin understand the technology to produce a higher melting point polymer and have certainly developed trial fibre and fabrics, but I do not believe that this is currently being done in commercial programmes – I am not certain of the latest position.
We have been producing Ingeo for some years but am only recently getting more attention. This RITE conference attracted over 300 delegates which is extraordinary especially considering this conference was held in the UK and in the textile and clothing sector. That means that this area is currently high profile.

Appendix 5.3: An example of industry surveys interviews in 2008/9 – JP recycled fibre/fabric manufacturers

*The sections that could identify either company or informant are censored as a few companies required to remain anonymous.

███████████████ Company D

1_What is your role in the company? How many people are working in your department?

███
███
███
███
███
███
███

2_What tonnage do you produce per year? What about 2005?

███
███
███
███
███ for a long time and this time we have produced them with recycled material. We are replacing conventional material with recycled material in other brands ███████
███████

What share ██
production?
We are producing ████████████████████████████ Usually polyester is a round and long yarn, but we differentiate our products by producing thin, triangle or using specific polymer and give them different brand names. These products take a of share perhaps about 20% ████████████████████.
Material recycling is known for producing a fleece jacket which involves a process of washing and melting plastic bottles and producing the yarn████████████████
████████████████████████████████████ Chemical recycling involves returning polyester into molecule level and then return it to raw polyester material. From this material we reproduce polyester. It is possible to return it to the raw material at equal quality as the raw materials derived from crude oil, we can produce polyester that is the same quality as the one from crude oil. Normally, quality used to became inferior when recycling is involved, but this is not the case now. ███████████████████
████████████████████████

For materials recycling, quality will be degrading?
Well, yes. Polyester is made with polymers that have a long chain of the same structure. These chains will break when heat is added to melt the polyester. This length of the chains is very important when we produce polyester fibre as the quality of the fibre will be unstable if these chains are broken in some place. Because of these

reasons, it was impossible to produce fabrics with special performance function. However, chemical recycling has overcome these difficulties. In theory, we could produce any types of polyester. And this is the specific point.

Fabrics with ████████████████████████████
████████ **are more difficult to produce?**
It was difficult to produce ████████████████████████ in comparison to produce a usual thin and long polyester fibre. It was not possible to produce them by material recycling but it became possible through using chemical recycling.

Due to the complicated fibre surface?
That is right. The specific polymer that has a bumpy surface is used for ████████████
██████████████████ is made of extremely thin yarn and to produce this particularly thin yarn is not easy. **Due to instability?** That is right.

Could you tell me the output since 2005?

	2005 年	2006 年	2007 年	2008 年
████████ █	█	█	████████	████████

████████████████████████████
████████████████████ that produce chemically recycled fibres. However, there is a difference between producing materials by recycling and collecting products and recycle them. ████████████
████████████

3_What is your market share in Japan? What percentage? What about worldwide?
I have no idea. There is so much imported yarn in Japan. I do not know its denominator.

You mean that there is imported polyester yarn?
Yes. They are the fibre produced by chemical recycling. For example, fibre quality does not matter for stuffing for soft toys. And many soft toys contain material recycled fibre from China. Therefore, I cannot get a whole picture.

4_Could you explain ████████████████████████████████ **(starting date/materials or chemical recycling, long or staple fibre)**

██
██
██
████████████████████████████████
██
██
██
██
████████████████████████████████

5_I saw fabric samples ████████████████████████████
██
████████ However, the variation has been increased. I mean the variation for instance, changing the woven structures or mixed and so on.

6_What is the reason ████████████████ **to be added? Is there any demand for such products?**
████████████████████████████████ but the reason why there is such high demand for polyester is that it is easy to treat, it is easy to add functions and feel to it.
███
███ Also replacing conventional polyester with eco materials is our company policy.

7_Which markets are your prime target ███████████
We are targeting the sportswear market. Until now we had markets such as uniform, interior and industrial materials. Polyester has been used for many kinds of industrial materials such as net and seat cushions for trains. We would like to continue to replace conventional material with more eco material in those areas.
At the moment we are concentrating on the sportswear market but in the future we would like to expand to fashion and general clothing area to replace polyester into eco material. However, at first we are targeting sports and outdoor wear markets.
What is the market share for eco material?
I do not know exactly however, in particular for the uniform market in Japan, we have 'the Law on Promoting Green Purchasing' that encourages companies to use uniforms made of recycled materials and also have a label called 'Eco Mark' that is well spread. Perhaps, uniforms that are made of partly recycled materials may have a 50% share. I do not know about general clothes because of the high percentage of imported goods. It is also difficult to grasp the whole picture as there are so many small SME's within the area of apparel and retailers.

Could you explain about the fabric samples that you have send to me ██████
██
██
██
██
██
██
Is this eco material? At the moment we do not specify this fabric as eco material. It has stretching character. But you can say this is eco as this can be recycled.

8_Is it possible to produce any type of fabric structure using recycled materials just like it is with virgin polyester?
 It is possible.

9_Do you have in house weaving facilities or do you outsource?
 We outsource. We produce yarn and pass it on to local product team usually.

10_Do you use textile designers to develop fabrics?
We have our designers within the process technology department, so we work together with them. However, we are flexible as sometimes local companies develop fabrics, it depends on the situation.
███

we outsource to produce fabrics.

For example, is it possible to work together from the design stage with apparels to produce the exact fabrics the apparel wants? Of course, it depends on price and quantity but would you be prepared to do that?
We do already. Sometime we will suggest doing that and on other occasion our clients ask us to develop fabrics together based on the fabrics that we have already. We are willing to do that but it will be difficult for small amounts of fabrics, it is difficult unless there is a certain amount of order if we are to produce new fabrics.

11_Have you ever tried to target the fashion market with recycled content fabrics e.g. high-street clothing retailers? If not, why not?
We have. There is a company called FLANDRE that have shops within department stores. This company have started to produce recruit suits that can be recycled since 2007. This project has been very popular among the department stores and MARUI department uses recycled materials for their private suits. These projects are ongoing. This is only a small part but I feel that it has started.

12_Where do you see the potential use for your recycled fabrics? Which sector?
I believe it will expand to the whole area where polyester is used. We feel that we have to expand to that level. The idea of green purchasing and CSR are well spread among companies hence there is demand. However, there is no such demand among the general consumers. There are some but not well established yet. We believe that we will have to carry out a marketing campaign in the same time that establishes and creates needs among the general consumers. By doing so, the market for recycled material will expand to the general public thus to the fashion market.

13_There is an argument that fashion garments for the high street fashion market should be made from recycled materials, could you tell me your view? Can you see potential for this to happen? If not, why not and what are or would be the key drivers for you to target the fashion market?
I do not think that recycled materials should be used in particular for fast fashion but they should be used also for fast fashion.
Do you find difficult to target fashion market due to its short fast cycle?
I do not think so. I do not see any problems ████████████████ fabrics to be used in this market as these fabrics can offer the feel and function that are desired in the fashion market where polyester has been used.
How do you think about slow fashion?
We do hope so. However, it is depends on the cost therefore in the end of the day, it is up to consumers to choose. We would like to offer good quality fabrics that will be used for a long time.

14_Is recycled fabric now cheaper than fabric with virgin materials? How does recycled fibre compare with virgin fibre? Cost? Quality?
They are more expensive. According to the products but as a yarn price, it is 20 to 30% more expensive. As a fabric price, it depends on quantity. There is no quality difference.

15_Is it feasible to mix a small percentage of recycled materials with virgin materials just like organic cotton used to when it first started entering the market? If so, what should be the percentage?
We produce fabrics for uniforms that contain 10% or 50% of mixtures. For instance, we use eco material for the weft and use ordinal polyester for the warp, we mix it as a

fabric (not as a yarn).

Is this to reduce the cost?
Mainly, it is to reduce the cost. However, sometimes it is to reduce costs and other times it is for fabric design.

16_Do you have a stable supply of waste materials so that you can supply recycled materials to the mass-market?
We can secure the quantity. The PET bottle itself is in an unstable situation worldwide, however there are PET bottles' waste, used clothes, industrial fibre waste and so on, therefore the supply is stable.
For the PET bottle situation, PET bottle waste is exported to China. In the recent months the Chinese are restricting import of waste. Until now, due to high oil price, there are many cases where they used PET bottle waste instead of crude oil. However, the oil price is decreasing at the moment, there is no need to do that anymore.

17_Is there an increase of resource supply recently? Where from?
Nationwide. ████████████████████████████████████
████████████████████████████

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██

There are so many stretchy fabrics in a market, does that mean that a high percentage of fabrics are not suitable for garment recycling?
██
██
██
██
██
██

19_Is the environmental section of your business profit motivated or is it justified by alternative company strategies?
(In fact it is both. They both have to be there.) Profit motivated. ████████████
████████████████████████. We had been expanding our business based on our chemical technology and decided to set the mission statement, to create an environmental business which lead to our focus ████████████████. Therefore it is not only profit making but without making a profit, a business would not survive in the

longer tem, so I believe that it is profit motivated.

How much importance is placed on the environmental credentials of your business specifically the fibre promotion?

We promote the environmental credential. However, it depends on the market you are selling to. For our fashion market, we promote the functions and the character of the fabrics first and then we mention that it is also eco fabric. On the other hand, for company uniforms, it is an absolute must to be an eco fabric. In that case, we promote the eco side of the fabric first. We are flexible in the way we promote fabrics, according to client's purpose of use.

20_How do you differentiate yourself from your competitors?

███
███
███
███
███
███
███

21_Is there an increased demand from the UK clothing industry?

There is. There are more inquiries from the whole of Europe. With some companies we are already doing business. For example, Quick Silver and Patagonia. There were some inquiry from M&S but I do not know about that in detail.

22_Do you think that Ingeo will replace oil based synthetic polyester in the future?

I think it will be both. I think it is not possible to replace all polyester demand with PLA derived from plant base. We will have to use virgin and recycled also, so it could be three types or both recycled and PLA may grow as two main materials.

23_ Textile recyclers have previously said to me that synthetic fabrics and fabrics with a mix containing synthetic fibres were no use to them. They want clothing industry to stick to natural fibres. How do you think about that?

The end of the day, it is up to consumers. Polyester is the fibre that is produced most in the world. The reason why polyester is so frequently used is that it is easy to treat and also customers want it. Unless otherwise there will be a law for us to use only natural fibres, I do not think it is realistic. I do not agree with the idea that is looking at from only the recycling point of view saying that we should not use synthetic fabrics because it is difficult to recycle them unlike cotton fabrics that are easy to recycle.

After all, it is a product that is important. It really depends on what customers want. I do agree with producing natural fabric that can replace polyester if that is what customers want

I have noticed that there is negative perception towards polyester (synthetic) despite the fact that it is the most used fibre in the world.

I think that there is still prejudice.

Do you mean that there is still the image of sixties and seventies polyester?

I think so. At that time, polyester was made to mimic natural fibre. Nowadays synthetic fibres have developed into their own area that has its own functions and performance materials, so that there are many opportunities ahead if we can use its characters well.

There are many designers who put their eyes on that area. If somebody who has no prejudice and uses anything s/he likes, for example sees polyester fabric and decides that s/he prefers cotton fabric, I think it is up to their taste.

24_In the book 'Cradle to Cradle' (by William McDonough & Michael Braungart), they express their concern about toxins within fibre from recycled plastic bottles. They criticised the use of recycled PET fibre from plastic bottles for clothing as it contains toxins such as antimony, catalytic residues, ultraviolet stabilizers, plasticizers, and antioxidants which are potentially harmful to humans. Can you get rid of these through chemical recycling? What about materials recycling?
Through chemical recycling, we get rid of these substances. However, if antimony is used again during the polyester production, it will remain within the fibre.
In the case of material recycling, at least catalytic residues will remain. We produce polyester called 'Purity' that is antimony (heavy metal) free fibre.

End

Appendix 5.4: An example of industry surveys Interviews in 2008/9- UK high street clothing retailers

*The sections that could identify either company or informant are censored as a few companies required to remain anonymous.

███████████ Respondent A

1_ What is your role in the company?
████████████████████████████████

2_Which products are you dealing with?
████████████████████████████████████

3_ How many people are in your team?
In my team ████
Are they part of the design team?
Yes, ████████████████████████████████

4_ ██
██
████████████████████████████████████

5_ How do you choose materials (e.g. fairs or agency?)
By working with trend agencies, by visiting the key fabric shows and through travel.
Do you work directly with fabric mills?
Yes, we work directly with fabric mills but we tend to do a lot of trend work through trend agencies, through fabric shows and through travelling but we do use the fabric mills as well to give us some guidelines because they are the people creating at the end of the day. We do two things really. We have a parallel process so we are working with the agents and the mills that we know but we are also gathering our own trend information at the same time.
So you are quite flexible depending on what materials you are trying to get in terms of working with agencies or direct with mills?
Yes, it does not matter, we can do both.

6_Do you have enough time to find out about the materials? Is there someone else doing it for you?
██

7_Do you sometime jointly develop fabrics with fabric manufacturers?
Yes, we do.
To what extent do you do that? What percentage?
Jointly I would say something like 20 percent, a fifth.
I think it should be more but it is not at the moment.

8_What are the priorities when choosing materials for your company?
(e.g. price, performance, looks or trend)

(Please circle the appropriate number according to your degree of preference. 1 to 5.)					
	Not Important				Very Important
Price	1	2	**3**	4	5
Fabric quality (e.g. performance, touch)	1	2	3	4	**5**
Seasonal (e.g. colour, weight)	1	2	3	4	**5**
Textile Design (e.g. construction, colour, print)	1	2	3	4	**5**
Consumer demand	1	2	3	4	**5**
General Trend (e.g. catwalk, in-street)	1	2	3	4	**5**
Stock availability	1	2	3	4	**5**
Other (please specify)	1	2	3	4	5

9_ How do you develop a design theme or project? Are you part of the design team?
▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ so all the new storyboards, all the new trend boards are created partly by my team because of their fabric sourcing influence.
So your team is the first to develop the concept?
Yes.
So the garment design team are going to present what they think as well.
Yes, fabric and silhouette at the same time.
So the same meeting?
Same team but maybe different meetings initially, but the same team.

10_ Who makes critical decisions at each stage of product development?
It depends on the stage.
Ultimately the buyer makes the decision whether to buy or not, but at each stage different people make different decisions.
So there is joint decision making but it depends on the different stages?
Yes, but it is really a joint decision.
So when you talk about product development, it is lots of people like designers and buyers and merchandisers, technologists?
Yes.

11_ What is the biggest area of compromise?
There is a combination of things, because you have availability, price, performance, suitability all at the same time. For example it could be a great fabric from the right place but it does not cost in. So you have to find another way to do the same thing to make it cost. There isn't a perfect solution generally but the idea you start with is a starting point and then you mould whatever you source to that initial idea.

12_ What is the designer's role in your company?
Product development, identifying the trend and realising the trend for our customer.
Are they involved with fabric sourcing?
Yes, absolutely joined.

13_ Would you consider using recycled materials in your products?
████████ Yes lots.
What type?
Cotton, polyester.
Is it recycled?

██
███
████████████████████████
██████████████████████
███
█████████████████████████████
████████████████████████████████

Do you know which companies that they are from?
I do but I can't say.

14_ Can you think of any reasons why recycled materials are not used widely yet in the clothing industry?
Availability and price.
The price is high?
Higher, yes.

██
████████████████████
███
████████████████████

15_ ███
████████████████████████

More ready but customers want recycled products but they are not prepared to pay any more for them.
So how do you tackle that?

██
████████████████████████████████

████ **All of them?** Yes.

Do you know of any clothing companies who are using eco-textiles (e.g. recycled/organic)? Please list them below.					
N/A_____					
What are important drivers to use recycled materials in your companies products?					
	Not important				Very important
Future Legislation	1	2	3	4	**5**
Competition	1	2	**3**	4	5
Company Decision	1	2	3	4	**5**
Personal Belief	1	2	3	4	**5**
Consumer Pressure	1	2	**3**	4	5
Other (Please specify below)	1	2	3	4	5

16_ Have there been any changes in terms of materials selection last a couple of years?

No, I don't think so. I think there are more European suppliers because of costs in the world but not significant changes.

There is a growth in European supply, because if you think about the exchange rate, the time it takes to get products from China, it is almost as easy and as cost effective to buy from Europe.

Do you get recycled fabric from Europe as well?

Yes.

17_ Who are the different people involved in the selection process? Is there any?

No, though if you are going to source specialist fabrics like recycled polyester for instance, ███
███████████████████████████████████████

███████████████████████████████████████
██████████████████

No. It has been there for a long time. This business has always had specialist skills.

For the fabric …?

For the fabric sourcing and development yes.

18_ Textile recyclers have previously said to me that synthetic fabrics and fabrics with a mix containing synthetic fibres were no use to them. They want clothing industry to stick to natural fibres. How do you think about that?

I think it is another challenge that we need to overcome. I don't think it can be ignored because there are a lot of blended fabrics. My view is that we need to overcome the challenge and find a way to do it.

19_ What do you think about slow fashion?

As supposed to fast fashion?

Yes, slow fashion means a quality garment and less consumption.

We do that here anyway. ██████ we spend a lot of time making sure our garments are right. Other retailers on the High Street maybe have a different customer base from ours, we have got ██████ customer who maybe expects different quality anyway and so all of our garments are built to the same standards, whether it is fast fashion or slow fashion. But there is an argument that says people want products to last longer, they want to buy it once, maybe pay a little bit more money and perhaps make them last much longer. So if we take Primark versus ████ we would be very different in our approach. We build product to last.

20_Do the CSR section feed back their knowledge and information to the design team?

██
██
██
██
██

21_ These are examples of fabrics currently available. How would you describe them?

Sample No. 8,9,10
So what are these?
This one is 100% polyester.
Recyced?
Yes.
Yes, nice.

Sample No. 23,24,25,26
Have you come across recycled nylon?
Is it Toray?
Yes.
Yes, OK, because recycled nylon is quite new.

Sample No. 11,12,13,14,15

██
████████████████████████████
████████████████████████████
████████████████████ **Does it say so on the website?**
No, it is brand new and it has not been advertised yet. Ah, yes I know Teijin, yes good. I think it will be very interesting to see how recycling…. What happens with the current economy, whether there will still be the appetite for recycling.
Yes, because the oil price is going down?
Yes.
Very good.

Sample No. 16,17
I think the skill with synthetic fabrics is making them feel like natural fibres and they need to be soft, drapey, very fluid that is the skill. People do not like buying synthetic fabrics. Fleece is the exception because it feels very soft and light. I think that is the skill, it is how you make these fabrics feel just like cotton and that is very difficult.

So do you think people still do not like polyester?
No, they don't like it.
I know the world wide production of polyester is huge and yet people have quite negative perception. Why do you think that is?
It depends how big polyester is in terms of end use. I know lots are used in the car industries, medical, and I don't think as much as you think is used in clothing. It is still predominantly cotton, natural fibres, linen, and with blends of polyester or nylon, but it is normally cotton. Probably 60 or 70% of everything we do is cotton or cellulose based. It is very small. There is probably a large production but compared to cotton probably look very small actually for textiles.

██
████████████████████████

You can, we can use synthetics but they have to feel a certain way and have to look a certain way. For instance if we take this, this feels too… it feels like a synthetic fabric and our customers just do not like it.

Do you think there is a possible way to work together with companies to develop better…?
We do already.
How do you think is going to go in the future?
I don't know, I think it is going to be very interesting. I am not sure what is going to happen on recycled. I think it is going to be very interesting but I really do not know. ▮

customers do not want to pay any more for it.

-END-

Appendix 5.5: An example of industry surveys Interviews in 2005/6 – UK high street clothing retailers

*The sections that could identify either company or informant are censored as a few companies required to remain anonymous.

Company A:

1. ████████████████████████████
2. What is your role in the company?
3. I work with women's wear design and I am on the fabric area. Before there
4. wasn't somebody specifically devoted to fabric within women's wear
5. design. It was done by the designers themselves together with the fabric
6. technologists. With the increasing importance of direct sourcing, it was
7. realised that they need somebody to focus on fabric. (So that is a new
8. development, they divided the tasks?) Well they have made it more
9. specific rather than being part of what garment designers do.
10. Which products are you dealing with?
11. ██
12. What is your target market?
13. ██
14. ████████████████
15. What size is the company?
16. ██
17. ██
18. ████████████████████████████████████
19. How many people are there in the design team?
20. ████████████████████████████████████
21. How do you choose materials (e.g. going to fabric fairs or agencies?)
22. We see fabric companies with pre-collections, we see fibre companies
23. also, we use trend services as well and obviously we go to the major
24. fabric shows in Europe generally.
25. Do you have agencies?
26. We work with agencies as well because they are very useful as they give
27. insights into what is happening in the market place.
28. Do you also work directly with mills?
29. Yes
30. How many mills do you work with?
31. It is very difficult, it changes because the world is changing so much.
32. It depends. Some have different skills, but we are always looking for new
33. sources. But obviously it is very important as well to maintain
34. continuity as well.
35. Do you work only with a limited set of people or are you quite open?
36. No. Because our company in particular has very high production standards
37. so the choice of suppliers is not only in terms of how the fabric
38. performs but is also the conditions in which the fabric is produced.
39. There have to be very high health and safety standards for the workers in
40. the factories in the weaving, knitting, dying and finishing.
41. Do you have enough time to find out about materials?
42. It is very difficult for garment designers to have the time to find out
43. about materials. They are working on so many things at the same time,
44. usually on two or three seasons at once. So it is quite important that
45. there is at least somebody who can be spending some time looking at
46. fabric ranges.
47. What are the priorities when choosing the materials for your company?

48. ..
49. ..
50. Fabric quality is very important. It depends whether you are looking for
51. a core basic, which you want to extend from season to season, in which
52. case probably the price is most important as well as the quality. Whereas
53. if you are wanting newness then the seasonality is important and it maybe
54. that price is not quite so important, but quality is always important.
55. Consumer demand for certain prints are important. Stock availability,
56. that means can they deliver when they say, that is very important because
57. there is no point in saying that you have it if you don't. Other? I think
58. colour would be important too, and I think value (appropriate) (Discussed
59. later on page 4.) would be very important as well. So really it is all
60. important.
61. How do you develop a design theme or project?
62. We will start off researching with fibre companies and with trend
63. companies, we establish the big colour and fabric messages but then they
64. have to relate to what the garment people are looking for, e.g. is it
65. structured or fluid? and so on. Then you start to focus down more into
66. something, which works as a totality.
67. (So you have your team, which is the fabric team and you have the garment
68. designers.)
69. The team is very small much part of the whole design team.
70. Could you draw a diagram showing your typical design processes by stages?
71. It is difficult because it sort of evolves. I don't know if I can draw a
72. diagram but I will try.
73. I would start with showing the 6-8 key colour directions and fabric
74. messages, but it may be that one of those might be a very big story early
75. on. Also it may be an important trend but it might not be suitable for
76. our customer. Or it might start in a small way and then evolve later on.
77. (So you suggest the fabric trend to the designer.) There are a series of
78. fabric trends. (Then your are going to show to the designers. Is it a
79. step by step process?) It is ongoing. (So you make like a story board.)
80. Yes, series of story boards using tear sheets but also real fabrics as
81. they are coming through, for example
82. this is the trend, linen is less rustic and very flat and very light or
83. very decorative. Then the garment designers might agree but say there
84. might still be a feeling for vintage but it is much more feminine or the
85. feeling for nautical and they are kind of these clean flat fabrics here
86. but perhaps some of the more natural ones too. And they then start mixing
87. across the different ones.
88. (So they take your ideas and then start developing from that?) They are
89. part of the input and they also are considering their own areas and will
90. be looking at magazines, tear sheets, vintage clothes etc and give their
91. own ideas, and then relate them to formal or casual etc. What you are
92. trying to say is these are what the important messages are coming through
93. but it depends on how we as a group chose to make it informal and casual.
94. (So do they /designers go to fabric fairs as well?)
95. Yes they do. Where I would be spending maybe three or four days at the
96. fabric fair they would tend to perhaps do the main forums and trend
97. areas. And a lot of the time they are looking for the season before,
98. because people are doing pronto-moda. Where before fabric companies would
99. work on the collection and then present it finished and then start the
100. next collection, now it is continuous as I am sure you know. So they are

101. always bringing out new things. So it is changing and evolving all the
102. time. (So the lead times are getting shorter?) Lead times are getting
103. shorter and shorter and yet we still have to look at the bigger picture.
104. So Premiere Vision was for spring summer 06 but nearly all the people who
105. went on the design side were looking mostly at winter 05/06 and even
106. quick response for spring 05. So they could maybe look at it in March to
107. have a delivery in June/July. That would obviously tend to be more on the
108. print side or something that is perhaps more distinctive and that would
109. be reflecting the catwalk. But with regards to true fabric development
110. that is more difficult obviously as it takes longer.
111. Who makes the critical decisions at each stage? Is it joint decision or
112. do you make the decisions.
113. It is a joint decision, as there is a lot of preparatory work by the
114. designer team and then the looks are presented, but then the buyers are
115. the ones who are responsible for the collections. Ultimately the critical
116. decision has to be made by the buyers. My role, responsibility,
117. accountability is to make sure that the fabrics are the right fabrics of
118. the season, but we have to keep continuously looking because new things
119. come up. Now the buyers are leaving decisions until later. Max Mara do
120. the same, 40% of their buy they hold back so they can inject newness. The
121. customer goes into store sees newness almost every week - it is really
122. developing in the American mould. The olden days of this is the spring
123. collection and it comes into store just sits there for three months
124. followed by the summer one comes just does not happen any longer. These
125. are things you were not taught at college either. Where fabrics are made
126. is another really important element because of where garments are made.
127. More and more garments are being made in the Far East so to use European
128. fabrics and ship them over is expensive. But on the other hand if you
129. want quick response it maybe better almost to manufacture them in Europe.
130. There are many other decisions as well as the aesthetics and the price
131. and everything including the speed of response and the speed of delivery.
132. It is much more complicated and I think designers in colleges should
    learn more about this.

134. I do think you need to know your part of a
135. huge massive global industry but it really impacts a lot on design also.
136. I think it is a really interesting exercise to analyse and look at labels
137. where things are made and to understand the reality of production. If
138. things have got a lot of hand work, in reality they are most likely made
139. in the far east, which impacts on the base cloth etc.
140. So in the joint decision making process what kind of debates do you
141. normally have with your colleagues?
142. Ultimately it also has to be what is called fit for purpose, it has to be
143. right for the customer - it might be fabulous for trend it might be
144. absolutely right for the season but if the customer does not understand
145. it and it is not comfortable and it does not perform then it will not
146. sell. So in a sense one can make some decisions aesthetically but there
147. are others that come into play. Perhaps on one of your lists you need to
148. say value as well, perceived value.
149. (Do you think it is going to be number 5?)
150. Yes, and that does not mean cheapness it is appropriate. So consumers
151. will buy something they perceive to be good value, but they do not
152. necessarily expect it to be cheap.

153. (So it is the balance between quality and value?)
154. It is, and I think the consumer is much more knowledgeable now and
155. actually shops around so she is more aware of what is available.
156. What is the designers role in the company?
157. I think it is changing. Before they were almost like consultants to the
158. buyers and the buyers could take their advice or not, because there are
159. huge garment manufacturers who make the garments and so they (buyers) are
160. talking to them all the time. But now it is becoming more about working
161. directly, meaning the designers are more accountable.
162. Could you separate these fabrics into two groups, which ones do you think
163. are a recycled and which ones do you think are a non-recycled group?
164. (Samples are shown from No.10 to No.1 order.)Recycled? Oh, OK recycled…
165. (PAUSE – she went through all fabrics.) It is difficult because I think a
166. lot of the synthetics could be recycled. Because if you gave me one of
167. those fleeces I would say that (No.8 - Knit blue flake) was recycled. I
168. mean that could be recycled.
169. … (PAUSE) Yes, probably this one is (No.5- Yellow non-woven fleece)
170. … (PAUSE)
171. Possibly, I do not know. I think it is quite difficult to tell because I
172. mean the synthetics could be or the polyester could be recycled. And if
173. you would show me a wool then that could have been (recycled). But I
174. don't think any of these are (the rest of the fabrics.) They are probably
175. all recycled… I do not know.
176. Could you explain the criteria for your selection?
177. It is because I know that certainly with the fleeces they have used
178. recycled PET and I have not been particularly aware of recycled woven
179. fabrics to the same extent, I have not been shown recycled where I have
180. been shown fleece that has been recycled. For example, the one made by
181. Malden Mills (USA). Recycling is quite difficult I think. because it
182. means that everything has to completely compatible in order to be able to
183. label it properly. However, I think the principle of recycling is good.
184. Would you consider using recycled materials in your products?
185. I think again if it is truly recycled and if it can be explained properly
186. to the consumer. Because I think the problem is that they tend to be
187. synthetic. The old Prato trade in Italy was built on recycling wool, but
188. then an awful lot of the labelling would say 'other fibres' because they
189. just did not know. But for this company they need to be able to be
190. absolutely sure that everything can be identified. It is also necessary
191. for continuity, because if you have mixed batches sometimes you get off
192. shades in dyeing. But I think in principle they would be supportive of
193. it, though I have to say I am not conscious of how much they have done.
194. They are working with organic.
195. What priority does eco-design take in your company.
196. Well, that is something which is becoming more of a priority. If the
197. consumer would consider it high priority then the company would. But they
198. have done various surveys because generally eco-design would tend to be
199. more expensive and the consumer has responded that they are not prepared
200. to pay more for what is perceived to be the same. I mean general
201. consumers, I am sure there are certain levels who would be more prepared
202. to pay. At the moment there is a debate about fair trade whereby the
203. producers get more. But that does not necessarily mean eco at all. In
204. fact it can almost mean the opposite, which is a bit worrying. I think
205. there is more awareness of being socially responsible. And there has

206.certainly been corporate social responsibility within this company as in
207.all big organisations. And the problem is if you are trying to identify
208.certain products as eco design then by implication the others aren't, so
209.it can have a negative effect on everything else. It is a marketing
210.problem really. But I think in principle it is a very good idea.
211.Can you think of any reasons why recycled materials are not widely used
212.in the clothing industry yet?
213.There is one thing about understanding that it is the right thing to do,
214.and good for the environment, but the fact is with clothing and with
215.other things you want to be seduced. It has to be beautiful. And if it is
216.beautiful then I think there is not a problem. I don't think there would
217.be resistance. For instance, hemp is being used and that is seen to be an
218.eco fibre, similar to bamboo. But quite often what happens to process
219.them as a viable fibre means that horrible chemicals are used. So
220.although the fibre itself maybe eco (but) the process (is not…). There is
221.a lot of complexity at the moment and the problem is that has made people
222.cynical. There are claims for something but then the reality is it is not
223.really there.
224.Do you know of any clothing companies who are using eco-textiles (e.g.
225.recycled/ organic)?
226.Designers like Jessica Ogden. And Preem do as well and ▮▮▮▮▮. And I
227.think they are really interesting. H&M did it for a bit for baby wear a
228.long time ago. It could be interesting to ask them why they stopped
229.because they are Swedish and I would have thought Swedish are more
230.environmentally aware people. There is the Yoga company down in Lewis…
▮▮▮▮(Gossypium?) Yes, ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
233.▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ You see
234.I think things need to be explained to consumers. Because I still think
235.the idea is very good. So you know Nike are using organic cotton. They
236.have 3% organic cotton and that is what we are doing as well in socks and
237.things like that. They have has been a lot of discussion and rather than
238.doing it suddenly, it has to evolve.
239.What are important drivers to use recycled materials in your companies
240.products?
241.Well, I think legislation. And if there was consumer pressure I think our
242.company would use them. I think all of these would be important. Can I
243.say that? And if the competitors did it, but I think we should be doing
244.it first.
245.These are examples of fabrics currently available. How would you describe
246.them?
247.E10 feels very performance orientated and probably more suitable for
248.men's wear because it is a little bit more harsh touch which I think is
249.OK for men. You would need to explain what it did but I think there is
250.customer who would understand that. It maybe if it was very highly
251.specified it might be more suitable for a Nike or an Adidas true
252.performance wear.
253.E9 feels quite nice. Again I suppose it will have a performance but it
254.has a sort of natural look which is nice where as
255.E8 seems very active sports and not right for women's wear at all.
256.E7 Again I think that would probably … it feels to me like… it would be a
257.performance fabric. So again for an active sports brand, I think rather

258.than a main stream retailer. And the same for
259.E6 also.
260.Chemical recycling? It is difficult to know…Oh this is all eco.
261.We have talked in the past about recycling and new fibres and other sorts
262.of things but people just don't understand what the benefits are other
263.than a sort of psychological thing, though it is starting to be more
264.considered. Do Benetton still do their thing? They asked for all their
265.old clothes to be returned to recycle a long time ago. It might be worth
266.talking to Benetton too. Why did they stop.
267.E5 Gosh, this is extraordinary. Feels strange. It's a dry synthetic
268.touch. I am not terrible keen, although it could be something Yohji
269.Yamamoto would use because they have extraordinary synthetics. But I
270.think that is quite a difficult fabric for a mainstream British consumer.
271.E4 And the same as well. I find this a very unnatural hand. I think they
272.are interesting, I like these dry touch but I think they are quite
273.difficult. Normally consumers like this one which is softer people feel
274.more comfortable would be the idea of it. They feel it would be more
275.comfy to wear.
276.E3 Again I find that feels a bit synthetic too. Just feel against your
277.skin it won't be very comfortable. You feel it won't breathe, it probably
278.will, it probably will perform but I don't feel it.
279.E2 Again it feels synthetic I think that would be an active sports once
280.again.
281.E1 This has a more cotton touch. (Yes, it has cotton in it.) And has this
282.one got cotton in it? (Yes, it does. And E6 and E7 they are chemical
283.recycled. This is the original fabric and they do chemical recycling to
284.make this fabric.) So it starts of as this and then they recycle it into
285.that? (They do fibre to fibre recycling now.) The Japanese consumer has
286.always been more aware and this is marketed too, I remember always in
287.Japan there were charts of different attributes on labels attached to
288.clothing, showing how it works against you skin and wickability and
289.moisture management etc. If you look generally there is not much
290.communication.
291.I think everyone has to tackle waste and this is the trouble you see,
292.because garments are so cheap and that is very scary. At the moment you
293.can get three t-shirts for £2. So where is the pressure on trying to
294.recycle? Now people are getting more used to recycling their paper maybe
295.it will come. I think something could be usefully done, but not as long
296.is it keeps getting cheaper and cheaper to buy new. The irony is that
297.people are spending less on their clothes now than they did twenty or
298.forty years ago. Much less money! (For domestic items like hoovers and
299.washing machines as well.) Yes, it is really cheap. And also what people
300.spend on food now is interesting. Now it is maybe 10% of the income. 40
301.years ago it was like 40%, it was a huge amount. People cared much more
302.and I think the skill of darning and mending has gone because you don't
303.need that. You just throw it away. (My parents generation used to make
304.clothes for us because clothes were really expensive.) Now the consumer
305.is much more targeted. There is newness in everything. I mean you look at
306.the magazines and you are made to feel you have to have something new.
307.But I think it would be wonderful if there can be a real proper
308.awareness. And I think every so often you do see hemp or bamboo in some
309.collections so some people are trying.
310.(When is working as a designer I found everything was always on the move,

311.a really busy work because you have to chase all the time and it is
312.getting more and more, is it not?)
313.Yes Absolutely. This what I was saying, you might be working on one thing
314.but you also have to look at this and look at that and you have to relook
315.again… Some of my favourite brands are timeless and they have a beauty
316.and simplicity. I love designers like Yohji Yamamoto as well but they are
317.more extreme. The customer is getting older and she is more aware as
318.well, but does not necessarily want to wear everything that is high
319.fashion, but wants to be aware of it. (How do you manage getting to grips
320.with such fast cycles?)Well, it is looking at all different things at
321.once really. (Do you travel a lot then?) Yes, also the designers travel a
322.lot and they buy samples as well. You also talk to agents and they are
323.coming in all the time too, so you are building up a picture. I think
324.that is why it is really important that you know who your customer is.
325.Otherwise you end up shooting in all different directions.
326.They are now more consciously trying to know who the customer is or the
327.series of customers because there are different types. (Do you have
328.designers for each target market?) Yes, there are. Whereas on the fabric
329.side, you tend to work with all of them. (So you present the ideas and
330.then each section's designer can take some elements.) Yes, and you work
331.with them on that. (How many times do you present the designs?) It is an
332.evolution. I don't think you can ever say there it is. More and more it
333.is about discussion, then travel for research, and then discussion again.
334.Obviously there are key stages in the critical path but it is evolving
335.all the time and as mentioned earlier you can have two or three seasons
336.going on at the same time. So it has to be quite flexible. You can't say
337.right that is it finished. (Do you feel sometimes when you stop looking,
338.you are going to lose out?) Yes, you can't stop.

END