

ReDress

ReFashion as a solution for clothing (un) sustainability



A thesis presented in partial fulfillment of the requirements for the degree of Master of Art and Design at AUT University, Auckland, New Zealand.

Kim Fraser 2009

ReDress – ReFashion as a solution for clothing (un) sustainability

Kim Fraser

A thesis submitted to AUT University in partial fulfillment of the requirements for the degree of Master of Art and Design (MA&D).

2009

School of Art & Design

Primary Supervisor: Dr. Joan Farrer

TABLE OF CONTENTS

List of Figures.....	iii
Attestation of Authorship.....	vi
Acknowledgements.....	vii
Intellectual Property Rights.....	ix
ABSTRACT.....	x
key words.....	x
INTRODUCTION.....	1
research questions.....	2
PART 1: RESEARCH CONTEXT.....	3
new zealand context.....	4
MOUNTAINS OF CLOTHING.....	5
increasing consumption.....	6
increasing disposal.....	8
green waste dumping.....	10
polarisation of the fashion textile market.....	13
cradle-to-cradle.....	15
ReFASHION.....	16
multiple one-offs.....	17
PART 2: METHODS.....	19
RESEARCH METHODOLOGY.....	20
tacit knowledge.....	24

design research through action and reflection.....	25
three cyclic studio phases.....	27
phase-1: 3D visualizing cycle.....	27
juxtaposition as method.....	29
narrow boundary as method.....	29
men’s trouser.....	31
phase-2: toile development.....	34
BEYOND ROUND 1	36
deficits in the field.....	40
PART 3: RESEARCH PROJECT.....	41
RESEARCH AIMS & OBJECTIVES.....	42
PHASE-3: PROTOTYPE DEVELOPMENT.....	43
expert maker & disassembly.....	44
expert cutter.....	46
complex jigsaw fit.....	47
re-manufacture.....	49
ROUND 2 EXHIBITION SERIES.....	51
PART 4: CONCLUSION.....	54
REFERENCES.....	56
Glossary of Terms.....	59
APPENDICES.....	A
Appendix one.....	B
Appendix two.....	D
Appendix three.....	F

List of Figures

Cover Page	Fraser, K. (2009). <i>Flowchart masculine trouser transforms into feminine dress</i> . CAD Compilation. 2009.	
Figure 1:1	Fraser, K. (2009). <i>Bales of second-hand clothing</i> . CAD Compilation. 2009.	3
Figure 2:1	Farrer, J., Fraser, K. (2009). Conscience clothing shoot. In Conscience clothing: polarisation of the fashion textile market. <i>Textiles – Quarterly magazine of the Textile Institute</i> , Vol. 2009, No. 1. p. 10.	5
Figure 3:1	Farrer, J., Fraser, K. (2009). Global apparel supply chain. In Conscience clothing: polarisation of the fashion textile market. <i>Textiles – Quarterly magazine of the Textile Institute</i> , Vol. 2009, No. 1. p. 11.	7
Figure 4:1	Farrer, J., Fraser, K. (2009). <i>Green waste</i> . CAD Drawing. 2009.	11
Figure 5:1	Farrer, J., Fraser, K. (2009). <i>Polarisation of opinion</i> . CAD Drawing. 2009.	13
Figure 6:1	Farrer, J., Fraser, K. (2009). Beyond the grave. In Conscience clothing: polarisation of the fashion textile market. <i>Textiles – Quarterly magazine of the Textile Institute</i> , Vol. 2009, No. 1. p. 12.	14
Figure 7:1	Resek, E. & M., (1955). Childs dress cut from adults. In <i>Successful dressmaking</i> , Melbourne, Colorgravure Publications. p. 172.	16
Figure 8:1	<i>Waistcoat 225</i> [Image] (n.d.).Retrieved September 19, 2008, from http://www.junkystyling.co.uk/	17
Figure 9:1	<i>Shirtskirt</i> [Image] (n.d.).Retrieved September 19, 2008, from http://www.janetdunnfashion.co.nz/index.html	17
Figure 10:1	<i>Nom*D –ANZFW 2008</i> [Image] (n.d.).Retrieved September 19, 2008, from http://www.fashionz.co.nz/events/nomd-bedlam.html	18
Figure 11:2	Fraser, K. (2008). <i>Red skirt transforms flowchart</i> . CAD Compilation. 2008.	19
Figure 12:2	Fraser, K. (2008). <i>Mindmap– rhizomatic mapping of research connections</i> . CMap Compilation. 2008.	21

Figure 13:2	Fraser, K. (2009). <i>Electronic Journal files and folders</i> . Digital photograph. 2009.	22
Figure 14:2	Fraser, K. (2008). <i>Typical design process flowchart for fashion</i> . CAD Drawing. 2008. Based on 'design loop' image. Retrieved September 30, 2008, from http://scholar.lib.vt.edu/ejournals/JOTS/Summer-Fall-1999/Todd.html	25
Figure 15:2	Fraser, K. (2009). <i>Table comparing action research and reflective design practice</i> . WORD Document table. 2009.	26
Figure 16:2	Fraser, K. (2009). <i>3 distinct cyclic phases diagram</i> . CAD Drawing. 2009.	27
Figure 17:2	Fraser, K. (2009). <i>3D visualising phase diagram</i> . CAD Drawing. 2009.	28
Figure 18:2	Fraser, K. (2008). <i>Visual diary recording first visualising trials</i> . Digital photograph. 2008.	30
Figure 19:2	Fraser, K. (2008). <i>First dress refashioned from men's trouser</i> . Digital photograph compilation. 2008.	32
Figure 20:2	Fraser, K. (2009). <i>Idea generation from 3D visualising cycle</i> . Digital photograph compilation. 2009.	33
Figure 21:2	Fraser, K. (2009). <i>Visual diary page recording working drawings</i> . Designers sketches. 2009.	34
Figure 22:2	Fraser, K. (2009). <i>Refining intention working drawings and resulting toile</i> . Digital photograph and designer sketches compilation. 2009.	34
Figure 23:2	Fraser, K. (2009). <i>Phase-2 toile development phase diagram</i> . CAD Drawing. 2009.	35
Figure 24:2	Fraser, K. (2008). <i>Reusable features</i> . Digital photograph. 2008.	35
Figure 25:2	Fraser, K. (2009). <i>Round 1 manufacturing process flowchart</i> . CAD Drawing. 2009.	37
Figure 26:2	Fraser, K. (2009). <i>Trousers on racks at Savemart – September 9, 2009</i> . Digital photograph compilation. 2009.	38
Figure 27:2	Fraser, K. (2009). <i>Savemart clothing bin – December 2008</i> . Digital photograph. 2009.	39

Figure 28:3	Fraser, K. (2009). <i>Flowchart masculine trouser transforms into feminine dress</i> . CAD Compilation. 2009.	41
Figure 29:3	Fraser, K. (2009). <i>Phase-3 prototype development phase diagram</i> . CAD Drawing. 2009.	43
Figure 30:3	Fraser, K. (2009). <i>Disassembly methods</i> . Digital photograph. 2009.	44
Figure 31:3	Fraser, K. (2009). <i>Pre-preparation: disassembled and pressed</i> . Digital photograph. 2009.	44
Figure 32:3	Fraser, K. (2009). <i>T-series evolves</i> . Digital photograph and CAD drawing. 2009.	45
Figure 33:3	Fraser, K. (2009). <i>Trouser stockcard example</i> . Digital photograph. 2009.	46
Figure 34:3	Fraser, K. (2009). <i>Men's trouser stock spreadsheet</i> . Excel Spreadsheet. 2009.	46
Figure 35:3	Fraser, K. (2009). <i>Complex pattern placement</i> . Digital photograph. 2009.	47
Figure 36:3	Fraser, K. (2009). <i>Marker diagram – showing '902' pattern placement</i> . CAD Drawing. 2009.	48
Figure 37:3	Fraser, K. (2009). <i>Round 2 ReFashion for a larger business model flowchart</i> . CAD Drawing. 2009.	50
Figure 38:3	Fraser, K. (2009). <i>Internal labelling of T-series</i> . Digital photograph compilation. 2009.	51
Figure 39:3	Fraser, K. (2009). <i>ReDress fold-out book</i> . Digital photograph. 2009.	52
Figure 40:3	Fraser, K. (2009). <i>Collage of T-series: final prototypes as exhibited</i> . Digital photograph compilation. 2009.	53
Figure 41:4	Fraser, K. (2009). <i>The final T-series toile</i> . Digital photograph. 2009.	54
Figure 42:5	Fraser, K. (2008). <i>First ReFashioned dress toile from men's trouser</i> . Digital photograph and CAD drawing. 2008.	A

Attestation of Authorship

"I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements) nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning."

Signed:

Date:

Acknowledgements

I would first like to thank my supervisor, Dr Joan Farrer (RCA). She has put considerable time in advising, encouraging and guiding me through the writing of this thesis. Her inescapable passion for sustainable fashion research fuelled my own, and the knowledge and enthusiasm she has brought to this thesis is enormously appreciated. I consider myself extremely fortunate, when at the end of my first year of postgraduate study, an international expert in sustainable fashion was appointed to the staff. In that first year, my findings clearly indicated academics in the U.K. and U.S. had been researching into sustainable fashion for nearly a decade. The northern hemisphere seemed to be so far ahead in thinking, my only considerations then, was that we might follow their lead. When Joan arrived she brought everything into context and allowed us to believe in ourselves and the value that we, as New Zealanders, might contribute to this huge worldwide problem.

A special thanks to my second supervisor, Dr Jan Hamon for the very level headed advice, support and encouragement throughout my postgraduate study. Her expertise in grammatical structure was invaluable in the writing of this exegesis.

I wish also to acknowledge the joint support of AUT University and the Faculty of Design and Creative Technologies, Head of Fashion Department, Mandy Smith, Head of School-Art & Design, Desna Jury and Head of Postgraduate Department,

Sue Gallagher. Your support provided the freedom to undertake this research and was greatly appreciated.

A huge thank you, to the supportive staff in the Fashion Department, especially Bev Furniss, Lisa Lloyd Taylor, Elise Cox and Angie Finn, for the many hours of meaningful discussions and vital feedback on my work, which provided excellent opportunities to reflect on my practice.

I would like make a special acknowledgement to Elise Cox for her participation as the 'expert'. Her expertise provided amazing material to work with.

This thesis would not be complete without thanking my wonderful friends Vicky and Didee, for listening and allowing me to rant and rave over the problems in the world. Thanks to Anna and Didee, for enduring my very first writing attempt, which was contextually rich but badly written. Their feedback during the project was invaluable, as was Anna's expert proof reading of my near final exegesis. And huge thanks to the many friends and family who donated clothing items for my project.

Lastly thanks to my husband Brett, the other half of my entity, and our son Reon, for being so understanding about the time and energy this thesis took. I deeply appreciate your tolerance and the unflinching support you continue to give.

Intellectual Property Rights

The designer asserts the intellectual and moral copyright of the garment designs that comprise the creative content of this exegesis. All rights of the owner of the created work are reserved. The designs contained in all formats are protected by copyright. Any manner of exhibition and any diffusion, copying, or resetting, constitutes an infringement of copyright unless previously written consent of the copyright owner thereto has been obtained.

Signed:

Date:

ABSTRACT

The primary aim of this practice based project is to promote debate and alter perceptions of second-hand materials and ReFashion¹ concepts. The work is positioned between the developed world business model extremes of overproduction, and over-consumption, in clothing manufacture.

Practical work which represents 80% of this thesis, pitches discarded clothing as an untapped commodity. The investigation poses questions and possibilities with respect to applying the ReFashion concept to a potential business model. By developing prototypes through deconstruction and reconstruction processes, reflection upon current practices of the secondary textile industry has been possible, highlighting ReFashion as a potential 'Materials Recovery' process.

The second outcome for the research is to provide contextualised information for the fashion manufacturing industry and government agencies, in order to develop innovative applications for new markets.

key words

ReFashion, overproduction, over-consumption, sustainability, second-hand, post-consumer textile waste, ReManufacture

¹ Refer Glossary of Terms page 59

INTRODUCTION

The Fashion Industry epitomises unsustainability with its fast changing trends, high minimums and planned obsolescence. Modern patterns of consumerism coincide with an increase in 'throwaway' fashion, contributing millions of tons of clothing to landfill, incineration and third world dumping. The context for this practice based research is positioned at the interface between the fashion business model of overproduction and over-consumption in clothing manufacture in the developed world.

In contrast to the usual cradle-to-grave customer approach, smaller clusters of consumers, aware of environmental and ethical issues and interested in societal change are turning to alternative models and niche interventions. This research asks is it possible to divert mountains of discarded clothing from landfill or incineration into a second life through innovative design and new business practices? During this phase of societal and consumer change can the ReFashion concept be business models successfully to encompass good design?

Can post-consumer textile waste (PCTW) be viewed as an untapped² commodity, a fibre/textile resource to be conserved, re-used, recycled, refashioned and transformed into contemporary fashion? Through reflection on the deconstruction and reconstruction processes of developing prototypes, issues involved in the current practices of 'Materials Recovery' in the secondary textile industry in New Zealand will be discussed. In the absence of New Zealand quantitative data, key

² Domina and Koch (1999) refer to post-consumer textile waste (PCTW) as a largely untapped commodity with strong recycling potential.

arguments and comparisons were drawn from British and American quantitative and qualitative studies with an expectation that the analysis would reflect the New Zealand business mode. It is intended that this project will provide contextualised information for the fashion manufacturing industry and government agencies, and consequently innovative applications for new markets.

research questions

- Is PCTW a problem in New Zealand?
- Is it possible to find New Zealand data on discarded clothing?
- What is the quantity of PCTW produced in New Zealand?
- How might discarded clothing be viewed as a fibre/textile resource to be conserved, re-used, recycled and refashioned?
- Is it possible to ReFashion PCTW into contemporary fashion?
- Is it possible to ReFashion a standardised fashion 'product' from targeted post-consumer textile waste?

PART 1: RESEARCH CONTEXT



Figure 1:1 Bales of second-hand clothing, from Savemart, August, 2008.

RESEARCH CONTEXT

The Research Context summarises the literature review and constitutes Part 1 of this thesis. To understand the tensions between the increasing consumption and concurrent increasing disposal of fashion, I needed to understand both concepts thoroughly in order to identify the intersections. A critical issue for this investigation was the study of wasteful fashion consumption in New Zealand. However, upon commencement of this research in 2007, this area was barely emerging and far from established. Key arguments, regarding wasteful fashion consumption as a social and environmental problem, were therefore drawn heavily from British and American qualitative studies. Initially it was determined that this verified data could be applied to New Zealand with consideration given to the smaller scale, distance factor and differences in manufacturing. However the logic was not confirmed as the research progressed, indeed the New Zealand differences proved to be key findings in this study.

new zealand context

New Zealand's once thriving domestic textile industry has been significantly diminished³ and no longer has the infrastructure required, to offer appropriate raw materials⁴ to the New Zealand Apparel industry. Most textiles must be imported, mainly from China⁵, in order to manufacture clothing products in New Zealand. This means that New Zealand fashion products have amassed a huge carbon

³ The New Zealand textiles industry is comprised of around 1,750 small to medium size businesses. It employs approximately 16,000 people and exports around \$500 million of textiles, carpet, footwear and apparel annually. Sourced 26 August 2009, <http://www.textilesnz.org.nz/sitedocs/industry/industry.aspx>

⁴ With the exception of wool yarn and some knitted textiles.

⁵ New Zealand imported over \$1 billion worth of clothing items in 2007, with 80% of clothing imports from China - Sourced from Statistics NZ (2008)

CONsCIENCE CLOTHING shoot 08

GARMENT MILES

Sam - Art & Design



Figure 2:1 CONsCIENCE CLOTHING Garment Miles poster campaign by Dr Joan Farrer (2008). The image illustrates the garment kilometers travelled by imported fashion to New Zealand markets. The model is an AUT student wearing her own clothing.

footprint, in transport miles, in the very first stages of the garment life cycle. This is verified in Figure 2:1, where a student, on an average day, is shown here depicted with arrows indicating the origins of each piece of clothing, which amasses to over 34,000 garment miles.

Deregulation⁶ and restructuring in the 1990s led to this loss in infrastructure. Increased price competition dictated by imports and inability to compete efficiently with the low labour cost countries, forced local manufacturers to restructure, many retrenching and opting for offshore manufacturing (Blomfield, 2002). The progressive decline of the industry correlates with the huge increase in imports from \$129 million in 1989 to over \$1 billion⁷ in 2007, and these imported clothing labels are everyday clothing in New Zealand. Given the already large carbon footprint of this imported clothing, would not it make sense to ReFashion this existing 'fabric' once it is thrown out? This process could potentially reduce the mountain of waste, and at the same time reduce the demand for further imports.

MOUNTAINS OF CLOTHING

Sustainability and ecological issues caused by the fashion textile industry have been discussed amongst researchers since the 1990s. Much qualitative and statistical research data comes from the U.K., Europe and the United States, with the U.K. and Europe having the highest profile in Fashion Textile Sustainability

⁶ The New Zealand Apparel, Textile and Footwear industry experienced significant restructuring from 1986 following the deregulation of the New Zealand economy. This restructuring led to a significant decline in the number of New Zealand based apparel manufacturing concerns, and a rationalisation of all related industry sub-sectors. Sourced from <http://www.informat.com/research/infre0000326.html>

⁷ These currency figures do not take inflation into account.

Research. Today's consumer society enjoys a throwaway attitude where affordability and disposability have become synonymous. 'Fast Fashion', which provides a cheaper source of trend clothing on the high street, has a limited life expectancy, exemplifying this attitude, thus entrenching disposable fashion into consumer psyche. In 2002 Schor drew attention to this alarming increase in discarded clothing, which according to Earley (2006) contributes an estimated 1 million tons⁸ into British bins and landfill every year. The synthetic fibres in these mountains of clothing break down slowly releasing toxic gases into the atmosphere. Ironically, fashions designed to last one season may take many years to decompose (Earley, 2006).

increasing consumption

The core business of fashion is facilitated by fast changing trends, leading to premature product replacement and fashion obsolescence, with profits realised through productivity. In the last decade, buyers⁹ capitalising on the globalised workforce and their economic strength through scale (Figure 3:1), have manufactured ever larger quantities of fashion textile products for western markets at considerably lower unit costs and from less transparent sources. Customers motivated by price and status rather than by need, are purchasing far more than ever before¹⁰ while expecting to pay the least possible price for the most possible products (Hethorn & Ulasewicz, 2008).

⁸ Confirmed Oakdene Hollins (2006) Report, p 33

⁹ Fashion Industry term: Fashion Buyers or Apparel Buyers:(an industry term), Apparel buyers are responsible for selecting and purchasing apparel and accessories from manufacturers, designers, or wholesalers for retail sale.

¹⁰ In 2006 consumers spent approximately \$1 trillion on clothing. ("Well Dressed", 2006)

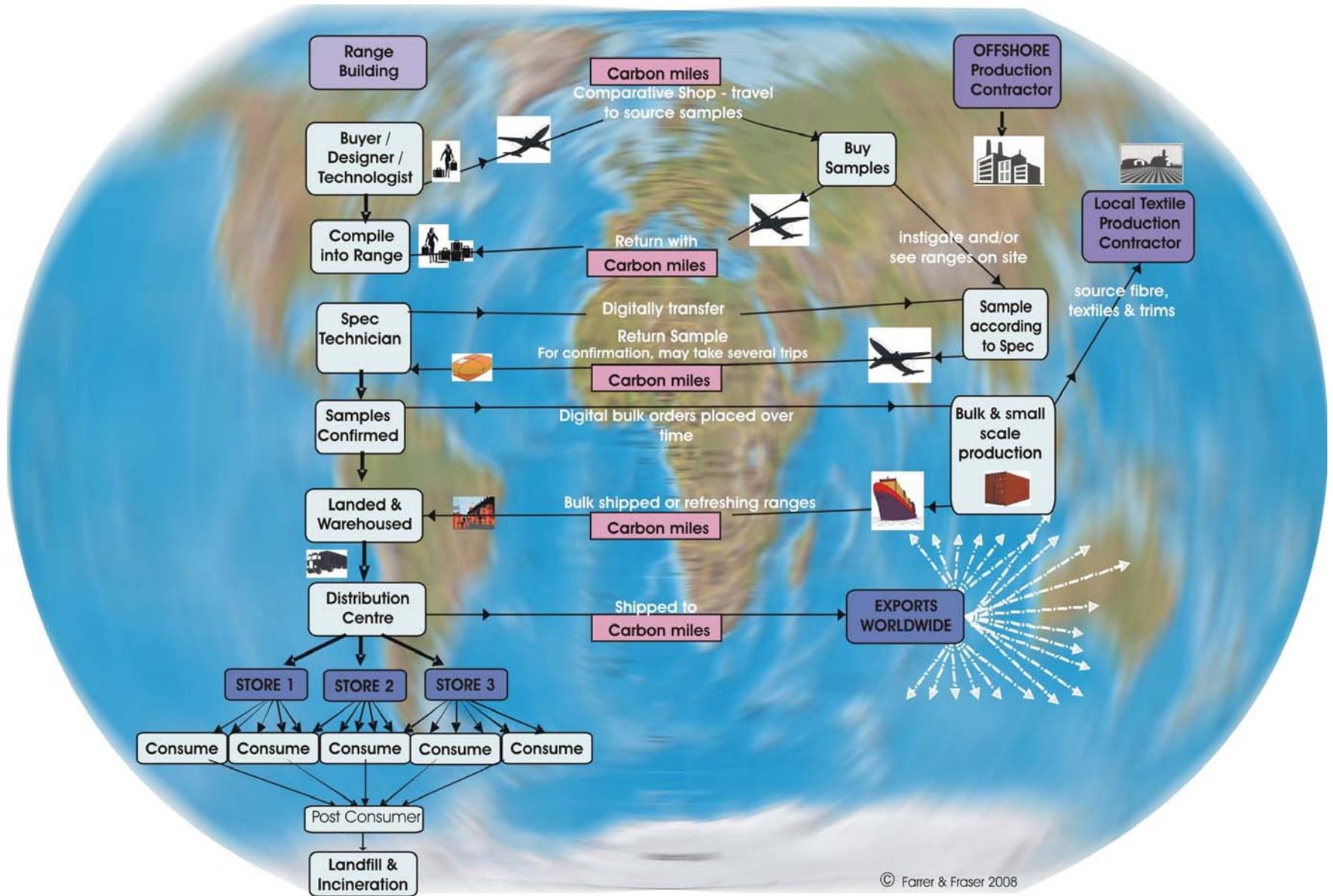


Figure 3:1 Global Supply Chain Complexity, illustrates typical fashion textile supply chain against the world map reflecting the complexity of a globalised industry.

Consequently this self-perpetuating cycle of over-production and affordability is tantamount to over-consumption and disposability. Birtwistle and Moore's (2007) research draws attention to the trend of throwaway¹¹ fashion, which they confirm owes much to the increased frequency¹² of fast fashion purchases (Defra, 2007). Fast fashion combined with globalisation¹³ provides easy access to low cost mass manufacturing, delivering a cheaper source of trend clothing on the high street. The victim of globalised supplier competition is inferior quality where quality, both in terms of labour and raw materials has been sacrificed for price (textile price reductions resulting from lower quality fibre and fast production techniques). Fashion followers, however are willing to accept this trade-off understanding the fast fashion item will not last as long as more expensive items.

increasing disposal

Increasing consumption now goes hand in hand with increasing disposal, (Farrer & Fraser, 2008). Fast changing trends, reduced price and diminished intrinsic value, encourage consumers to replace and dispose of products before their real life cycle has ended. In the U.K. textiles discarded to landfill originate mostly from household sources¹⁴. In 1998 the U.S. Council for Textile Recycling projected PCTW to grow at rates higher than the population growth and would result in post-consumer textiles contributing 5 per cent to the municipal solid waste stream by 2010.

11 "throwaway culture" where products and fashion lost intrinsic value, encouraging consumers to replace and dispose of products before their real life cycle had ended" (Birtwistle & Moore, 2007, p. 214)

12 Increased frequency in purchasing is enabled and cultivated by the "real reduction in price levels from fast fashion retailers, such as H&M, TopShop and Zara, who sell garments at very competitive price points, that are expected to be used less than ten times." (Birtwistle & Moore, 2007, p. 211)

13 Globalisation enabled by the free market business model, free trade zones and reduced import tariffs, digital communication for design, manufacturing and for warehousing coupled with the rapid developments in containerisation, has allowed the mass manufacturing of product to move successfully between the farm, manufacturing and retail sites throughout the newly industrialised and industrialised world (Farrer & Fraser, 2008).

14 Textiles make up about 3% by weight of a household bin. Sourced from [http://www.wasteonline.org.uk/resources/Information Sheets/Textiles.pdf](http://www.wasteonline.org.uk/resources/Information%20Sheets/Textiles.pdf) in New Zealand, textiles make up 4% of all waste discarded to Landfill (refer Appendix one)

The secondary textile industry is one of the oldest and most established of the recycling¹⁵ industries. According to the U.S. Secondary Materials and Recycled Textiles (SMART)¹⁶ association, 75% of pre-consumer¹⁷ textile waste is diverted from landfill every year. Waste-Online¹⁸ estimates 95 per cent of all the textiles, both natural and man-made fibres, are recyclable. Yet the average American throws away about 68 pounds (31kg) of clothing and textiles every year.¹⁹ Both Birtwistle and Moore (2007), and Domina and Koch (1999), agree that landfill space could be reduced through more efficient recovery of PCTW. Given the huge quantities discarded to landfills, Birtwistle and Moore (2007) concur that consumers do not understand how their disposal habits affect the environment, which was a key viewpoint for this study. Domina and Koch (1999) question the importance of the perceived value of the unwanted textile product in relation to where the article was eventually disposed. They speculated whether labelling 'this garment is 100 percent recyclable' would increase the frequency of textile recycling?

15 "Textile recycling originated in the West Riding of Yorkshire about 200 years ago when the "rag and bone" men went door-to-door to collect rags, metal and any other household articles." (Birtwistle & Moore, 2007, p. 212)

16 <http://www.textilerecycle.org/> Secondary Materials and Recycled Textiles (SMART) is US trade association

17 Pre-consumer textile waste consists of by-product materials from the textile, fiber and cotton industries.

18 'Waste Online' estimates up to 95% of the textiles that are land-filled each year could be recycled. Sourced from: http://www.wasteonline.org.uk/resources/Wasteguide/mn_references.html#a3b2c22

19 <http://www.textilerecycle.org/facts.pdf> Textiles recycling fact sheet

green waste dumping

There is considerable demand in the global used clothing market²⁰ for discarded garments in developing countries,²¹ Textilerecycle.org confirm over 70% of the world's population uses second-hand clothes; this would equate to 4.2 billion people. The sheer quantity of clothing required to fill this need is mind-boggling and yet charities and the secondary textile industry are surpassing this quota. In their discussions of charity surpluses, Schor (2002) and Birtwistle and Moore (2007) confirm that the bulk of this second-hand textile waste is shipped²² to developing countries (Figure 4:1) or sold to 'post-consumer'²³ industries.

This textile waste (Schor, 2002) in the recipient country is sold on to shoddy mills²⁴ or given away by charitable foundations under the guise of 'humanitarian aid'. There is little beneficial evidence²⁵ showing shoddy cloth making it back to the western market, moreover if the fibre in the original textile was poor quality the resulting shoddy textile is unlikely to be usable as a fashion textile, unlike a recycled paper product. Additionally, the influx of cheap and free clothing in Africa actually undermines the local producers and creates more poverty (Schor, 2002). Tranberg (2004) and

20 Textile Recycling Factsheet: "Between 1990 and 2003, the United States exported nearly 7 billion pounds of used clothing and worn textile products around the world". Sourced from <http://www.textilerecycle.org/>

21 "The markets for second-hand clothing are large, and there is a considerable demand for unwanted, second-hand UK garments in developing countries. The main destinations for exported second-hand garments are much of Africa, the Middle East, Pakistan and Eastern Europe" http://www.wasteonline.org.uk/resources/Wasteguide/mn_wastetypes_textiles.html

22 SORT is a non-profit shipper's trade association designed to benefit members and provide reduced ocean freights and additional services for the efficient transportation of used clothing, wipers, textiles, and textile waste products for shipment by sea and land sourced from www.sorti.com 03 July 2007

23 "where they are re-used or sent to a recycling plant and made into fillings or cleaning rags. Linen, cotton and viscose can be made into paper pulp and wool can be recovered and felted or re-spun" (Birtwistle and Moore, 2007, p. 212).

24 Shoddy traditionally refers to the historical process of recycled or remanufactured wool, originally using rag grinding machine invented in 1813, where the recovered shoddy fibre was blended with new wool at the preparatory stage of development. Sourced from <http://www.heavywoollen.org.uk/history.htm> 03 July 2007

25 "There is little evidence of "closed loop" recycling, whereby recycled fibres are used in the manufacture of new clothing in the place of virgin fibres." (Oakdene Hollins Report 2006 p.13)

POST CONSUMER TEXTILE WASTE

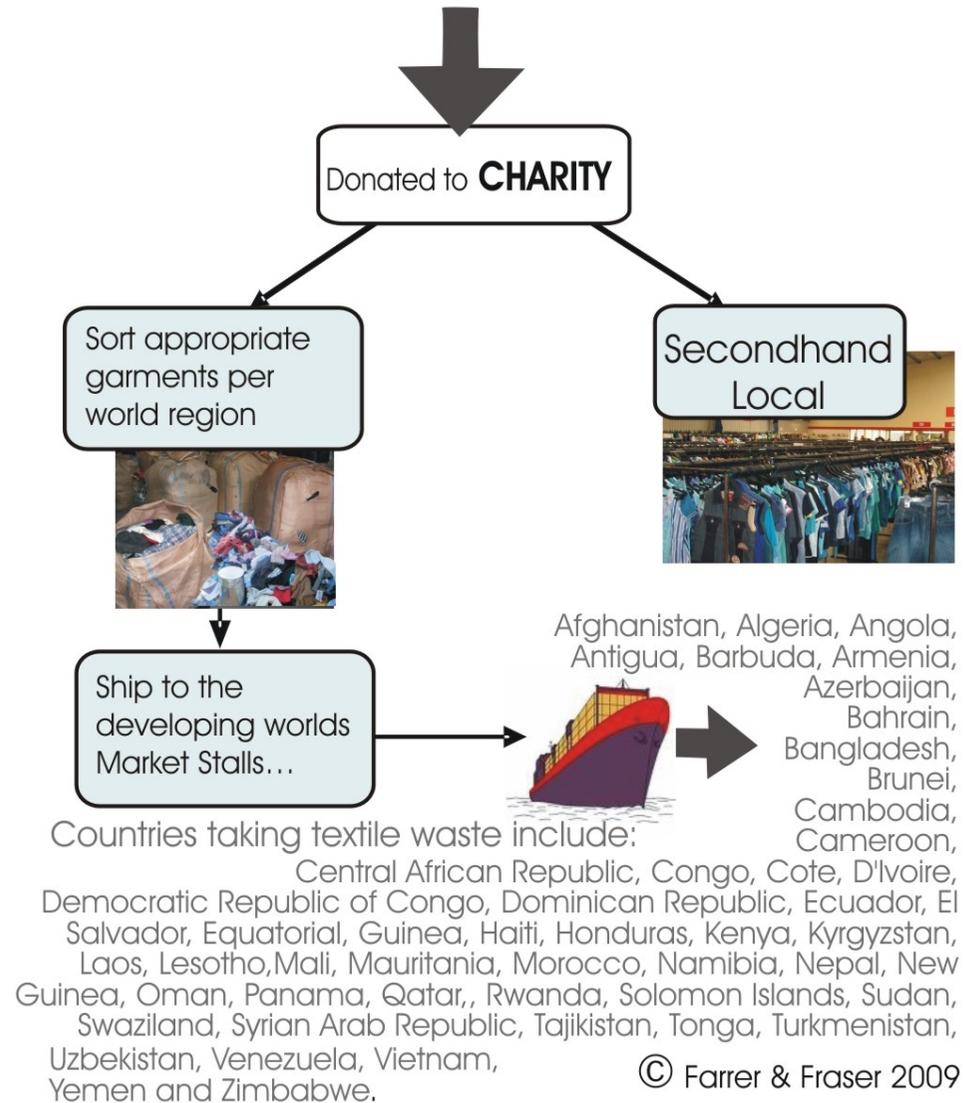


Figure 4:1 Green waste – showing Charity textile surpluses being shipped to developing countries throughout the world.

Norris (2005) concur using qualitative studies of this second-hand trade, confirming this green waste shipping or dumping erodes the local garment industry. Given the planned obsolescence of fast fashion, the researcher considered whether it might be deemed appropriate if these discards were recycled, reduced to shoddy fibre, fabricated into textile, with limited life expectation, then cut and sewn and re-introduced back into the fast fashion stream?

New Zealand's participation in this charitable export trade was a key finding for this study. 5.2 million kilograms of second-hand clothing was exported in 2008²⁶, with 92% of this green waste shipped to the little nation of Papua New Guinea. However it is difficult to compare this exported PCTW with consumption and waste quantities, as existing in New Zealand databases are limited²⁷ and available statistical data regarding clothing imports and exports, report in differing units of measure. Figures for exports can be found in measures of weight, but figures for imports are only accessible by dollar value. In addition New Zealand solid waste figures are not current²⁸. This *lack in appropriate data* is another key finding; for example: how do we draw meaningful comparisons of this exported quantity²⁹ with quantities landed when the import figures are only accessible by dollar value³⁰; or define the significance of this with discarded³¹ textile waste when the collected waste data³² includes carpet?; and what is the total textile consumption in New Zealand and how much of this is stored in our wardrobes?

26 Sourced from Statistics New Zealand (2008) <http://wdmzpub01.stats.govt.nz/wds/TableViewer/chartView.aspx>

27 'Data gaps or issues - Limited data are available in New Zealand to report on consumption and resource use per capita' Statistics NZ, sourced from <http://www2.stats.govt.nz/domino/external/web/nzstories.nsf/htmldocs/Sustainable+Development:+Consumption+and+resource+use>

28 In a recent report (Statistics New Zealand, 2009) total solid waste figures were drawn from 2008 yet 'Composition of waste disposed to landfill', highlighting the percentage of Textiles, is dated 2004. Refer *Measuring New Zealand's Progress Using a Sustainable Development Approach: 2008* attached as appendix sourced from <http://www.stats.govt.nz/Publications/NationalAccounts/sustainable-development/waste.aspx>

29 In reference to previous example: 5.2 million kg of second-hand clothing exported in 2008

30 In reference to previous example: New Zealand imported over \$1 billion in 2007

31 In New Zealand PCTW contributed 4% (2004) of total waste disposed to landfill, extrapolating this for 2008 equates to approx 128,000 tonnes (128,000,000 kg), from a total waste pool of 3.2 million tonnes. Refer appendix one.

32 MFE describes the composition of Textile waste as clothing and carpet, which contributes 4% of the total solid waste. Sourced from <http://www.mfe.govt.nz/publications/ser/technical-guide-new-zealand-environmental-indicators/html/page4-4.html>

polarisation of the fashion textile market

At the interface between fast fashion, overproduction and over-consumption in the fashion manufacturing sector (Figure 5:1), a clear division in the producer, consumer, disposal and reuse market has unfolded (Farrer & Fraser, 2009).

This perspective emerges from a combination of data saturation and deductive reasoning, arising from the burgeoning of literature and theory relating to sustainability, which unfortunately is fragmented and often vague in the fashion textile industry. The 'cradle-to-grave' manufacturing model inherited from the Industrial Revolution, generates products designed for a one-way trip to the landfill. This model developed in times when few understood or appreciated the interconnectedness of people and nature (McDonough & Braungart, 2002). In contrast to the usual cradle-to-grave customer approach, smaller

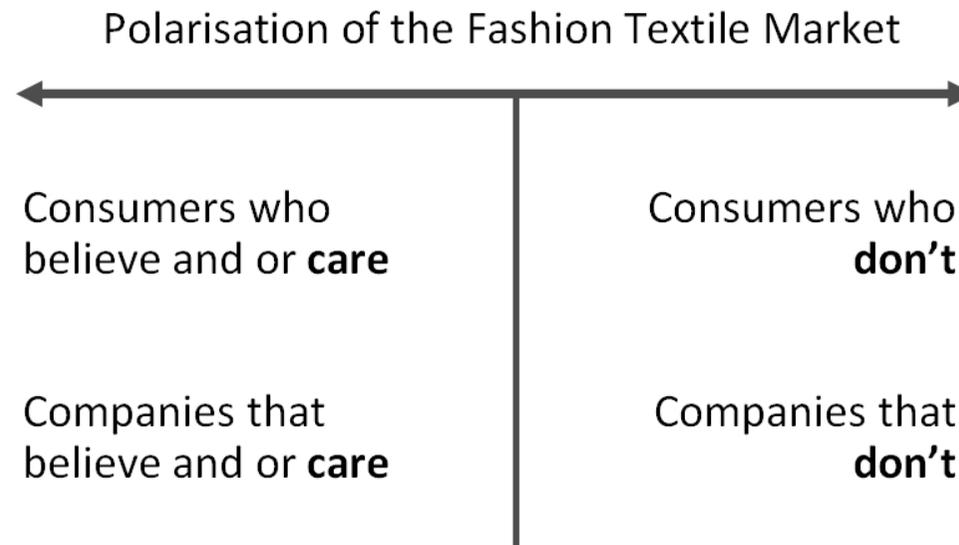


Figure 5:1 Polarisation of opinion with regard to sustainability has occurred between those who believe and or care and those who don't (Farrer & Fraser, 2009).

clusters of consumers, aware of environmental and ethical issues and interested in societal change are turning to alternative models and niche interventions.

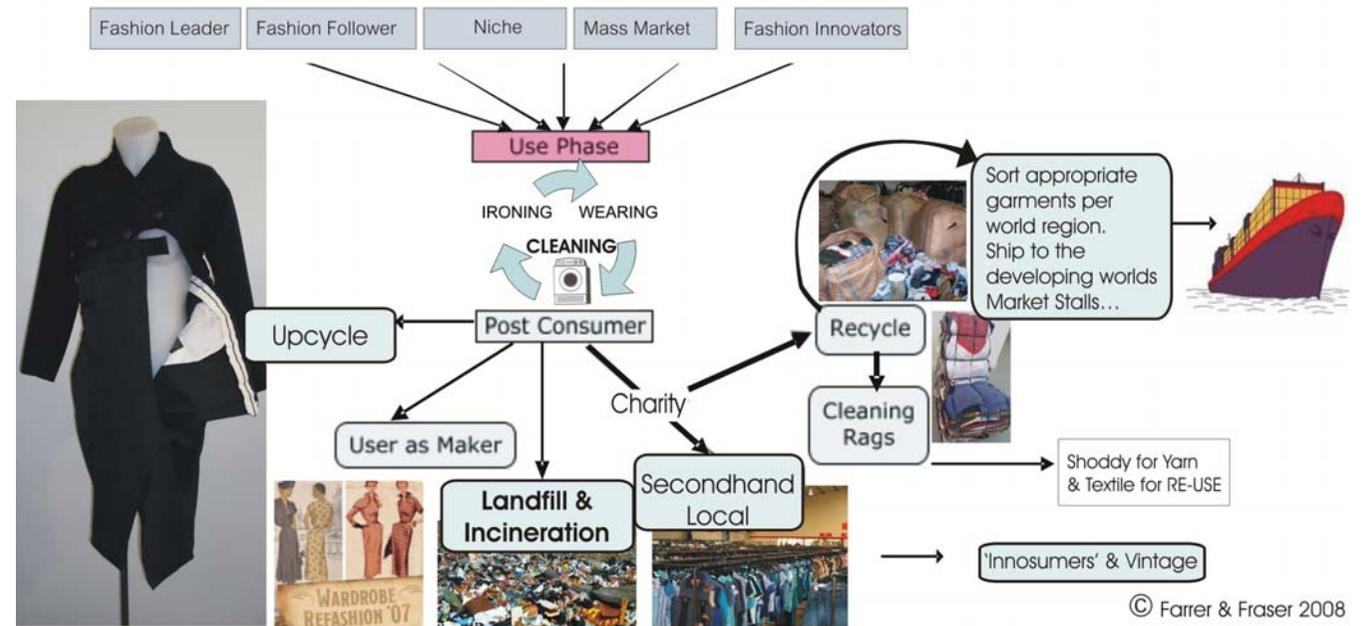


Figure 6:1 *Beyond the Grave* shows the gradual diversion of discarded clothing from landfill, to be channelled into second and third life innovative business practice.

Farrer and Fraser's (2009) diagram (Figure 6:1) visually charts the potential fate of PCTW. Gradually discarded clothing is redirected away from landfill and channelled into second or third life uses, through innovative business practices of Upcycle and ReFashion. These changes are being instigated by a new wave of consumers, the 'User as Maker' (Fletcher, 2008) and 'Generation C'³³, who are taking control, co-creating products, innovating, customising and expecting the supply chain to 'do the right thing'.

33 Unlike any generation before it, Generation C is growing as people of all ages discover newer, better ways of doing things...the underlying driver is that Generation C want the control to make their own culture, rather than have society manufacture it for them. <http://idealogue.co.nz/magazine/march-april-2008/features/ch-ch-changes>

cradle-to-cradle

McDonough and Braungart (2002) compare the 'cradle-to-grave' model with earth's natural systems, where one organism's waste becomes food for another, therefore eliminating the concept of waste. Adapting this concept they have formulated a design strategy to assist companies in re-designing eco-effective products, where all materials are viewed as continuously valuable, circulating in closed loops of production, use, and recycling. Cradle-to-cradle Design Protocol is a system for categorising materials and processes according to characteristics within the desired application.

Fletcher (1999) also describes the current product design approach as linear (compliance driven, waste minimisation with end-of-pipe³⁴ pollution controls), promoting the 'lifecycle' approach alternative to minimise environmental impact across the entire lifecycle. This approach relies on design to constantly analyse and re-evaluate the product in light of environmental constraints in production, use and disposal. In comparing design guidelines for environmentally responsible products, with 'good' design practices, Fletcher suggests notions such as durability and materials efficiency have always been central to good design.

³⁴ Environmental issues have been dealt with mainly from the manufacturing site, at a management level and are mainly compliance driven, emphasising waste minimisation and end of pipe pollution controls. 'The idea of designing products from the outset to minimise waste at its point of use and through its entire life-cycle has so far not been considered within the textile industry' (Heeley, 1999)

ReFASHION

Refashion as a process intercepts discarded clothing, reclaims, re-cuts and refashions, returning the item to the clothing stream, effectively creating a new loop and postponing its grave ending. This process could potentially reduce the mountain of waste, whilst reducing the demand on raw materials required in the manufacture of new textiles.

Reusing and remodelling used clothing is an age-old practice: patchwork developed from the necessity of recycling precious fabrics; 1940s and 50s abundant evidence highlighting scarcity of resources reinforcing the practice of 'make-do-and-mend', whereby 'hand-me downs' prevail, outgrown garments are renovated and adults' garments cut-down and remade for children. Numerous 'How-to' dressmaking books presented formulas for 'renovating' garments (Figure 7:1), while Pattern companies produced specific patterns for transforming men's suits into ladies' suits and women's dresses into children's clothing.

ReFashion has already taken place across the fashion industry from the high end haute couture houses of Paris to online DIY communities. Considering most clothing is discarded before it is truly worn-out, Kirsten Dirksen³⁵ suggests that the most eco-friendly fabrics are those that already exist. Fletcher (2008) suggests that loosening the ties between fashion and consumerism, is key to shifting the fashion and textile sector. She introduces the term 'User as Maker' and presents participatory design as a challenge to high street consumerist fashion, a stand against the dominance of elitist brands and identikit product. The 'User as maker' as a facilitator to

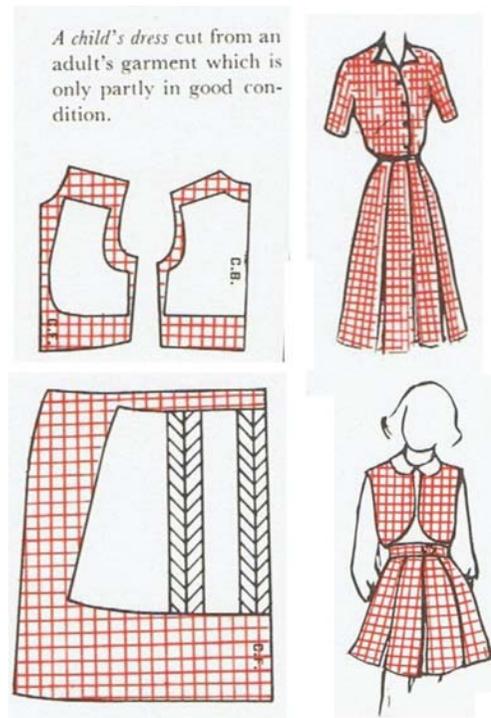


Figure 7:1 Example of child's dress cut from an adult garment - sourced from Resek, E. & M., (1955) *Successful dressmaking*, Melbourne, Colorgravure Publications.

³⁵ <http://www.faircompanies.com/main.aspx?uc=notampl&id=364&sec=2> Retrieved September 21, 2008.

reduction in PCTW is two fold: it draws the user's attention to the enormous issue of waste currently in the system, highlighting our throwaway consumer society; whilst providing the chance to engage the user in the solution of reducing, recycling and refashioning.

multiple one-offs

Junky Styling, (Figure 8:1) established in the 90s, is an example of a successful 'green' business built on the ReFashion concept using an obvious remake aesthetic. More recently Janet Dunn (2008) established the ReFashion ReDunn label in New Zealand. Dunn considers the diversity of the starting



Figure 8:1 Example ReFashioned Junky Styling vest – Sourced September 2008



Figure 9:1 Example ReFashioned ReFashion ReDunn ensemble – Sourced September 2008



*Figure 10:1 Nom*D – from the catwalk at ANZFW 08, the Bedlam collection demonstrates deconstruction and customization, which according to Nom*D media releases have been key themes in every Nom*D collection.*

point materials, as intrinsic to refashioned clothing, providing the character which is its point of difference (Figure 9:1). She applies the term 'multiple production of one-offs' to the production stage of ReFashion, acknowledging the piecemeal sourcing of garments as justification for lack in standardisation of sizing, construction and quality in donated garments.

On the other hand, New Zealand's Nom*D, known for their passion of vintage, manages to transcend the remake aesthetic. (Figure 10:1) Furthermore Nom*D has continued to rework vintage pieces³⁶, including them in their ranges, alongside deconstructed, androgynous suiting, throughout the growth of the label.

We are witnessing the beginning of a movement towards a more sustainable fashion and textile industry, where users and small businesses are adopting new practices, both internationally and locally. However while ReFashion exists well for 'User as Maker' and small niche operations, promoting reduction in consumption and waste, these existing designers and Re-Fashion businesses have a limited reach for the majority of customers, furthermore all seem to be applying the multiple one-offs approach. In addressing the potential for the ReFashion concept for larger business models, it is apparent that whilst the process is suitable for low unit quantities, as it stands this method of production is unlikely to be attractive to large fashion businesses based in economies of scale.

³⁶ In winter 2002 Nom*D "used vintage 1940's men's suiting, breaking it down and reassembling it to create a singular look" sourced from <http://www.generalcucumber.com/designer.php?designer=5>.

PART 2: METHODS



Figure 11:2 Red Skirt Transforms
 The transformation of the Red Skirt functioned as an in-depth re-investigation, from a previously unrecorded studio episode in 2007, in order to understand the tacit 'method' used and determine if the 'method' was repeatable or merely random. The flowchart analysis above, visually maps the experimental ideation process, identifying a continuing spiral of 'trials' leading to a large number of possible solutions. Refer Appendix two for Trial descriptions details.

RESEARCH METHODOLOGY

The methods employed in this practice-based research are summarised in Part 2 of this thesis. Whilst a single methodology cannot be named, a collection of approaches have been employed in a discovery-led process of open ended enquiry, including methods unique to my own particular creative practice. Primarily this project is undertaken through reflective design practice, informed by literature review. The potential for the ReFashion concept to be adapted for business models was investigated with a view to utilising PCTW in New Zealand. This objective emerged from the interconnections between the reflection on literature and the reflective studio/design practice.

Initially literature relating to sustainability, especially in relation to the fashion textile industry, highlighted a multitude of conflicting views, and an apparent paradox of fashion consumption and sustainability. The subsequent literature review evolved through a rhizomatic³⁷ gathering process. The mapping (Figure 12:2) of this broad scoping of tested and emerging theories shaped the area of inquiry and a vast web of intersecting connections transpired revealing opportunities for further exploration (Gray & Malins, 2004).

³⁷ Rosenberg describes Poetic research as *rhizomatic* in nature, it organizes *tactically*, it sets out roots and shoots that break and reform, reproduce and transform. The process may be broken at any point but at the point of rupture it can reconstitute itself to form connection again. It develops its future by looking for radical forms, breaks and lacunae in thinking. Sourced from http://sitem.herts.ac.uk/artdes_research/papers/wpades/vol1/rosenberg2.html. In this research the term is used to describe the web like juxtaposition of information into saturated clusters, interconnecting seemingly unrelated information which has meaning later.

Fundamentally, I am a practitioner, specifically working in garment design and garment making with an aptitude for 3-dimensional forming of fabric on the body. This practice-based research is approached from this perspective. My design practice is a combination of ongoing cycles, of reflective studio practice, informed by literature review, encapsulated in an active documentation to visualise research (Gray & Malins, 2004). A variety of recording methods³⁸ have been used to capture and store

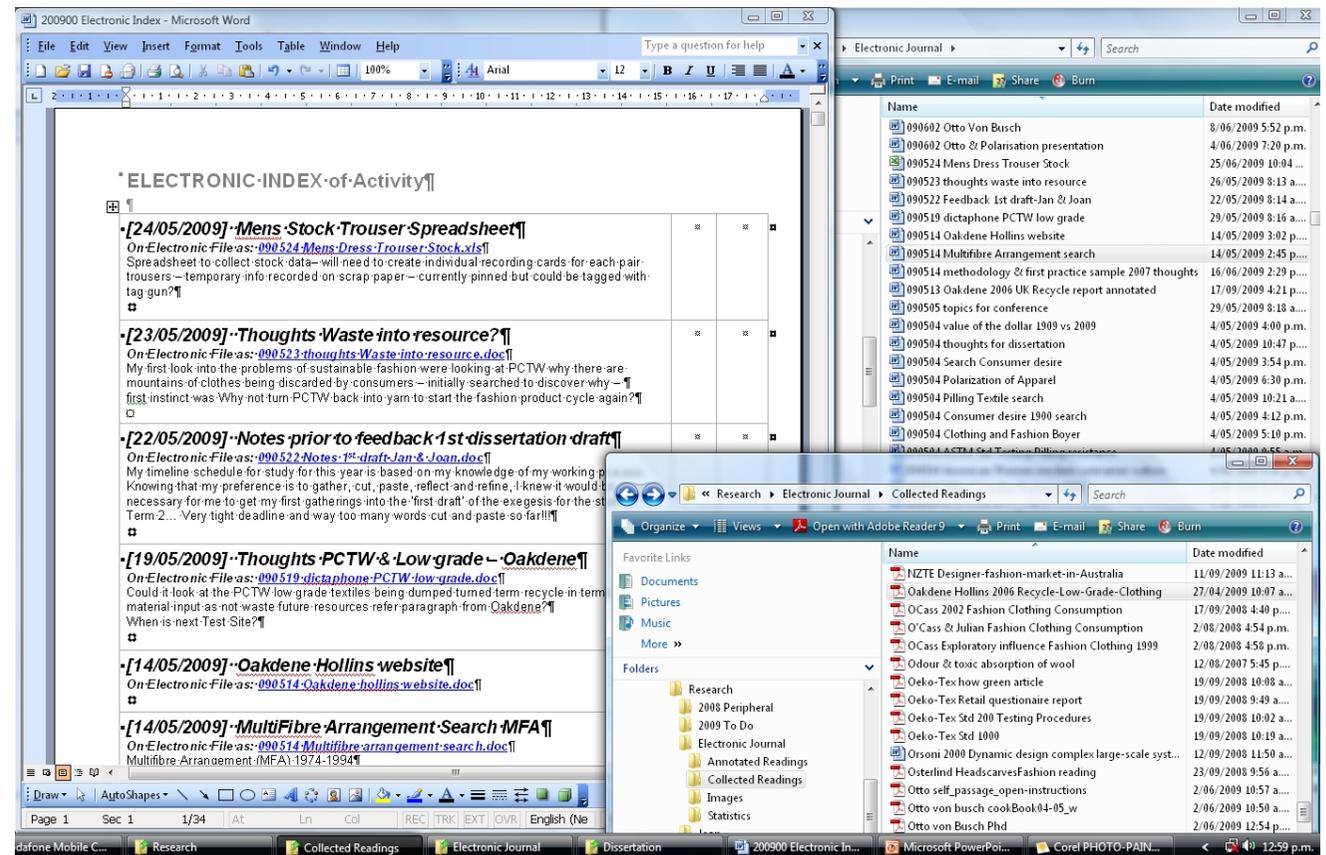


Figure 13:2 Example of the structure of the Electronic Journal files and folders.

38 Variety of recording methods include note-taking, dictaphone, photographic, technical and specifications notes, electronic journal and visual diary

'reflections in action of practice', (RIAP) and 'reflection on action in practice', (ROAP), in ongoing developmental dialogue.³⁹

The Electronic Journal⁴⁰ (Figure 1.3:2 displaying the structure of the files) provided a method to record all 'events' (research, theory, practice, concept, reflection) sequentially, without concern for current 'meaning', but conserved for later review. As concepts and contexts developed and the theory emerged, files were re-grouped and re-sorted into various juxtapositions, to help identify emerging gaps. This activity highlighted areas of intrigue, permitting saturation of an idea to 'exhaustion' or 'new direction' without concern for the 'logical order' of its collection.

³⁹ Reflection in Action and Practice (RIAP) and Reflection on Action and Practice (ROAP) are referred by Schon (1983) as the 'back-talk' to the researcher

⁴⁰ My transitory work and study schedule included 4 hours travelling each day. In order to make the most of my down time, I used a Dictaphone to capture dialogue whilst driving and developed a digital 'Memo Fund' ("The basic goal of memoing is to develop ideas on categories with complete freedom into a memo fund that is highly sort-able" (Glaser & Holton, 2004, p.12)) filing system on my Laptop to record my reflective analysis during my train journey. Adaptation of this Memo Fund tool into a tabular format with categories that enable sort-ability as an active documentation has become my 'Electronic Journal'.

tacit knowledge

Tacit knowledge is the unspoken 'knowing' in our subconscious thought and has been accumulated through a lifetime of experience, experimentation, perception, and learning by doing.⁴¹ As an experienced designer, I have over 23 years experience of fashion related work, including 12 years of lecturing. The 'familiar situation' according to Schon (1983) "functions as a precedent, or metaphor". Schon says "our knowing is ordinarily tacit, implicit in our patterns of action... our knowing is in action". He refers to this use of tacit knowledge and built up experience as "Seeing as" and "Doing as"; the ability to see unfamiliar situations as familiar ones, and to do in the former as we have done in the latter. Through my tacit understanding of the fashion design process I was able to conceive and record ideas and formulate resolutions to technical issues in my visual diary/journal, often without necessarily committing resources and technical experimentation.

Early on I recognised elements of my design practice that were tacit, that went under the radar and I could not articulate. In order to identify these 'tacit' decision making/departure points, I strategically chose to rerecord a previously unrecorded studio episode from 2007 (Figure 11:2). This in-depth investigation became a study of the way of doing. Through photographic recording and ROAP, of this initial ReFashion attempt, consistency in my method was established and defined.

⁴¹ Mascitelli, Ronald, Source: [Journal of Product Innovation Management](http://www.blackwell-synergy.com/doi/abs/10.1111/1540-5885.1730179?journalCode=jpim), Volume 17, Number 3, May 2000 , pp. 179-193(15)
<http://www.blackwell-synergy.com/doi/abs/10.1111/1540-5885.1730179?journalCode=jpim>

design research through action and reflection

The various methods employed in this project can loosely be associated with Action Research, Reflective Practice and Design Practice. The latter comprises a cycle of methods and principles that mirror a typical design process used in developing a fashion product. Phases (Figure 14:2) within the Design process can be described as problem–analysis–synthesis–evaluation (Swann, 2002).

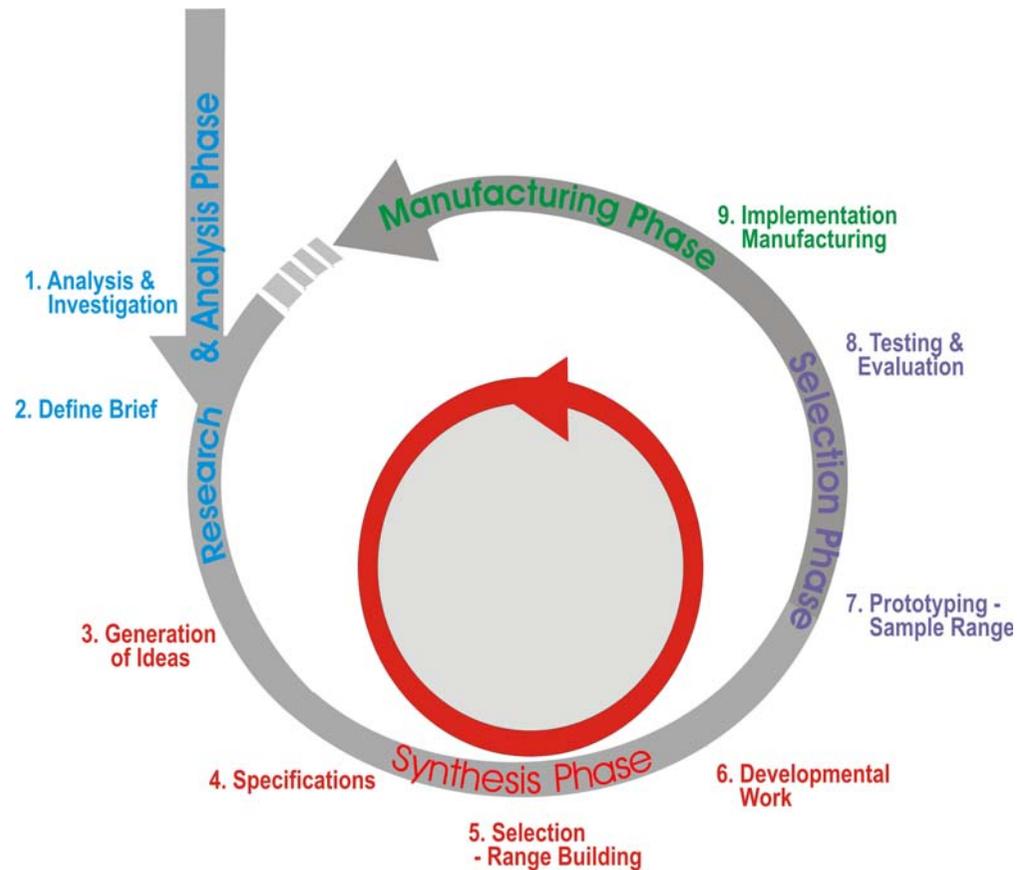


Figure 14:2 A diagram representing the researcher's interpretation of a typical design process flowchart for fashion based on the 'design loop'

Similarly Action Research can be described as having four cyclical phases; planning–acting–observing–reflecting; (Figure 15:2) and both approaches are cyclical and emergent, taking place gradually. This research takes place through Reflective Design practice (Figure 15:2). The Analysis & Synthesis phase combines contextual research with actual doing in an experimental 3-dimensional approach.

Phase	Reflective Design Practice	Action Research Phases
Planning Phase	<ul style="list-style-type: none"> • Planning: Logical, sequential, ordered, structured • Gathering – juxtaposition becomes clustered, categorized, saturated and rhizomatic. • Acceptance, understanding, coding sorting, dialogue, critique, use or 'play' with the idea – integration. 	<ul style="list-style-type: none"> • Planning – or definition of the problem and organization of research practices.
Cyclic Studio Phase (Analysis & Synthesis)	<ul style="list-style-type: none"> • Review & gather materials. • Phase 1: Generate possibilities, RIAP. • Observe on the body, review 	<ul style="list-style-type: none"> • Acting – or implementation.
	<ul style="list-style-type: none"> • Drawing, technical analysis, planning • Phase 2: Refine intention, RIAP. • Finished final toile • Phase 3: Repeatability, RIAP. • Fully develop and test Prototype 	<ul style="list-style-type: none"> • Observing – or action and collection of data. Observation, subsequent reflection and action.
Reflective Phase	<ul style="list-style-type: none"> • Return to Order –new categories, critique, ROAP. • Reflection, comparison of position 	<ul style="list-style-type: none"> • Reflecting – and developing revised action derived from what has been learned.

Figure 15:2 Table presenting typical Action Research Phases in comparison to the similar phases of the researchers individual Reflective Design Practice.

three cyclic studio phases

Within this Reflective Design practice, my version uses three distinct cyclic studio phases for innovating product (Figure 16:2): The first phase is a 3-Dimensional Visualising Cycle which aims to generate possibilities; the process actively seeks new possibilities and identifies shapes, features and techniques that hold potential. The second phase is Toile Development, which takes place after the original concepts have been analysed through thinking and drawing; the process aims to refine the intention, through synthesis focusing on aesthetic, fit and function. The third phase of Prototype Development aims to develop fit, function and aesthetic while identifying the appropriate repeatable manufacturing process required to repeat the product.

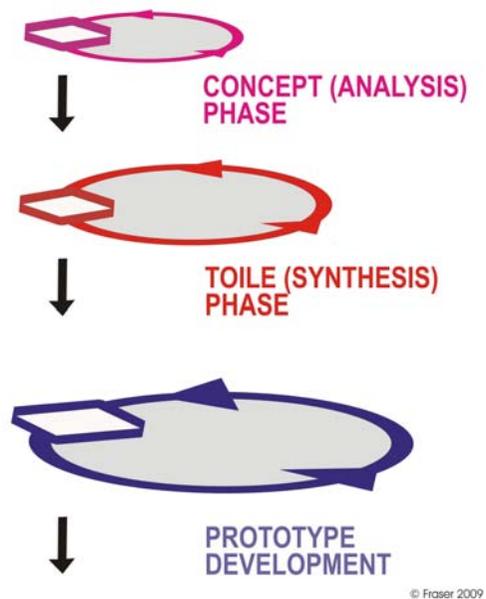


Figure 16:2 Visual representation of the 3 distinct Cyclic Phases diagram

phase-1: 3D visualising cycle

Concepts for silhouette or the 'form on the body' were developed through several 3D Visualising cycles. After a review of discarded garments and some preliminary concept sketches (quick roughs triggered from tacit knowledge) initial starting point garments were indicated for selection. The resulting studio episodes that followed were distinctly 3-dimensional transformations which enabled the discarded garment to be transformed on the dress form. As a means of discovery, this process incorporates a systematic method of traditional, non-traditional, intentional and contingent garment draping and fitting techniques through seemingly contradictory cycles. Fundamental to this approach is having the confidence to break the rules or to disregard the wisdom of the field. Once underway, a 3D visualising cycle can make rapid progress and, as a continuing spiral of 'trials', can lead to a large number of possible solutions which are best recorded through photography.

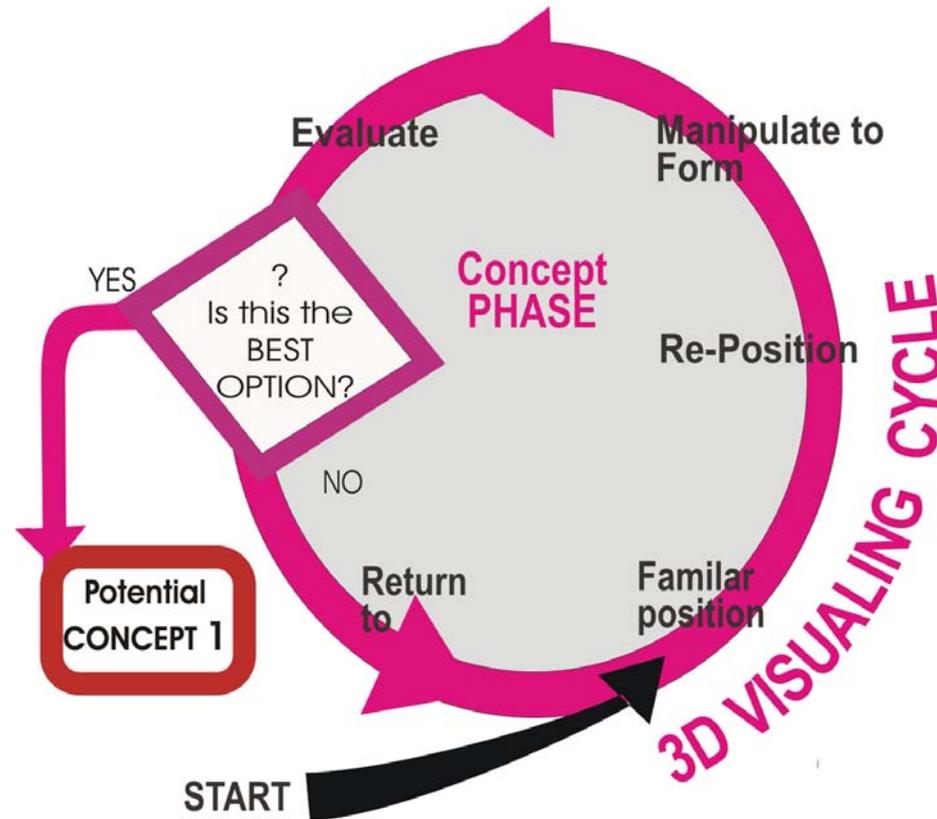


Figure 17:2 3D Visualising

In this cycle (Figure 17:2) the starting discard is first fitted to the tailors form in an expected way or familiar position⁴², then re-positioned in an unexpected manner, until a desired shape is achieved. Throughout this 3D transformation process, several ‘move testing’ experiments⁴³ are systematically employed using traditional and non-traditional techniques. Components may be disassembled and

⁴² This ‘familiar situation’ according to Schon (1983) “functions as a precedent, or metaphor”.

⁴³ Schon’s (1983) move testing experimentation whereby the practitioner take action in order to produce an unintended change.

reassembled in an alternate juxtaposition and fitted on the form until a desired result emerges. A 'Mental Checklist' (refer Appendix three) is used for evaluating and testing whether and how the idea works or 'pleases'.

The 'Mental Checklist' provides an RIAP⁴⁴ occasion and bears similarities to on-the-spot experimentation (Schon, 1983) where intended and unintended consequences are reflected upon. Comparably Scrivener (2000) explains when the practitioner reflects on knowing-in-practice they are reflecting on knowledge and ways of working automated over an extended period.

juxtaposition as method

Juxtaposition is an important aspect of my methodology, it was used in contextualising the research as a form of comparative analysis, a method of analysing and comparing ideas, determining position in relation to each other and seeking obscure connections. Similarly juxtaposition used as a 3-dimensional 'action' looks to re-arrange the physical elements in non-usual ways and discover the newness.

narrow boundary as method

During this analysis stage the juxtaposing of information has a tendency to create complexity. One strategy I developed to filter and interpret the complexity was to restrict or limit the boundaries and criteria. The first boundary limit was to restrict the materials input to 'discarded' clothing. Following this, potential discards were selected based on a tacit understanding of the aesthetic of the discard item (e.g. fabric, colour see Figure 18:2).

⁴⁴ Reflection in Action and Practice (RIAP) and Reflection on Action and Practice (ROAP) are referred by Schon as the 'back-talk' to the researcher (Schon 1983 p.148).

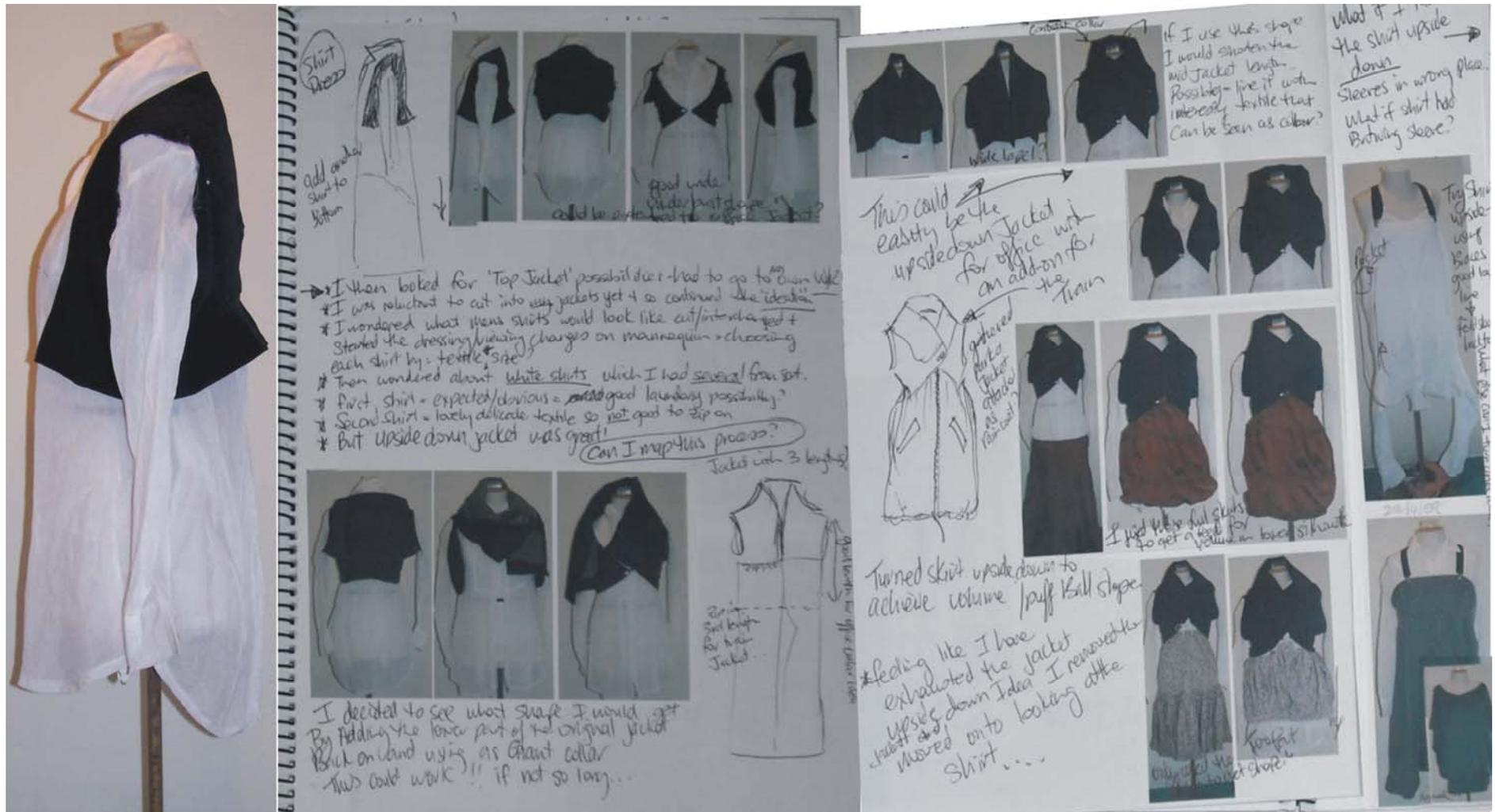


Figure 18:2 Example page from Visual Diary highlighting the researcher's recording of the first 3D visualising trials with discarded items, based on a tacit understanding of the fabric and form.

Working with these items identified other necessary characteristics for example: physical size of original item; size of existing panels; existing design details (collars, pockets, openings etc).

Similarly, working with these initial discards allowed reflective time to identify the 'common' item discards, highlighting potential item pools. In the absence of statistical information regarding PCTW in New Zealand, I began contextualising the data drawn from quantitative studies with my own tacit knowledge of second-hand and 'Op Shops'⁴⁵ in New Zealand. In the first instance, I considered my own large stockpile of fabrics and extended wardrobe, collected over my lifetime.

Shortly after commencing the refashioning studio episodes, a broader selection of discarded clothing items was required to work from. A simple request for donations of clothing was sent out through my network of extended family and friends. The first primary research came from categorising the donated bundles of clothing⁴⁶ into groups/types of garments, to deduce the potentially common categories in the secondary industry.

men's trouser

Reflection on the successful ReFashion transformation of the men's trouser in 2008, highlighted the potential for targeting men's dress trousers: quality of cloth within a semi-standard size and shape; similar construction and tailored details; apparent availability of large quantities (Figure 19:2).

⁴⁵ A localised term for Opportunity Shop, a shop specialising in second-hand.

⁴⁶ More than 250 items were donated by friends and family, ranging from childrenswear, through womenswear and menswear.



Figure 19:2 First trouser transformation from own studio practice episode in 2008: ReFashioned trouser toile into dress.

Furthermore the limiting shape of the original trouser panel more readily fitted to the form and became form fitting (Figure 20:2). Further limiting the materials input to only men's dress trousers at this stage, allowed for a very feminine shape to be contrasted from an original masculine trouser (also refer Title page).



Figure 20:2 Idea generation from first focused trouser 3D Visualising cycles. Trousler panels are more readily fitted to the form and became form fitting.

phase-2: toile development

Following the first phase the most appropriate concepts were developed further. Technical issues were considered, problems were mentally visualised, potential variations were thought through, and technical issues drawn out (Figure 21:2), minimising commitment of resources and technical experimentation.

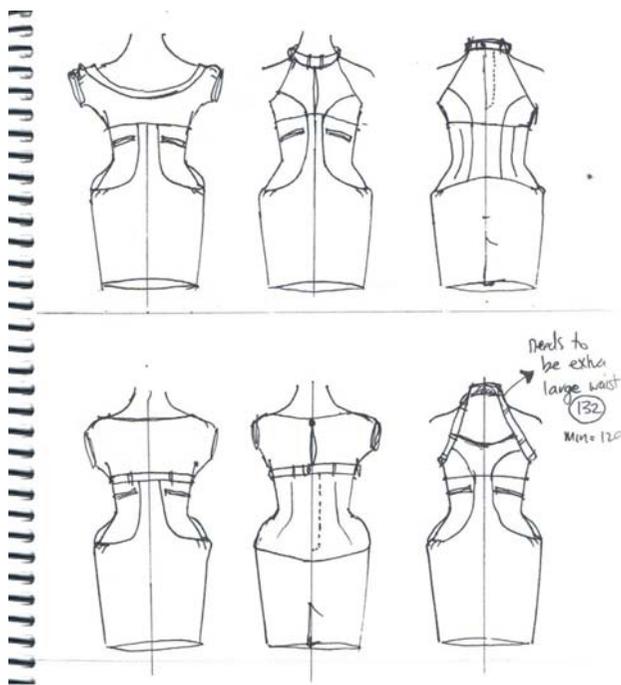


Figure 21:2 Working drawings exploring technical issues were drawn out prior to selection of appropriate solution to test through toile development.



Figure 22:2 Example of refining intention from earlier rough concept through: technical drawing, patterning, disassembling, cutting and constructing of toile.

Small details were mocked-up (Figure 22:2) and eventually the most promising ideas were selected and confirmed for toile development.

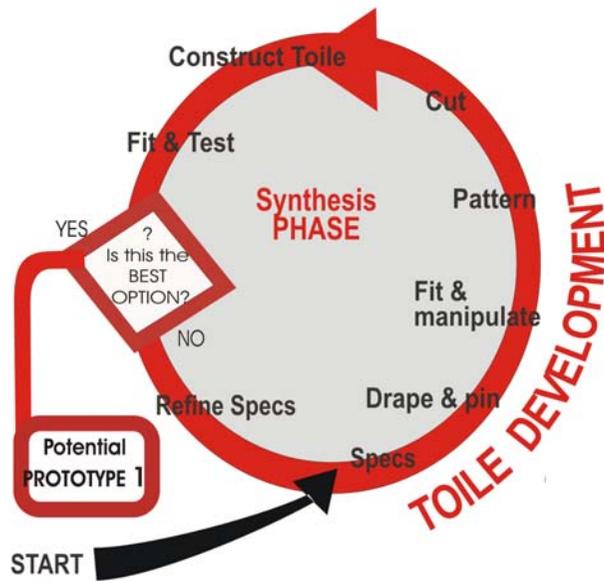


Figure 23:2 Phase-2 Toile Development diagram.

This second cyclic phase aims to refine the intention (Figure 23:2). Toile Development as a process is readily recognised in the fashion industry. This ReFashion version takes on a 3-dimensional emphasis and apart from the toile needing to be disassembled in the process remains standard to the industry. The manufacture of a fashion garment employs a skilled and mechanised process of engineering the 2-dimensional fabric into a 3-dimensional moving form. As an experienced designer I know what is possible in terms of technical garment construction and how to minimise manufacturing costs. So whilst



Figure 24:2 Subtle reuse: waistband, pockets and fly construction

toiles are developed with a focus on aesthetic, fit and function, tacit technical knowledge automatically feeds decisions at evaluating points.

The aim in this second phase was to produce viable toiles that could potentially be produced from men's trousers and would be acceptable in a 'fashion' market. During this phase the concept of subtle Re-Use of existing features developed (Figure 24:2).

Also further narrowing the boundary to only the black variety of men's trousers became a take on the classic little black dress (LBD), now contrasted from the original men's dress trouser.

BEYOND ROUND 1

Whilst multiple production of one-offs is suitable for low unit quantities, clearly it is not an effective production method for large fashion businesses based on economies of scale. Issues of re-manufacture will need to be addressed in terms of larger businesses.

Typically large fashion businesses operate in an 'Economy of scale'⁴⁷ that is, large companies lower the average cost per unit through increased production. The subsequent advantage being that buying bulk is cheaper on a per-unit basis, allowing a producer's average cost per unit to fall as scale is increased.

The selection and availability of the cloth is key to a successful fashion product, exact same fabric and trims (down to dye batch number) must be sourced in the required quantity. We can assume in standard production of Men's trousers that raw materials are sourced in bulk (Figure 25:2).

⁴⁷ "Economies of scale tend to occur in industries with high capital costs in which those costs can be distributed across a large number of units of production . Therefore reductions in unit cost occurs as the size of a facility increases. As the scale of the facility increases, the capacity for production of units increases. Thereby shares the fixed costs over an increased number of goods Sourced from <http://www.investopedia.com/terms/e/economiesofscale.asp> 03 May 2009

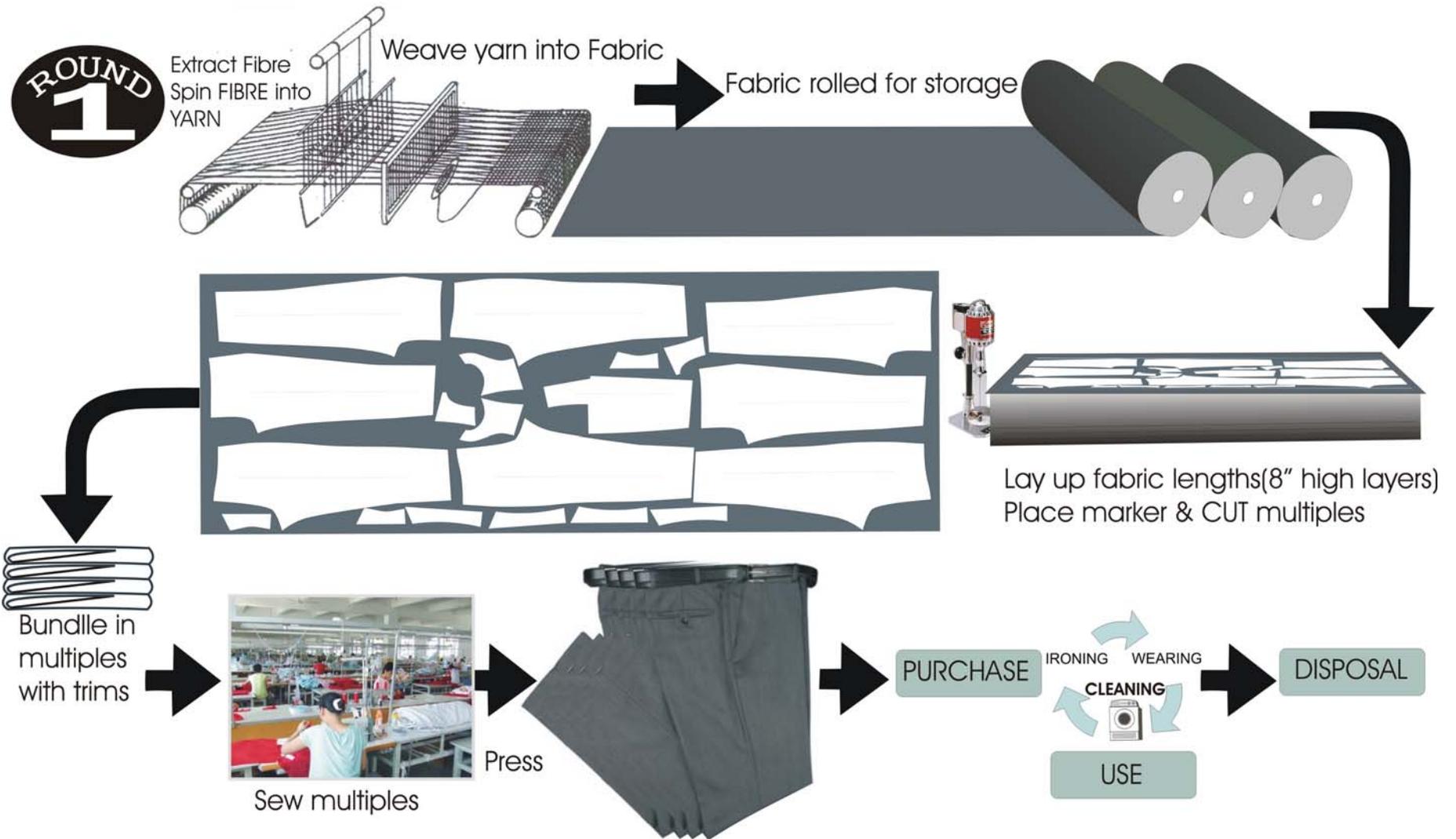


Figure 25:2 Flowchart outlining the Round 1 manufacture process required in the typical production of men's trousers.

If the ReFashion process is ever to be attractive to large fashion businesses, current manufacturing systems will need to be considered, in order to identify potentially adaptable aspects. Gaining an overview of the manufacture processes in this way, initially indicates that for Re-Manufacture to parallel this bulk model, there is an obvious need to source a bulk supply of input stock in order to begin to address effective re-manufacture for large businesses.



Figure 26:2 Racks of men's trousers in the Onehunga Savemart store.

Further primary research obtained from visiting 6 of the 28 Savemart⁴⁸ stores throughout New Zealand, provided confirmation of the most common product types and proportions discarded. An average was gauged, regarding the quantity of stock in each store and particularly the volume of men's trouser, thereby grasping the potential availability of men's dress trouser as raw material input. After following this with a tally of main garments on selected racks, together with a quick multiplication by the number of racks, a guesstimate of total stock levels⁴⁹ in Savemart stores was obtained. The actual trouser count on racks in the Onehunga store was over 1000 pairs, so initial findings indicated potentially healthy feedstocks (Figure 26:2).

However, the *success of the re-fashioned product is largely dependent on the quality of the original discard garment*, in retrospect it is now clear that not all trousers will be useable. As an expert my eye is trained to recognise quality textile, quality detail, the fall, drape and handle of the trouser textile. This criteria was tacitly used when selecting and buying the initial men's trouser stock. A point of view emerged that the huge quantity of poor quality textile that has infiltrated women's fast fashion, was consequently flowing into mainstream menswear. The second visit to the Onehunga store confirmed this realisation, on discovery the stock was very similar to the visit six months prior and only nine pairs of

⁴⁸ Savemart – New Zealand's largest retailer of recycled clothing.

⁴⁹ Guesstimate count established 675,000 stock garments, with 1000 pairs x 28 stores = 28,000 pairs potentially available.

acceptable quality trouser were located for the project. My tacit knowing, in the initial selection process, overlooked 90% of the stock that was non-salvageable as fabric, a fact that may not have come to light as quickly without the restriction to one type of discard garment. While this obviously highlights the small percentage of high grade stock available to work with in New Zealand, more importantly, as another key finding for this study, it suggests a *large percentage of low grade PCTW in New Zealand*.⁵⁰



Figure 27:2 Savemart Clothing Bin at the Pukekohe Pak n Save car park.

Granted this perception has been drawn just from Savemart, one of many second-hand clothing retailers in New Zealand, however it is justifiably the largest retailer, with its main collection method through the convenient Clothing Bin network. Domina and Koch (1999) stressed the importance of convenience for increasing recycling rates of textiles which was substantiated by households with kerbside collection.

They also discuss frequency of use as being more likely, when the option is well known and requires little planning or preparation⁵¹. Savemart's Clothing Bins, (Figure 27:2) visibly promoting the Child Cancer Foundation, are conveniently located in most supermarket car parks and readily located throughout New Zealand. Donations are anonymous, meaning clothes can be dropped through the slot with minimal preparation required. In the absence of actual New Zealand data this preponderance of vast distribution, ease and accessibility of clothing bins supports accepting Savemart as the norm in New Zealand. It follows then that poor quality textile has infiltrated the bulk of discarded clothing in New Zealand.

⁵⁰ Envision NZ's 2005 survey of recycling and second-hand businesses in the Auckland region, confirms the growth in cheaper imported new goods, stating this as one of the key impediments to growth in the second-hand sector in New Zealand (Roberts, 2005).

⁵¹ "Over 80 per cent of the respondents reported using the Salvation Army as a disposal option at least once during the previous year. The frequency of use may be explained by the likelihood that this option is the best known and requires little planning or preparation." (Domina & Koch, 1999, p354)

deficits in the field

In the absence of New Zealand statistics, this reflective design practice drew key arguments and comparisons from British and American quantitative and qualitative studies. In attempting to substantiate the New Zealand position, several anomalies drew attention to the lack in real data, questioning:

- o What is the quantity of textile product consumed by New Zealanders?
- o What is the quantity of PCTW consequently produced?
- o What are the Kiwi's textile disposal patterns?⁵²
- o What is the proportion of poor quality discards (low grade waste) in New Zealand?
- o How does this compare with international statistics?
- o What is the quantity of low grade textile⁵³ exported from New Zealand?
- o What does Papua New Guinea do with the 92% of exported New Zealand second-hand clothing?

This quantitative gap questions the validity of using international findings in the New Zealand context.

⁵² Ministry for the Environment state that textiles make up 4% of all waste discarded to New Zealand Landfill (refer Appendix one). But this statistic does not take into account other factors with regard to PCTW like the quantity of clothing in second-hand stores, or in export or stored in the nations wardrobes. How long might New Zealanders wear an item before disposing of it? And what is their preferred method of disposal?

⁵³ Poor quality textile is non salvageable as fashion fabric, as a recyclable, low grade waste will only be useful as shoddy fibre and cleaning rags.

ReDress

ReFashion as a solution for clothing (un) sustainability



Figure 28:3 Flowchart – masculine trouser transforms into feminine dress.

RESEARCH AIMS & OBJECTIVES

This project aims to inspire new approaches in fashion design and clothing production in New Zealand, through promoting debate and altering perceptions of the secondary textile industry. The project presents the viewpoint that discarded clothing is an untapped commodity, a rich fibre/textile resource to be conserved, re-used, recycled, re-fashioned and transformed into contemporary fashion. Investigation into the ReFashion concept, producing solutions from discarded clothing, aims to identify adaptations that have potential application to business models and viable product manufacture. It is intended that this research will provide contextualised information for both the fashion manufacturing industry and government agencies, in order to develop innovative applications for new markets.

Reflection on the process of developing the ReFashion prototype emphasises the issues involved in current practices of recycling in the second-hand materials industry, and provides a vehicle to discuss the implications including sorting, selecting methods/practices, standardisation and repeatability for re-manufacture.

The objective is to ascertain the potential of the ReFashion concept to be adapted to fashion business models.

PHASE-3: PROTOTYPE DEVELOPMENT

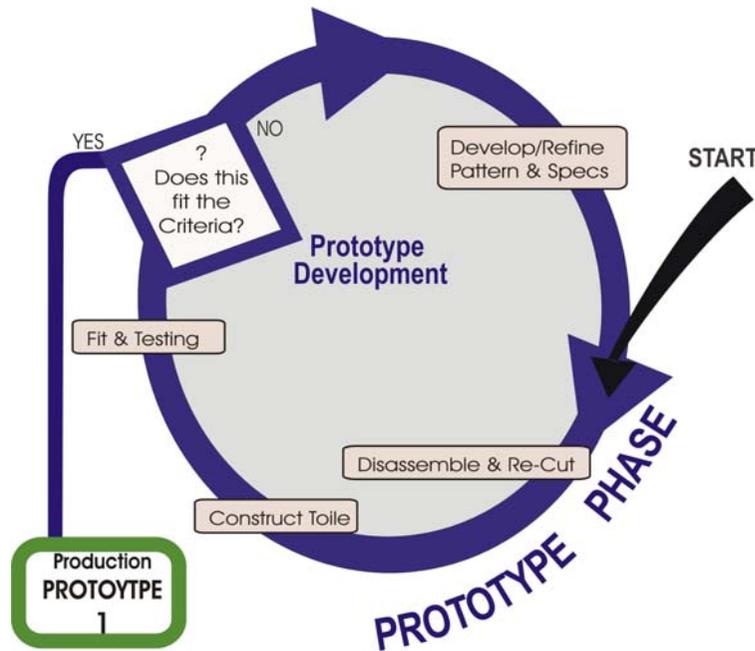


Figure 29:3 Phase-3 – Prototype Development diagram.

Prototype Development as the third phase, (Figure 29:3) is an Evaluating Phase. Design research through action is cyclic in nature, (Finn, 2008) toile's developed in Phase-2 are analysed and the resulting prototype is re-developed as necessary through fit, function and aesthetic to determine a final prototype. The emphasis is on repeatability, identifying the appropriate manufacturing techniques and processes that will be required to repeat this product.

During this stage issues relating to patterning for repeatability were highlighted (disassembly, usable piece size, nature of the second-hand garment, complexity and jigsaw fit, expertise of the cutter, initial selection and stock recording).



Figure 30:3 Disassembly- Elise's rapid blade method (above) standard unpicking through chainstitch.



Figure 31:3 Pre-preparation: disassembly and press.

expert maker & disassembly

At this point I chose to work alongside an expert maker to analyse the 'make' process in an industrial environment. I contracted an Expert Maker, my colleague, Elise Cox. Elise has considerable experience and expertise in garment construction, manufacture and clothing alterations contributing further wealth of tacit technical information. Working with Elise provided another perspective, another comparative analysis and juxtaposition of techniques/technical methods. For instance Figure 30:3 presents the disassembly process, and demonstrates Elise's rapid blade method for unpicking. Whilst more traditional dismantling

techniques for releasing the chain stitch, drew attention to the fact that the seams in this sample were not directional, denoting its probable mass manufacture origins. Corroboration of methods, selection process, and techniques, emphasised the two unique responses to a particular situation, highlighting automatic tacit decisions. Together, improvements, mechanised approaches and new ways of 'making' were identified, through analysis of each step and industry, considerations. As an example during the first 2 phases of research the original approach was to disassemble the trouser with minimal unpicking, attempting to use as much of the original assembly as

possible. However working with Elise, provided realisation that unpicking or further disassembly (Figure 31:3) was beneficial to the next manufacture stage by providing better access for re-cutting and re-assembly. Throughout this phase, rather than the fashion aesthetic, the emphasis became more about ensuring repeatability of the process. In this example (below left) minor structural design details of the fake central pocket and busy central panels⁵⁴, were complicating the process and clouding the real intention of the prototype. Simplification of the style was required to initially test the reassembly process.

During this phase the T series evolved, the name referring to the 'T' shape created by the position of the bust darts (bottom right).



Figure 32:3 T series evolves following panel simplification of an earlier toile.

⁵⁴ An earlier toile that previously evolved through a manipulation cycle in Phase-2

expert cutter

2009 Mens Dress Trousler Stock

stiff / crisp / med / soft / fluid

DATE/CODE: 905HN104-2		104
BRAND: Bond street		
COLOUR: instant coffee		
TEXTILE:		
twilled rib weave		
C O M P O S I T I O N	Wool:	100% wool
	Polyester:	
	Cotton:	
	Silk:	
	OTHER:	
HANDLE: stiff		
WAISTBAND: 0		
PLEATS: 1		
FLY: 0		
P O C K E T	FRONT:	slant
	COIN:	1
	HIP:	2
GRADE:	CLEANED:	PRICE:
COMMENT:		
firm fabric-good cond		

Figure 33:3 Example of Trousler Stockcard.

CODE	Date	Brand?	Cost	Waist	Colour	Textile	Composition	Handle Code	Waist band	Pleat
5ORIG102	1-Jan	Bracks Slacks		102	deep grey-brown	fine twill	100% poly	fluid	42	2
904SO102	14-Apr	Las Vegas-P hilli	7.99	102	dark grey-navyish	dull self stripe	wod?	firm	36	0
904SO104	14-Apr		7.99	104	black pale blue pinstripe		100% poly	soft	38	0
905HN104	1-May	Oscar Jacobs	12.00	104	navy pinstripe	garbedine	100% wool pure ne	firm	40	0
905HN104-	15-May	Bond street	10.00	104	instant coffee	twilled rib weave	100% wool	stiff	36	1
808ST106	8-Aug	Hallerstein	11.99	106	dark grey pinstripe	herringbone pin str	100% wool	med	38	2
905HN108	1-May	Barkers	8.00	108	Black grey marle	fine rib weave?	100% wool	soft	34	sgle
807SD132	14-Jul	Bracks Slacks		132	mid grey	garbedine	wod?	med	42	0
906SN92sh	20-Jun	NewAesira, Sur	9.99	92	black	herringbone	?	med	35	0
906SN94bl	20-Jun	Profile	12.99	94	black	fine rope weave?	60% wool 40 poly	med	38	2
906SN88ne	20-Jun	Slates - Dockers	12.99	88	black	fine garbedine	45 worsted, 55 pd	st med	37	2
906SN80ve	20-Jun	made in NZ	8.99	80	black pin stripe	pinstripe-narrow gr	cotton blend?	med	38	1
906SN88	20-Jun	Winners	12.99	88	black	self stripe twill	Poly? BT tested	crisp	40	2
906SN86	20-Jun	Wallace	11.99	86	black	self stripe twill	poly?	crisp	37	2
906SN74	20-Jun	Newwave	8.99	74	Dirty grey	Pinstripe Herringbo	wod?	crisp	40	2
906SN79	20-Jun	Crocodile	10.99	79	Black - blue fleck	loose weave rib?	Polyacrylic 65 Poly	crisp	38	2
906SN80	20-Jun	Besti Homme St	14.99	80	Steel Grey	herringbone	wod?	med	37	2
906SN82	20-Jun	Hallerstein	14.99	82	black	soft garbedine	poly 100	soft	36	2
906SN85	20-Jun	Rembrandt (Chi	11.99	85	Steel Grey (Marle)	garbedine	wod?	med/cris	42	1
906SN87	20-Jun	Hallersteins	12.99	87	Steel Grey (Marle)	garbedine	wod 45 poly 55	crisp	38	2
906SN89	20-Jun	San Mono (italia	10.99	89	Black with cream	pl-weve, b/w grid	wod 80 nylon 20	soft	40	2

Figure 34:3 Collation spreadsheet for Men's trousler Stock information.

Incoming stock needs to be processed before it can be used. At initial selection, stock is graded by usability and quality and must be commercially cleaned to remove the accumulated surface grime of the previous wearer. The Stockcard (left) records standard details of origination, size, colour and material value. It is formatted to collect actual length dimensions, which once collated (Figure 34:3) is key information that informs the cutter when selecting the best trousler option to commence disassembly.

A 'Marker', or diagram indicating probable best fit placement of pattern pieces on a given original size, (Figure 36:3) needs to be produced for each style. However, this is not a guarantee of exact placement. It is necessary for the Cutter to be an 'expert', to understand the limitations of grainline placement, within this limiting environment, in order to successfully disregard the wisdom of the field.

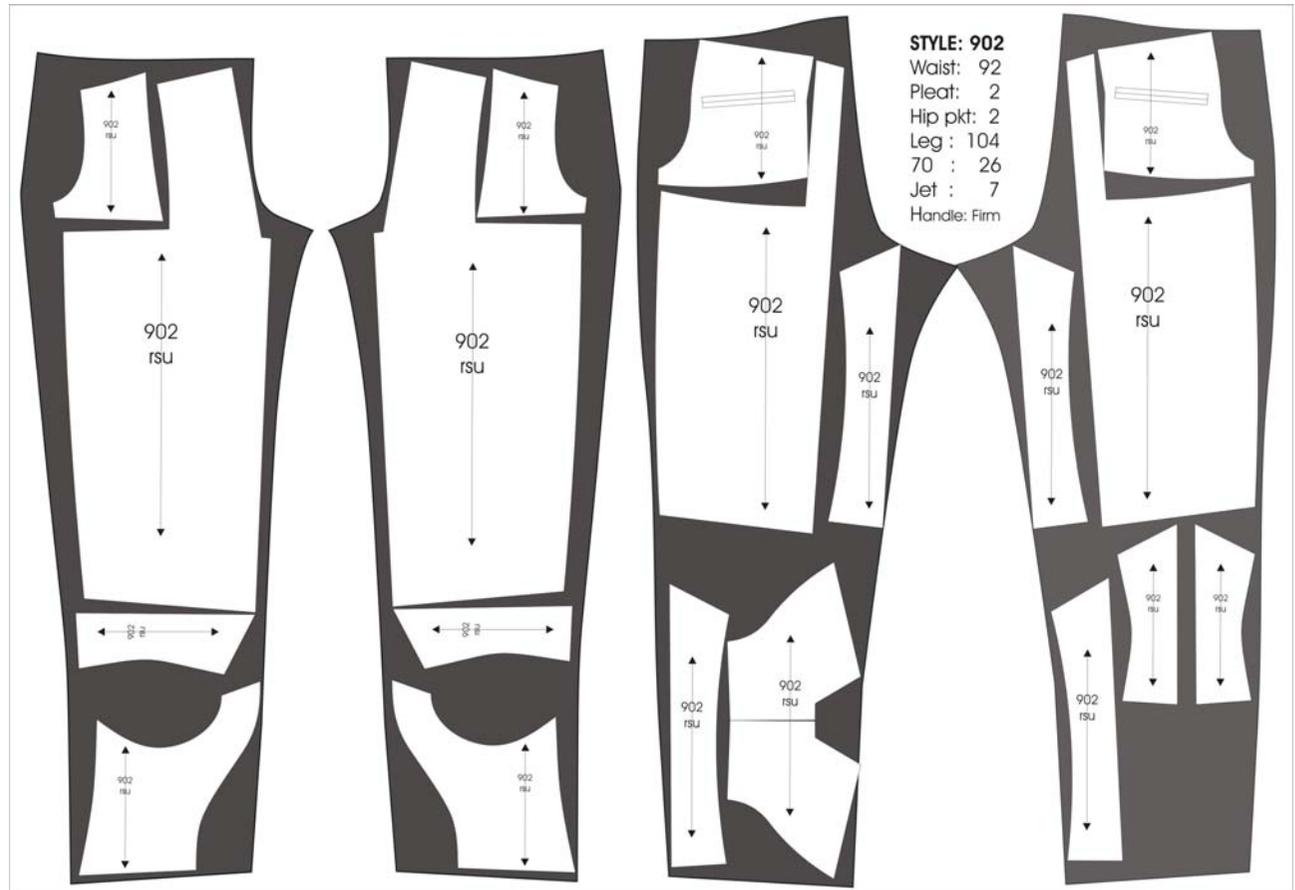


Figure 36:3 Example of the resulting Marker diagram from the previous pattern placement (Figure 35:3).

re-manufacture

If we compare the Round 1 – Manufacture flowchart (Figure 25:2) with the flowchart of the Re-manufacture Process for Round 2 (Figure 37:3), we see similarities and variance from the mass manufacturing process of Round 1 in several areas.

1. Raw materials (feedstock) being individual 'trouser' rather than rolls of fabric.
2. Pre-preparation of the raw materials or the clean, disassembly, press.
3. Variable jigsaw fit of pattern pieces.
4. Individual (single layer) cut.

The bundling and assembly processes are equable to standard manufacturing processes and therefore transferable to current skilled personnel and manufacturing systems.

It was important to produce at least one prototype, repeated, in order to demonstrate the successful standardisation of design, fit and similar fabric types. The 'make' part of this process is a standard assembly process achievable with minimal change in current manufacturing systems. Therefore ascertaining a potential business model for ReFashion is dependent on the disassembly and cut process. *This research highlighted the new skill set required, revealing potentially achievable methods to manage the disassembly and jigsaw fit process.*



Figure 37:3 Round 2- the researcher's interpretation of the potential process for ReFashion in a larger business model

ROUND 2 EXHIBITION SERIES

The final exhibition featured three T-series refashioned dresses and a tall bound fold-out book tracing 'Round 2', the follow on process from 'Round 1'. ReDress questions whether post-consumer textile waste (PCTW) could be viewed as an untapped commodity, a fibre/textile resource to be conserved, re-used, recycled, refashioned and transformed into contemporary fashion?



Round 1 is the current cradle-to-grave garment life cycle: garment manufacture, retail, purchase, use and disposal.



Round 2 proposed by ReDress is a cradle-to-cradle garment life cycle, in which the ReFashion concept is applied to targeted PCTW to ReManufacture new fashion product.

Figure 38:3 Internal labeling of T-series prototype: The bound seams in high end menswear inspired the re-use of necktie binding for all internal seams. Existing lining was used to recover the original pocket bags and all labels were attached and displayed as providence.

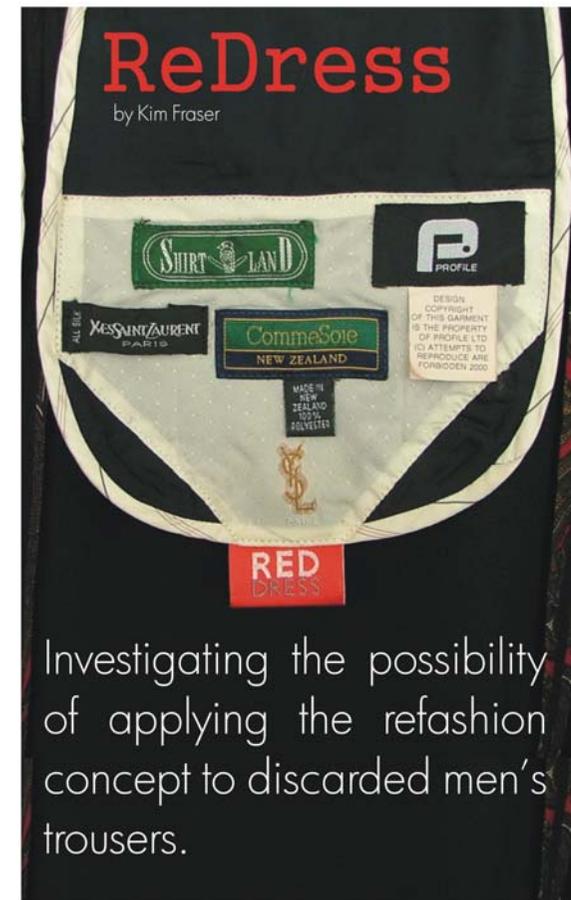




Figure 39:3 ReDress - tall bound fold-out book that traces the proposed ReFashion process 'Round 2'.



Figure 40:3 Finished T-series prototypes as exhibited: Discarded neckties provided ideal internal finishing trim.

PART 4: CONCLUSION



Figure 41:4 The final T-series toile.

The primary purpose of this project was to promote debate and alter perceptions of the second-hand materials industry and ReFashion concepts. This research takes a position in which the ReFashion concept has potential to be adapted for business models. As the contextual literature revealed, ReFashion is emerging in small niche fashion operations. However these businesses tend to be associated with an obvious remake aesthetic, resulting from the haphazard and diverse nature of the starting point materials. In contrast, Nom*D targets specific 'vintage' pieces, reworking them within their own design aesthetic, and successfully transcends the 'remake' into contemporary fashion.

Within this project the studio investigation targeted specific PCTW and established several processes unique to ReFashion⁵⁶. Reflection on the project emphasised the dependence on both, the quality of the original discard garment, and the disassembly expertise, as being necessary elements for successful ReManufacture. Potential adaptations of a manufacture process for ReFashion have been identified and documented, with the T-series providing evidence of the possibility of ReFashioning a standardised fashion 'product'.

The New Zealand statistical data is fragmented and tenuous. The gaps and unanswerable questions, raise doubt as to the validity, of using international findings in the New Zealand context. Internationally PCTW contributing between 3% and 5% to landfill is considered problematic. Clearly at 4% in New Zealand, PCTW should at least be considered a problem requiring attention by the appropriate authorities. Then again, the data is not definable to clothing, with carpet included in the 4% PCTW figure, clothing can not be substantiated as the major cause.

⁵⁶ The 'make' part of this process is a standard assembly process achievable through current manufacturing processes. The sorting, grading, cleaning, disassembly and jigsaw-fit processes will require a new expertise and skill set, which is learnable.

Questionable quality, or low grade PCTW, was highlighted during the project, as an issue for New Zealand. The threat of prevailing low grade PCTW, placed doubt on the validity of Re-Manufacture as a solution. On the other hand, identified statistics indicate high grade textile waste in British and American landfills, rendering this Re-Manufacture solution as potentially international. At the same time it would be possible to develop a partnership with a Round 1 'quality' manufacturer, instigating a recycle return or take-back policy (Oakdene, 2007) as a 'targeted supply' of secondary stock.

Extending this concept could see businesses: 'Designing for Disassembly' whereby considerations such as durable quality textile, and larger re-usable panels that can be readily disassembled are embedded in the Round 1 design process; or designing garments to be 'Updatable' next season, perhaps you purchase an add-on pack or you send in your original item and get it updated.

This avenue of research is not concluded, it poses more questions than it answers. Upon commencement, I foresaw ReFashion as a short term or interim solution to 'clean up' New Zealand's mountains of textile waste, whilst our fashion manufacturing sector developed a more sustainable approach. However in the course of this study a larger more indecipherable picture has evolved. Clearly now, the issues of *fast fashion and overconsumption in New Zealand*, require 'actual' clean data for *accurate assessment*, which is far greater than the scope of this project.

REFERENCES

- Birtwistle, G., Moore, C. M. (2007). Fashion clothing - where does it all end up? *International Journal of Retail & Distribution Management*, 35(3), 210-216.
- Blomfield, P. (2002). *The Designer Fashion in New Zealand. Industry New Zealand Scoping Study*. Wellington: Industry New Zealand.
- Bruce, M., Daly, L. (2006). *Buyer behavior for fast fashion*. Journal of Fashion Marketing and Management. Vol. 10, No. 3, p. 329-344. Retrieved August 28, 2008, from www.emeraldinsight.com/1361-2026.htm
- Brundtland, G.H. (1987). Our Common Future. *World Commission on Environment and Development*. Retrieved November 2, 2008, from <http://www.worldinbalance.net/pdf/1987-brundtland.pdf>
- Defra (2007). *Sustainable clothing roadmap briefing note December 2007: sustainability impacts of clothing and current interventions*. Defra, London. Retrieved December 15, 2008, from <http://www.defra.gov.uk/environment/consumerprod/products/clothing.htm>
- Domina, T., Koch, K. (1999). Consumer use and recycling from post-consumer textile waste. *Journal of Fashion Marketing and Management*, Vol. 3. 4. p. 346-359.
- Dunn, J. (2008). *ReFashion reDunn*. Masters Thesis. Massey University, Wellington. Retrieved June 16, 2009, from <http://muir.massey.ac.nz/handle/10179/711>
- Earley, R. *Well fashioned: towards our eco future*. Retrieved November 17, 2006, from <http://www.craftscouncil.org.uk/wellfashioned/noflash/essay1.html>
- Farrer, J., Fraser, K. (2009). Conscience clothing: polarisation of the fashion textile market. *Textiles - Quarterly magazine of the Textile Institute*, Vol. 2009, No. 1. p. 10-13.
- Finn, A. (2008). *Fashion manufacturing in New Zealand – Can design contribute to a sustainable fashion industry?* Honours Thesis. AUT University, Auckland.
- Fletcher, K. (1999). Towards environmentally responsible design in textiles. In A. Richard Horrocks, (Ed.), *Ecotextile '98 – sustainable development*, (p. 203 – 210). Cambridge: Woodhead Publishing Ltd.
- Fletcher, K. (2008). *Sustainable fashion and textile: design journeys*. London: Sterling, VA: Earthscan.

- Glaser, B. G., & Holton, J. (2004). Remodeling grounded theory. *Forum: Qualitative Social Research*, Volume 5, No. 2, Art. 4. Retrieved September 12, 2007, from <http://www.qualitative-research.net/fqs-texte/2-04/2-04glaser-e.htm>
- Gray, C., Malins, J. (2004). *Visualising research – a guide to the research process in art and design*. Cornwall: Bodman.
- Hawley, J. (2008). Economic impact of textile clothing. In Hethorn, J., Ulasewicz, C. (Eds.). 2008. *Sustainable fashion – why now? :A conversation about issues, practices and possibilities*. (p. 207 – 232). New York: Fairchild Books
- Heeley, J. (1999). Environmentally conscious textile design: towards a new approach. In Richard Horrocks, A. (Ed). 1999. *Ecotextile '98 – sustainable development*. (p. 203 – 210) Cambridge: Woodhead Publishing Ltd.
- Hethorn, J., Ulasewicz, C. (Eds. 2008). *Sustainable fashion – why now? : A conversation about issues, practices and possibilities*. New York: Fairchild Books.
- Industry Sector Analysis*. (2006). Retrieved September 17, 2009, from <http://www.infomat.com/research/infre0000326.html>
- Mascitelli, R. (2000). From experience: harnessing tacit knowledge to achieve breakthrough innovation. *Journal of Product Innovation Management*. Vol. 17, No. 3. p. 179-193.
- McDonough, W., Braungart, M. (2002). Design for the triple top line: New tools for sustainable commerce. *Corporate Environmental Strategy*. Vol. 9, No. 3. p. 251 – 258. Retrieved August 19, 2008, from www.corporate-env-strategy.com
- Norris, L. (2005). Cast (E)-off clothing - a response to K. Tranberg Hansen (AT 20[4]). *Anthropology Today*, 21(3), 24.
- Oakdene Hollins Ltd, Salvation army Trading Company Ltd, Nonwovens Innovation & Research Institute Ltd (2006). *Recycling of low grade clothing waste*. Retrieved April 27, 2009, from <http://www.oakdenehollins.co.uk/pdf/Recycle-Low-Grade-Clothing.pdf>
- Oakdene Hollins Ltd, Salvation army Trading Company Ltd, Nonwovens Innovation & Research Institute Ltd (2007). *Clothing take-back for recycling and reuse: a Japanese insight*. Retrieved May 14, 2009, from <http://www.oakdenehollins.co.uk>

- Pearce, J., Young, S. (2007). Ch-ch-changes. *Idealog*, 14, 69. Retrieved June 18, 2008, from <http://idealog.co.nz/magazine/march-april-2008/features/ch-ch-changes>
- Resek, E. & M., (1955). *Successful dressmaking*, Melbourne, Colorgravure Publications.
- Roberts, S. (2005). *Auckland recycling industry study, a survey of recycling and second-hand businesses in the Auckland region*. Envision New Zealand. Retrieved September 8, 2008, from <http://www.wasteminz.org.nz/conference/conferencepapers2005/Sarah%20Roberts.pdf>
- Rosenberg, T. (2000). "The reservoir": towards a poetic model of research in design. *Working Papers in Art and Design 1*. Retrieved September 17, 2009, from <http://www.herts.ac.uk/artdes/research/papers/wpades/vol1/rosenberg2.html>
- Schon, D.A. (1983). *The reflective practitioner- how professionals think in action*. New York: Basic Books.
- Schor, J B. (2002). Cleaning the closet: Toward a new fashion ethic. In Schor J.B., Taylor, B. (Eds.), *Sustainable planet - solutions for the twenty-first century*, (p. 45-59). Boston: Beacon Press.
- Scrivener, S. (2000). Reflection in and on action and practice in creative-production doctoral projects in art and design. *Working Papers in Art and Design 1*. Retrieved May 29, 2007, from <http://www.herts.ac.uk/artdes/research/papers/wpades/vol1/scrivener2.html>
- Statistics New Zealand (2009). *Measuring New Zealand's progress using a sustainable development approach: 2008*. Wellington: Statistics New Zealand.
- Statistics New Zealand (2009). *Key findings on New Zealand's progress using a sustainable development approach: 2008*. Wellington: Statistics New Zealand.
- Swann, C. (2002). Action research and practice of design. *Design Issues*, Vol. 18, No. 1, p. 49-61. Retrieved July 13, 2009, from <http://www.jstor.org/stable/1512029>
- Tokatli, N. (2008). Global sourcing: insights from the global clothing industry- the case of Zara, a fast fashion retailer. *Journal of Economic Geography*, vol. 8, p. 21-38. Retrieved August 28, 2008, from <http://joeg.oxfordjournals.org/cgi/content/abstract/lbm035v1>
- Tranberg, K. (2004). Helping or hindering? Controversies around the international second-hand clothing trade. *Anthropology Today*, 20(4), 3-9.
- University of Cambridge (2006). *Well dressed? The present and future sustainability of clothing and textiles in the United Kingdom*. Cambridge. Retrieved June 25, 2009, from www.ifm.eng.cam.ac.uk/sustainability/

GLOSSARY OF TERMS

- Cradle-to-Cradle** Cradle-to-Cradle a phrase coined by Walter R. Stahel in the 1970s and popularised by William McDonough and Michael Braungart in their 2002 book *Cradle to Cradle: Remaking the way we make things*. This framework seeks to create production techniques that are not just efficient but are essentially waste free. In cradle to cradle production all material inputs and outputs are seen either as technical or biological nutrients. Technical nutrients can be recycled or reused with no loss of quality and biological nutrients composted or consumed. [http://en.wikipedia.org/wiki/Cradle to Cradle](http://en.wikipedia.org/wiki/Cradle_to_Cradle)
- Cradle-to-grave** By contrast cradle to grave refers to a company taking responsibility for the disposal of goods it has produced, but not necessarily putting products' constituent components back into service
- Fast Fashion** The fashion retail market is split into a number of segments – luxury, high street, and supermarket/out-of-town discounter. The entrance of supermarkets into the clothing market has increased competition and redefined how customers shop for clothing, with time-starved customers able to purchase cheap fashionable clothing as part of the weekly shop, rather than visiting the high street. Zara is a specialist fashion chain; they are credited with being a leader in fast fashion and an important example of a fast fashion retailer, with rapid stock turnaround and vertical integration. (Bruce & Daly, 2006, p. 329).
- Globalisation** The process enabling financial and investment markets to operate internationally, largely as a result of deregulation and improved communications. Globalisation can also be used to describe a process by which the people of the world are unified into a single society and function together. This process is a combination of economic, technological, socio-cultural and political forces.
- High Street** A British term "High Street" is a generic name given to the business area of a town or city in the United Kingdom. The term is often used to describe common stores found on a typical high street, to differentiate them from more specialist or less common outlets.
- Materials Recovery** A term used to describe the resource recovery method in which emphasis is on separating and processing waste products to reclaim usable materials.
- PCTW** Post-consumer textile waste consists of any garment or household textile article that is no longer needed and discarded.

Refashion	To fashion anew; to form or mold into shape a second time. http://thinkexist.com/dictionary/meaning/refashion/
Re-Manufacture	Remanufacturing is the process by which end of life products are made new with a warranty to match. Rather than recycle, which involves destroying the product to recover the materials for use in different products, remanufacturing brings that product back to a useable state for use in its original application. Remanufacturing works best where the product is: of higher value, complex, durable, not related to personal status or lifestyle. Sourced from http://www.remanufacturing.org.uk/remanufacturing-expert.lasso?session=RemanSession:DB58109F1638035CFBqiGO7FCA37
Round 1	The term used by this researcher to indicate the first cycle of production, use and disposal of a garment.
Round 2	The term used by this researcher to indicate the next life in the lifecycle of a product that follows Round 1. Round 2 sees discarded clothing being redirected away from landfill and channeled into second or third life uses, through innovative business practices of and ReFashion and ReManufacture.
Secondary Textile Industry	A term for the Second-hand Textile industry
Standardised	Means to make or become standard: to remove variations and irregularities and make all types or examples of something the same or bring them into conformity with one another.
Sustainability	In 1987 the Brundtland Report, also known as <i>Our Common Future</i> , alerted the world to the urgency of making progress toward economic development that could be sustained without depleting natural resources or harming the environment. Published by an international group of politicians, civil servants and experts on the environment and development, the report provided a key statement on sustainable development defining it as: <i>development that meets the needs of the present without compromising the ability of future generations to meet their own needs.</i>
Third world dumping	A term used to describe the developed world economies 'shipping or dumping' of post-consumer textile waste on developing countries. (Farrer & Fraser, 2009), (Tranberg, 2004), (Norris, 2005), (Hawley, 2008).



Figure 42:5 First ReFashioned dress from men's trouser 2008.

A

ReDress

Appendix one

From: Statistics New Zealand (2009). Measuring New Zealand's Progress Using a Sustainable Development Approach: 2008. Wellington: Statistics New Zealand sourced from <http://www.stats.govt.nz/Publications/NationalAccounts/sustainable-development/waste.aspx>

Table 8.1 Waste indicators – key results

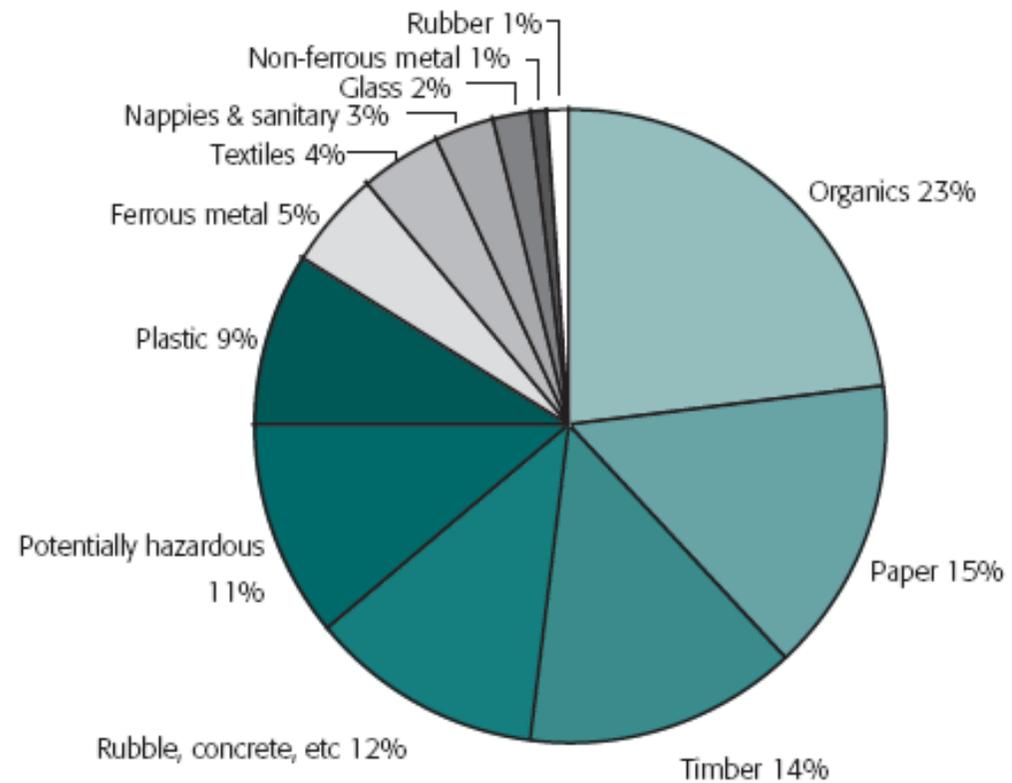
Indicator	Indicator type ⁽¹⁾	Target trend	What has happened	Actual result
8.1 Solid waste disposed to landfill	Flow		It is estimated that 3.2 million tonnes of waste was disposed of to municipal landfills in 2006.	
8.2 Proportion of population with access to kerbside recycling	Structural		Access to kerbside recycling has increased since 1996.	
8.3 Proportion of packaging waste recycled	Structural		The proportion of packaging waste recycled has doubled since 1994.	
8.4 Real household consumption expenditure	Flow		Real household consumption expenditure increased by 78% from 1988 to 2008.	

(1) See 'Types of indicators' in part C.

Figure 8a

Composition of waste disposed to landfills

2004 December year



Source: Ministry for the Environment

Appendix two

TRIAL DESCRIPTION DETAILS

Dated Wrap Skirt

Style: 90's long fitted wrap skirt

Textile: Polyester Satin Brocade

Size: 12

Condition: good

TRANSFORMS INTO:

Origami Wrap Dress

Style: '08 origami fitted wrap dress

Textile: Polyester Satin Brocade

Size: 10

Condition: good

1st Trial: Raised Placement

1. Standard front facing, zip as armhole = expected shape
2. Twist zip back to front = expected shape, neutral
3. Return zip to side, find form, contour = expected shape, neutral
4. Rotate zip to CB, with contour = expected shape, neutral

2nd Trial: Find Volume

5. Std facing front, hitch up, fold excess under = surprise shape, neutral
6. Twist zip back to back = expected shape, desirable
7. Find form, contour = expected shape, desirable
- 7a. Front view = expected shape, neutral
8. Twist zip to front, pull out volume on left side = expected shape, desirable
9. Twist zip side, with asymmetric volume = unexpected shape, undesirable

3rd Trial: Turn upside down

10. Std facing front = surprise shape, neutral
11. Find form, contour = expected shape, neutral
12. Twist zip to CB = expected shape, neutral
13. Function add straps = expected shape, neutral

4th Trial: Find Volume

14. Std facing front, draw out volume, manipulate excess = surprise shape, desirable
15. Continue to manipulate excess = surprise shape, desirable
16. Find form, contour back = surprise shape, neutral

5th Trial: Function & Aesthetic

17. Apply functional straps =surprise shape, desirable
18. Manipulate to find more volume =surprise shape, desirable
19. Reduce volume into folds =surprise shape, desirable
20. Release folds to gain more volume=expected, desirable
21. Draw string functional straps and large origami folds=**surprise, desirable**

6th Trial: Function

22. Move straps to sides and focus on symmetrical shaping=neutral
23. Tuck away and focus on diagonal origami fold=neutral
24. Form, release lower folds to focus on torso=neutral

7th Trial: Function & Aesthetic

25. Form & fit in upper torso is now desirable
26. Focus on origami folds=awkward form, could be misconstrued as mistake=undesirable
- 26a. Side view is surprise and desirable
- 26b. Back view is surprise and undesirable. At this point I reflected on all previous trials and determined the diagonal origami folds were most successful
27. Release folds and re-pin losing awkward form = is now very desirable.

TOILE Synthesis

28. Remove from mannequin and transfer pinned information.
29. Lay garment flat, unpick where necessary, equalise darts and form shaping seams. Re-cut.
30. Stitch: join new dart shapes and seams. Finish edges.
31. Check fit.

Appendix three

MENTAL CHECKLIST during studio practice	
Does the silhouette work?	
Is the FIT appropriate?	
Does it cover necessary parts of the body?	
Does the length work?	
How does it work proportionally for other support garments?	
Is this the best use for this fabric?	
Does the fabric 'prefer' an alternative placement?	
Can the body still function? – is movement unrestricted?	
What construction/fastenings will I need – is there an alternative?	
What happens if?	
Surprise? / Expected?	
Desired? / Okay? / Move on?	