EXAMINE THE ROLE OF DIFFERENT ACTORS ACROSS THE TEXTILE – FASHION SUPPLY CHAIN TO UNDERSTAND THE ISSUES REGARDING GROWTH OF ECO-LABELED SUSTAINABLE TEXTILE PRODUCTS

A dissertation submitted to the University of Manchester for the degree of Master of Science by Research in the Faculty of Engineering and Physical Sciences.

2010

Rohit Shah
SCHOOL OF MATERIALS
CHAPTER 1: OVERVIEW

1.1 Introduction......................................................................................................................15
1.2 Research context..............................................................................................................15
1.3 Research Aim and objective............................................................................................16
1.4 Thesis structure................................................................................................................17
1.5 Conclusions......................................................................................................................18

CHAPTER 2: SUSTAINABLE TEXTILES

2.1 Introduction......................................................................................................................19
2.2 Why Is Sustainable Textile Needed Today?.......................................................................19
2.3 A definition of “Sustainable Textile Product”.....................................................................20
2.4 Concept of ecology in textiles..........................................................................................21
2.5 The social and ecological impact of textile & clothing industry........................................22
2.6 Impact Of Fibres Cultivation And Manufacturing...........................................................25
   2.6.1. Cotton.....................................................................................................................26
   2.6.2 Synthetic Fibre........................................................................................................27
   2.6.3 Impact On Human Health And Environment..........................................................30
2.7 Processing of textiles.......................................................................................................30
2.8 Waste..................................................................................................................................32
2.9 Consumption....................................................................................................................33
2.10 Toxic Laundry................................................................................................................34
2.11 Carbon Foot print & Textile-Clothing industry...............................................................35
2.12 Sustainable Textile Products (STP)..................................................................................40
2.13 Sustainable Textile Fibres................................................................................................40
   2.13.1 Organic Cotton.......................................................................................................41
      2.13.1.1 ‘Organic agriculture’ definition and principles.................................................42
      2.13.1.2 Organic Cotton Vs Genetically Engineered/Modified Cotton (GMO)..............43
      2.13.1.3 Confirmation to GMO cotton.............................................................................49
      2.13.1.4 Standards...........................................................................................................49
      2.13.1.5 Organic cotton production.................................................................................50
      2.13.1.6 Trends in organic cotton and Retailers Organic Cotton Programs.........................52
      2.13.1.7 Organic Cotton retail sales................................................................................55
      2.13.1.8 Organic Farming, Cotton and Sustainability.........................................................56
      2.13.1.9 Organic Cotton Price and Premium.....................................................................57
2.14 Fairtrade..........................................................................................................................58
CHAPTER 3: ECO-LABELLING

3.1 Introduction..............................................................................................................69
3.2 Background...............................................................................................................69
3.3 History Of Eco-labelling..........................................................................................70
3.4 Definitions of Eco-labelling......................................................................................71
3.5 Types of eco-label....................................................................................................73
3.6 Essential features of trustworthy eco-labelling schemes.......................................77
3.7 Ecolabelling Process...............................................................................................79
3.8 Benefits of Eco-labelling........................................................................................83
3.9 Weakness of Eco-labelling systems........................................................................85
3.10 Eco-labelling, Textile and Retailers........................................................................86
   3.10.1 Eco-standards for textiles................................................................................88
      3.10.1.1 Global Organic Textile Standard (GOTS)..............................................93
      3.10.1.2 Oeko-Tex Standard 100.......................................................................94
      3.10.1.3 EU Eco-Label (EU Flower)..................................................................96
3.11 Certification............................................................................................................107
   3.11.1 Certification demand and flow.......................................................................108
   3.11.2 Cost and benefits of certification....................................................................113
3.12 Ecolabelling and Consumer..................................................................................115
   3.12.1 Factors affecting consumer’s behaviour......................................................116
      3.12.1.1 Consumers’ demographic characteristics...........................................117
      3.12.1.2 Consumers’ knowledge.......................................................................119
      3.12.1.3 Consumers’ values.............................................................................119
      3.12.1.4 Consumers’ attitudes.........................................................................120
      3.12.1.5 Consumers’ behaviors.......................................................................121
      3.12.1.6 Self- Identity.......................................................................................121
   3.12.2 Consumer approach towards Eco-labeled STP.............................................122
3.13 Eco-labeled STP pricing and Consumers willingness to pay....................................123
3.14 Eco-labelling- Market Impact and International Trade........................................125
   3.14.1 Market Impact...............................................................................................126
   3.14.2 International Trade.......................................................................................126
3.15 Marketing activities for Ecolabelling....................................................................128
3.16 Challenges for eco-labelling................................................................................129
3.17 Conclusion............................................................................................................131
### CHAPTER 4: RESEARCH METHODOLOGY

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Introduction</td>
<td>134</td>
</tr>
<tr>
<td>4.2 Background</td>
<td>134</td>
</tr>
<tr>
<td>4.3 Research Philosophy</td>
<td>134</td>
</tr>
<tr>
<td>4.3.1 Positivism</td>
<td>134</td>
</tr>
<tr>
<td>4.3.2 Interpretivist</td>
<td>135</td>
</tr>
<tr>
<td>4.3.3 Phenomenology</td>
<td>135</td>
</tr>
<tr>
<td>4.4 Research Methods</td>
<td>135</td>
</tr>
<tr>
<td>4.4.1 Deduction Research Method</td>
<td>135</td>
</tr>
<tr>
<td>4.4.2 Induction Research Method</td>
<td>136</td>
</tr>
<tr>
<td>4.4.3 Research Methods Comparison</td>
<td>136</td>
</tr>
<tr>
<td>4.5 Types of Data</td>
<td>137</td>
</tr>
<tr>
<td>4.5.1 Primary Data</td>
<td>137</td>
</tr>
<tr>
<td>4.5.1.1 Advantages of Primary Data</td>
<td>137</td>
</tr>
<tr>
<td>4.5.1.2 Disadvantages of Primary Data</td>
<td>137</td>
</tr>
<tr>
<td>4.5.2 Secondary Data</td>
<td>138</td>
</tr>
<tr>
<td>4.5.2.1 Advantages of Secondary Data</td>
<td>138</td>
</tr>
<tr>
<td>4.5.2.2 Disadvantages of Secondary Data</td>
<td>138</td>
</tr>
<tr>
<td>4.5.3 Research Approach</td>
<td>139</td>
</tr>
<tr>
<td>4.5.3.1 Qualitative Research</td>
<td>139</td>
</tr>
<tr>
<td>4.5.3.2 Advantages of Qualitative Research</td>
<td>142</td>
</tr>
<tr>
<td>4.5.3.3 Disadvantages of Qualitative Research</td>
<td>142</td>
</tr>
<tr>
<td>4.5.4 Quantitative research</td>
<td>142</td>
</tr>
<tr>
<td>4.5.4.1 Advantages of quantitative research</td>
<td>143</td>
</tr>
<tr>
<td>4.5.4.2 Disadvantages of quantitative research</td>
<td>143</td>
</tr>
<tr>
<td>4.5.5 Qualitative Vs Quantitative Research</td>
<td>143</td>
</tr>
<tr>
<td>4.6 Data Collection Methods</td>
<td>144</td>
</tr>
<tr>
<td>4.6.1 Research Aim and Objective</td>
<td>144</td>
</tr>
<tr>
<td>4.6.2 Data collection process</td>
<td>146</td>
</tr>
<tr>
<td>4.6.3 Data collection in Qualitative research</td>
<td>147</td>
</tr>
<tr>
<td>4.6.4 Interviews</td>
<td>149</td>
</tr>
<tr>
<td>4.6.4.1 Advantages of Interview</td>
<td>150</td>
</tr>
<tr>
<td>4.6.4.2 Disadvantages of Interview</td>
<td>150</td>
</tr>
<tr>
<td>4.6.5 Interview Forms</td>
<td>151</td>
</tr>
<tr>
<td>4.6.5.1 Computer assisted Interviews</td>
<td>151</td>
</tr>
<tr>
<td>4.6.5.2 Focus group Interviews</td>
<td>151</td>
</tr>
<tr>
<td>4.6.5.3 Factual Interviews</td>
<td>152</td>
</tr>
<tr>
<td>4.6.5.4 Conceptual Interviews</td>
<td>152</td>
</tr>
<tr>
<td>4.6.6 Telephonic Interview</td>
<td>152</td>
</tr>
<tr>
<td>4.6.6.1 Advantages of Telephonic Interview</td>
<td>152</td>
</tr>
<tr>
<td>4.6.6.2 Disadvantages of Telephonic Interview</td>
<td>153</td>
</tr>
</tbody>
</table>
4.6.7 Case Studies........................................................................................................153
  4.6.7.1 Advantages of case studies.................................................................154
  4.6.7.2 Disadvantages of case studies..........................................................154
4.6.8 Questioners Design.......................................................................................154
  4.6.8.1 Types of variable.................................................................................155
  4.6.8.2 Designing individual questions......................................................156
4.7 Research Design.............................................................................................157
  4.7.1 Components of Research Designs.......................................................157
  4.7.2 Sampling Design and Analysis.............................................................158
4.8 Qualitative Data Analysis Techniques............................................................161
4.9 Adopted Research Method.............................................................................163
4.10 Fieldwork.........................................................................................................164
4.11 Interview Questions.......................................................................................165
4.12 Conclusion.......................................................................................................165

CHAPTER 5: RESULT AND ANALYSIS........................................................................166

5.1. Introduction......................................................................................................166
5.2. Data collected...................................................................................................166
  5.2.1 Time and place.......................................................................................166
  5.2.2 Interview Procedure...............................................................................168
  5.2.3 Interview Transcripts.............................................................................168
5.3 Interview Summaries.........................................................................................168
  5.3.1 Textile Manufacturers.............................................................................168
    5.3.1.1 Purecots Creations............................................................................169
    5.3.1.2 Alok Textile Industries.................................................................171
  5.3.2 Textile Dyes and Chemical Manufacturer.............................................172
    5.3.2.1 DyStar............................................................................................172
    5.3.2.2 M/s. Inter Continent Chemicals India Ltd.....................................173
    5.3.2.3 Britacel Silicones Ltd.................................................................175
  5.3.3 Ecological Testing - Texanlab Laboratories Pvt Ltd..............................176
  5.3.4 Certification - Soil Association...............................................................179
  5.3.5 Eco-labelling - Hohenstein Institute.....................................................181
  5.3.6 Retailer – Frugi.......................................................................................182
5.4 Analysis.............................................................................................................184
  5.4.1 Textile Manufacturers.............................................................................185
  5.4.2 Dyes & processing aids manufacturer...................................................191
  5.4.3 Ecological Textile Testing Laboratory...................................................198
  5.4.4 Certifications............................................................................................201
  5.4.5 Ecolabelling.............................................................................................205
  5.4.6 Retailing....................................................................................................210
5.5 Conclusion........................................................................................................214
CHAPTER 6: DISCUSSION AND CONCLUSION..........................................................215

6.1 Introduction.............................................................................................................215
6.2 Sustainable Textiles: Gravely needed.................................................................215
6.3 ‘Why’ and ‘How’ to become sustainable textile manufacturer............................218
6.4 Eco-labeled STP, Textile Manufacturers and Retailers......................................225
   6.4.1 Arguments in favour of Eco-labeled STP......................................................225
   6.4.2 Arguments against expanding Eco-labeled STP...........................................227
   6.4.3 Opportunities..............................................................................................229
   6.4.4 Threats.....................................................................................................231
6.5 Eco-labeled STP and Consumer..........................................................................232
6.6 Certification and Eco-labeled STP......................................................................235
6.7 Conclusions.........................................................................................................238
6.8 Research Limitations.........................................................................................241
6.9 Recommendations for Further Research and Industry.......................................242

APPENDIX
Appendix 1: Interview Questions..............................................................................244
Appendix 2: Purecots Creation Transcripts..............................................................248
Appendix 3: Alok Industries Ltd Transcripts...............................................................252
Appendix 4: DyStar Transcripts................................................................................256
Appendix 5: M/s. Inter Continent Chemicals India Ltd Transcripts..........................258
Appendix 6: Britacel Silicones Ltd Transcripts.........................................................261
Appendix 7: Texanlab Laboratories Pvt Ltd Transcripts...........................................263
Appendix 8: Soil Association Transcripts....................................................................267
Appendix 9: Hohenstein Institute Transcripts............................................................270
Appendix 10: Frugi Transcripts................................................................................273

REFERENCES..............................................................................................................276
Figures and Tables

Fig 2.1: Social and ecological impact during different processing stages........................................23
Fig 2.2: Influences and affects of unsustainable production.................................................................25
Fig 2.3: Description of Life Cycle of Cotton..........................................................................................28
Fig 2.4: Description of Life Cycle of Polyester......................................................................................29
Fig 2.5: CO₂ emission of long sleeve shirt............................................................................................36
Fig 2.6: The system boundary and processes considered for the cotton T-shirt production Consumption chain........................................................................................................................37
Fig 2.7: CO₂ emission of long sleeve shirt...............................................................................................39
Fig 2.8: Sustainable fibres.........................................................................................................................41
Fig 2.9: Difference between Organic Cotton & Conventional cotton....................................................45
Fig 2.10: Cost of inputs needed for cotton cultivation.............................................................................48
Fig 2.11: Yearly Organic Cotton worldwide production............................................................................48
Fig 2.12: County wise Percentage of Global Organic Cotton Production..............................................51
Fig 2.13: Global Retail Sales of Organic Cotton Products.........................................................................56
Fig 2.14: Pillars of sustainability................................................................................................................58

Fig 3.1: Ecolabelling Development...........................................................................................................71
Fig 3.2: Classification of Environmental Labels.......................................................................................74
Fig 3.3: The stages of obtaining an eco-label.............................................................................................82
Fig 3.4: Process to obtain certification for eco-label..................................................................................83
Fig 3.5: Benefits of Ecolabels....................................................................................................................86
Fig 3.6: Certification Flow.........................................................................................................................110
Fig 3.7 Transaction Certificate Flow ........................................................................................................112
Fig 3.8: Theoretical framework of factors affecting consumer willingness to pay for sustainable products...............................................................................................................................117

Fig 4.1: Data collecting activities.............................................................................................................145
Fig 4.2: Textile Supply Chain..................................................................................................................160
.
Fig. 6.1 Revised Certification Flow........................................................................................................239
Table 2.1: World cotton production and major producing countries
Table 2.2: Non-renewable primary energy and emissions of CO2, NOx, total particulates and SO2 for 100 days of garment use for cotton T-shirt
Table 2.3: Non-renewable primary energy and emissions of CO2, NOx, total particulates and SO2 for 100 days of garment use for polyester jacket
Table 2.4: Pesticides and their cost used for Bt and organic cotton
Table 2.5: Cost of cultivation and income from Bt and organic cotton
Table 2.6: Top ten Cotton producing countries
Table 2.7: Brands and retailers with largest organic cotton programs by fiber volume
Table 2.8: Substances of very high concern

Table 3.1: Difference between Nomothetic and Ideographic method
Table 3.2: Examples of eco-labeled textile products in Asia, Australia and Oceania
Table 3.3: Examples of eco-labeled textile products in Europe
Table 3.4: Examples of ecolabels used in other countries
Table 3.5: Private labels
Table 3.6: Comparison between GOTS, Oeko-Tex, OE, and EU Flower standards
Table 3.7: Comparison of residual parameters between GOTS, Oeko-Tex, OE, and EU Flower standards
Table 3.8: Intended and Unintended effects

Table 4.1: Difference between Nomothetic and Ideographic method
Table 4.2: Dimensions for comparing five research traditions in qualitative research
Table 4.3: Quantitative and Qualitative Paradigm
Table 4.4: Qualitative data collection types, options, advantages, and limitations
Table 4.5: Main methods of analysing qualitative data
Table 5.1: Interviewee Details
Table 6.1: Achieving sustainable development pillar
Glossary

AOX - Adsorbable Organic Halogens is a measurement often used in waste water testing to indicate the overall level of the halogens; fluorine, chlorine, bromine and iodine.

APEO - Alkylphenol Ethoxylates are non-ionic surfactants with emulsifying and dispersing actions.

Carcinogen - Cancer causing substance.

Dyes - a usually soluble substance for staining or colouring fabrics

Ecological - Design that makes use of resources that come from the earth in such a way that they can be returned to the earth without causing harm, in a cycle that echoes the natural systems of living things.

Ecological Footprint – Way to measure of the impact of a given product.

Effluent- Run-off of by-products of a process, suspended in waste water.

Emissions - Airborne by products of burning, heating and other transformations within the manufacturing process.

Ethical - Right and wrong ways to do things, usually applied to an expectation that people and animals have not been treated badly in the production and use of any given items or services.

Greenhouse gases - Gases which contribute to the rise in temperature on earth, known as global warming, which traps the heat of the sun within the earth’s atmosphere.

Heavy metals - Used as mordents to enable dyestuff to bond with fibres in many natural dye recipes. Many are poisonous. Use is not desirable, but absence can render limits to actual achievable shades of colour, as well as impermanence to light and washing.

LD$_{50}$ or LC$_{50}$. The dose that killed half (50%) of the animals tested (LD = "lethal dose"). The animals are usually rats or mice or fishes.

Mercerising - Impregnation of alkali such as caustic soda to improve lustre in cotton
Natural Dyes – The dyes which are produced or extracted from natural raw materials like Madder, Indigo, Weld, Wood, Cochineal, and fustic.

Volatile organic compounds (VOCs) - organic chemical compounds which have significant vapour pressures and which can affect the environment and human health
Abstract

The general definition of ‘ecology’ in the perspective of textiles is complex and diverse and ‘ecology’ is often used in loose sense. The textile industry is considered one of the most ecologically harmful, polluting and therefore has enough attention from all. Each actor of supply chain is affecting the environment negatively at different level with different intensities; Significant water use, toxicity from fertilizer, pesticide and herbicide use, energy use and GHG emissions associated with fertilizer generation and irrigation systems from conventional cotton growing, Water use, toxicity, hazardous waste and effluent associated with production stage pre-treatment chemicals, dyes and finishes, energy use and generation of greenhouse gas (GHG) emissions from washing (water heating) and drying of clothing. This research has sought to examine the role of each actor of supply chain like textile and dyes-chemical manufacturer, textile buyers, certification body & ecological textile testing laboratory to become more sustainable. The literature review has investigated the need for sustainability in textiles, social and eco-logical impact and carbon Foot print of textile-fashion industry. Moreover the most commonly used sustainable textile fibres like organic cotton may reduce the impact on soil and further wet processing as per standards like GOTS, REACH, and Oeko-Tex may reduce the impact on environment. Further literature review has explored eco-labelling to understand its benefits, impact and significance on textile – fashion industry as well as on consumer to become more sustainable.

To understood above issues, qualitative method has been used and data collected through in-depth semi-structured, telephonic and computer assisted interview techniques, since it enables the generation of ‘thick descriptions’ and depth of information required for the formation of the conceptual framework.

The research findings indicate ‘how’ and ‘why’ each actor of supply chain should produce sustainable textiles products (STP). To become sustainable manufacturer need to find out products’ biggest impacts; they have to be transparent; they should bolster their claims with independent verification, by avoiding making the claims ‘in a vacuum’, they need to Educate, Enable, and Encourage the consumer; and try to Reduce, Reuse, and Recycle. Certification and then ecolabelling the product is the only way to call the product sustainable; however various eco-logs are creating confusion within market and consumer.
There are wider implications of the research like how much consumer knows about eco-labels, and eco-textile standards. The shopping behaviour and attitudes of STP consumers have not yet been analysed through actual purchase data. Further issues also not yet addressed include:

1) Are there any significant health benefits of STP especially Organic Cotton to human being?

2) Compared to conventional cotton, if organic cotton saves 171% of cost and increases 200% farmers income then why there is a need to pay premium to the farmer?

3) Why are eco-standards not mandatory throughout the textiles industry?
DECLARATION

That no portion of the work referred to in the dissertation has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.
COPY RIGHT STATEMENT

The following three notes on copyright and the ownership of intellectual property rights:

i. The author of this dissertation (including any appendices and/or schedules to this dissertation) owns any copyright in it (the “Copyright”) and s/he has given The University of Manchester the right to use such Copyright for any administrative, promotional, educational and/or teaching purposes.

ii. Copies of this dissertation, either in full or in extracts, may be made only in accordance with the regulations of the John Ryland’s University Library of Manchester. Details of these regulations may be obtained from the Librarian. This page must form part of any such copies made.

iii. The ownership of any patents, designs, trademarks and any and all other intellectual property rights except for the Copyright (the “Intellectual Property Rights”) and any reproductions of copyright works, for example graphs and tables (“Reproductions”), which may be described in this dissertation, may not be owned by the author and may be owned by third parties. Such Intellectual Property Rights and Reproductions cannot and must not be made available for use without the prior written permission of the owner(s) of the relevant Intellectual Property Rights and/or Reproductions.

iv. Further information on the conditions under which disclosure, publication and exploitation of this dissertation, the Copyright and any Intellectual Property Rights and/or Reproductions described in it may take place is available from the Head of School of Materials.
ACKNOWLEDGEMENT

I would like to take this opportunity to express my gratitude and appreciation to my supervisor, Dr. Pammi Sinha, for her time, help and support throughout the year. Thanks to all my interviewees, without whom I would not have been able to accomplish my dissertation. Last but not least, I would like to thank my beloved family and friends for all their support through my ups and downs, much appreciated.

Thank you.
1.1 Introduction

This chapter introduces areas of concern within the research. Section 1.2 identifies the research context, section 1.3 presents the research aims and section 1.5 gives the objectives and the structure of the thesis.

1.2 Research Context

The general definition of ‘ecology’ in the perspective of textiles is complex and diverse and ‘ecology’ is often used in loose sense (Moore and Wentz, 2009). The textile industry is considered one of the most ecologically harmful, polluting and therefore has enough attention from all. The eco-problems in textile industry start from cultivation of raw material till dumping of clothes back to the soil. Each actor of supply chain is affecting the environment negatively at different level with different intensities; Significant water use, toxicity from fertilizer, pesticide and herbicide use, energy use and GHG emissions associated with fertilizer generation and irrigation systems from conventional cotton growing, Water use, toxicity, hazardous waste and effluent associated with production stage pre-treatment chemicals, dyes and finishes, energy use and generation of greenhouse gas (GHG) emissions from washing (water heating) and drying of clothing (Defra, 2008). The clothing industry is a high value sector, globally worth over 1 trillion, employing approximately 30 million people and supporting a significant number of economies and individual incomes around the world in 2006 (Allwood. J et al, 2006). This economic success story also has a significant adverse environmental and social “footprint” across it global lifecycle where rising consumption being a key factor in this. Sustainable Textile & Fashion are the priority of today’s fashion, textile world.

To overcome the above issue make the textile-clothing supply chain ‘eco-labeled sustainable textile products (STP) are needed. The product should called Sustainable textile only if the complete textiles supply chain from cultivation or manufacturing of raw material till reaching the finish goods to shop with low impact to the environment. To enable these actors such as certification bodies, eco-logical testing, ecolabelling bodies are the key authorised player to confirm whether products are sustainable or not. Mostly certification is for improving the
manufacturing condition and their impact on environment whereas eco-labelling tied to consumer right-to-know about the ingredients contained in a product, as well as each ingredient’s health and environmental hazards, so that they can use this information to make informed decisions regarding the products they purchase (EPA, 2008).

However, certification and eco-labelling is not mandatory. Consumers became aware of the need to make more responsible purchases and looked to the institutions to behave in this way too. People are aware that environmental protection is not only the task of firms and institutions, but also their responsibility as consumers. Therefore, when consumers decide to buy certain products instead of others, they affect the supply of goods so that STP products remain in the market and those, which are not, will disappear. This clears that, consumers are willing to buy sustainable products, but they don’t to pay extra money for that. As per RSA 2009 market report “Green Appetites” for majority of European consumers ethical and green clothing choices are least important. So, it’s very much obvious that less consumption of sustainable clothing and definitely this affects the whole textile supply chain.

This research has sought to examine the role of each actor of supply chain including certification body & ecological textile testing laboratory to become more sustainable and produce STP with issues and significance of ecolabeled STP on it. The research outcomes ranged from consumers and textile-clothing manufactures approach towards STP and ‘how’ and ‘why’ the actors of supply chain should produce and use eco-labeled STP. The initial areas of concern at the beginning of this project were:

- Different actor of textile supply chain including consumer has different approach towards ecolabeled STP
- Certification and eco-labelling body; ecological testing laboratory are the important players of sustainable textile supply chain,
- Need of retailer and manufacturer to produce eco-labeled STP.

1.3 Research Aims and Objectives

The aim of the research is to examine the role of different actors across the textile-fashion supply chain to understand the issues regarding growth of eco-labeled STP. The main objectives of this research:
1) Conduct literature review to understand the issues and significance of ecolabeled sustainable textile goods on textile consumer’s and textile industry.

2) Conduct 9 in-depth interviews textile manufacturers, dyes & chemicals manufacturers, ecological textile testing laboratory, certification body, ecolabelling body, and retailer to understand ‘how’ and ‘why’ they may use ecolabeled STP.

3) Based on interviews understood the significance, role and importance of each one of while producing eco-labeled STP.

4) Compare and contrast literature review with research results to identify further research and issues for the textile industry to consider.

1.4 Thesis structure

Chapter two reviews the literature concerning impact of textile-clothing industry on environment with different intensities at different stages. It identifies appropriate methodological issues within the textile-clothing supply chain. The literature review explores the nature of STP like Organic cotton, Fairtrade and their current practises.

Chapter three reviews the literature concerning textile eco-labelling, types of eco-labels, how to obtain those labels through certification. Eco-standards like GOTS (Global Organic Textile Standards), Oeko-Tex, EU flower, and Organic Exchange are discussed and how they differ from each other. Further certification process is reviewed. The literature review explores the issues and significance of eco-labelling on textile consumers including consumers’ willingness to pay for eco-labeled STP.

Chapter four reviews the various research approaches and discusses the appropriate methods of data collection and examines the purposes, problems and its benefits. An appropriate research design for the research aims and objectives is discussed.

Chapter five gives the overview of the result and analysis. The summaries of the interviews are given and further those summaries are analysed in tabular form under different area like, approach towards STP, thoughts on certification, thoughts on future of STP, Pricing of STP etc.
Chapter six is discussion and conclusion. It compares and contrasts emergent issues within the literature review and data analysis, assesses the outcomes of the research and concludes with recommendations for both further study and the industry.

1.5 Conclusions

This chapter has outlined the structure of the thesis, presented the context of the research. The need for an investigation of eco-labeled STP across the textile supply chain and the results of the analysis of the data gathered are offered as contribution to current knowledge.
CHAPTER 2: SUSTAINABLE TEXTILES

2.1 Introduction

This chapter reviews the literature concerning the sustainable textile, there need, there social and ecological impact, carbon footprint by textile and clothing industry, consumption and waste generation, available sustainable textile fibres & there benefits. Under section 2.3 and 2.4 definition of sustainable textile and the concept of ecology in textile are discussed. Section 2.5, 2.6 and 2.7 identifies the impact of textile, clothing industry on environment from raw fibre like cotton (natural fibre) and polyester (synthetic fibre) to their processing stage. Section 2.8 and 2.9 reviews the literature concerning the consumption and waste generated from textile, clothing industry. Section 2.11 discussed the how textile and clothing industry responsible for global warming and it’s proved with help of discussing two examples showing emission of responsible pollutants for carbon footprint by textile industry at various stages. Section 2.12 reviews the literature concerning the available sustainable textile fibres and out of which organic cotton is studied in depth. Section 2.13 reviews the impact of dyes and chemicals and the regulation like REACH to overcome it. Section 2.14 explains the importance of ecological testing in textile and clothing industry. Finally conclusions are drawn from the literature review about sustainable textile products and formulated into research questions about the sustainable textile products, there need, and importance in section 2.15.

2.2 Why Sustainable Textile Is Needed Today

The textile industry is considered one of the most ecologically harmful, polluting industries and therefore has enough attention from all. From cultivation or manufacturing of raw material till reaching the goods into the shops environment is getting polluted by them. Hundreds of chemicals are used in day to day life, from sunrise to sunset and many of those are synthetic. During cultivation of cotton, tonnes of pesticides, fertilisers have been used; to make fabric colourful hundreds of non-ecofriendly chemicals, dyes, and pigments are being used; and eventually it negatively affects the environment as well as human being too. According to Daily Mail Reporter (2009), researchers have found 121 chemical traces from 68 breast milk samples from women in Denmark & Finland, e.g. Dioxins, Polychlorinated Biphenyl (PCBs), and pesticides and this proves that upto which extent human beings are
affected by these harmful chemicals. As the world slowly awakens to the damaging effects of some of the chemicals that were synthesized by humans, ecology and pollution have become one the main focus issues.

Around 153 years ago “William Henry Perkin” synthesized mauve or aniline purple the first synthetic dyestuff from chemicals derived from coal tar (Chemical Heritage Foundation, 2005) and this was the major influence in development of organic chemistry. From that day onwards till today thousands of dyes has been developed for different applications. With these developments human beings are enjoying their luxury lifestyle, enjoying colourful life. However, with the same speed of development, waste percentage has also increased in phenomenal way; but at what cost? Waste volumes from the sector are high and growing in with the advent of ‘fast fashion’. Energy use in laundry, production of primary materials especially man-made fibres and in yarn manufacturing of natural fibres is huge. This high consumption of energy shows increase in carbon footprint by the product on environment.

2.3 A definition of “Sustainable Textile Product”

‘Sustainability’ is the ability to maintain an activity indefinitely over time. A sustainable activity is therefore one that does not exhaust the resources on which it depends. The concept of sustainability gained worldwide recognition following a report in 1987 by the World Commission on Environment and Development (WCED). This report entitled Our Common Future, defined sustainability development as (Performance Apparel Market, 2009) –

“Development that meets the needs of present without compromising the ability if future generations to meet their own needs”.

Based on above definition, it’s possible to define the term ‘sustainable textile product’ (STP) as –

“a product which is manufactured with the help of services and related products in responds to basic need and bring a better quality of the life with use of minimum amount of natural resources and toxic chemicals during the production, minimum waste emission to the environment over the life cycle of product keeping environmental and social factors in mind throughout the supply chain”.
Sustainable textile or apparel can be called a product if they are:

- Safe for human and physical environment;
- Made from renewable materials;
- Produced while making the most efficient use of resources such as water and energy;
- Manufactured by people employed in decent working environment;
- Capable of being washed at low temperature using environmentally friendly laundering agents; and
- Capable of being returned safely to the environment at the end of their useful life (Performance Apparel Market, 2009).

Looking into the current textile and clothing supply chain, most part of the supply chain works contrast to the given definition. The ecological & social impacts of textile-clothing industry on environment are easily visible and have different faces. From polluting the soil till dumping cloths to land, the environment is getting polluted by this industry too.

### 2.4 Concept of ecology in textiles

The general definition of ‘ecology’ in the perspective of textiles is complex and diverse and ‘ecology’ is often used in loose sense. This has created confusion in the usage of term. Many references to ‘ecological’ or ‘natural’ textiles refer to unbleached textiles, or non-dyed textiles, or textiles dyed with natural dyes (Moore and Wentz, 2009). It’s very important to note that, all the natural dyes are not eco-friendly; for example, under GOTS (Global Organic Textile Standards) few natural dyes get fail to comply under heavy metal & LD 50 (Lethal Dose 50, for Rat) criteria, which prove that few natural dyes are toxic on inhale.

The term ‘textile ecology’ is easier to understand if explained in three parts Production ecology, human ecology and disposal ecology:

- **Production ecology**: This refers to the process of production and manufacturing of fibres, textiles and garments. Sustainable textiles should be environmentally friendly and should satisfy the social and environmental requirements to control the pollution. A third-party certification body, governments has issued RSLs (Restricted Substance...
Lists), private labelling that link production ecology to human ecology. Such list of restricted chemicals helps to use safer chemicals (Moore et al., 2009).

- **Human ecology**: Human ecology focuses on the effects of textiles on the users and their near environment. Consumers are very conscious about the residue of harmful chemicals present on textile substrate which may affect their skins. Such chemicals must be tested by accredited independent laboratories to verify the presence of harmful chemicals.

- **Disposal ecology**: This ecology is based on what happen at the end of the product cycle and it addresses recycling, reuse, energy, disposal, and/or decomposition of textile products without release of harmful substance (Moore et al., 2009).

### 2.5 The social and ecological impact of textile & clothing industry

When the term environmentally responsible is applied to textile products, for example, it should refer to fibres, fabrics or apparel whose manufacturing, usage, maintenance and ultimate disposal have minimal negative impact on the environment (Chen & Burns, 2006). The textile & clothing industry is a high value sector; in 2006 it’s contributing globally worth over 1 trillion, employing approximately 30 million people and supporting a significant number of economies and individual incomes around the world (Allwood. J et al, 2006).

According to Goldbach and Seuring (2003), the value adding process of textile & clothing consists of six chain levels and their impacts are illustrated in Fig. 2.1 –

1) **Fibre production**: Fibres are produced by farming, includes growing and harvesting and finally cleaning them by process called ginning, e.g. – cotton fibre.

2) **Spinning**: During spinning fibres are converted into yarn (ex- cotton) or in case of man-made fibres the yarn is made from polymers which extrudes through spinneret to produce yarn. There are various techniques by which it’s produced, e.g. – wet spinning, dry spinning.

3) **Fabric production**: The yarn is converted into fabric by weaving and knitting.

4) **Wet processing**: During this process, number of chemicals and dyes are used to make fabric whiter, colourful, attractive.
5) Clothing production: This includes cutting, sewing, ironing, packing.

6) Retailing: Finally, readymade garments are distributed and sold to the customer.

7) Maintaining the garment during life cycle.

8) Disposing of, reuse or recycling of the textile products.

Each of above mentioned areas are affecting the ecologically and socially in different ways, with different intensities and there level of impact is varying from each other like low, medium and high.

---

**Fig 2.1: Social and ecological impact during different processing stages**


To summarise the key environmental and social impacts per clothing lifecycle stage, the most significant environmental impacts include -
• Energy use and generation of greenhouse gas (GHG) emissions from washing (water heating) and drying of clothing.

• Energy use, resource depletion and generation of GHG emissions from processing fossil fuels into synthetic fibres.

• Significant water use, toxicity from fertilizer, pesticide and herbicide use, energy use and GHG emissions associated with fertilizer generation and irrigation systems from conventional cotton growing. Organic and GM cotton reduce the toxicity related impacts; however other GM impacts are currently unclear.

• Water use, toxicity, hazardous waste and effluent associated with production stage pre-treatment chemicals, dyes and finishes (Defra, 2008).

Social and Ethical Impacts include -

• Child labour, poor working conditions in developing countries are the main adverse social impact on a large scale. In addition, low wages, long hour’s shifts, non respect of workers’ rights and health & safety risks are also the social issues (Fairtrade Foundation, 2005; cited in Defra, 2008).

• Limited market access, information and trade terms for farmers and workers Fairtrade Foundation, 2005; cited in Defra, 2008). Loss of resources, economic and cultural assets from resettlement to enable access to resources e.g. fossil fuels, timber plantations or crop growth.

• Animal welfare is a key impact for sheep, cows and fur producing animals used in garments.

In terms of poverty alleviation, the clothing and textile industry is seen as a catalyst for economic growth in developing countries. However it can fail to provide social mobility as training and skills development at this lower value end of the supply chain are not a priority (Defra, 2007; cited in Defra, 2008).

In addition to above mentioned factors, there are few other areas whose influences and effects are equally important. Fig.2.2 shows the influences and affects of unsustainable production of textile and clothing.
2.6 Impact of Fibre Cultivation and Manufacturing

The raw materials required for textile-clothing industry are mainly divided into two parts, namely Natural & Man-made fibres. From last 5,000 years flax, wool and cotton are fibres have been in use by humankind. Up until the 18th century, the share of these fibres used in textiles was 78% wool, 18% flax and only 4% cotton. Due to technical innovations however this has now changed and today cotton takes up 48% of textile production, while 45% is taken up by synthetics and the rest accounted for by other fibres (Soth et al, 1999) and therefore Cotton called king of natural fibre, where as polyester from Man-made side.
2.6.1. Cotton

Cotton is one of the world's 'dirtiest' crops due to its heavy use of insecticides, hazardous pesticide which affects the environment, human and animal health. Cotton is cultivated around 2.5% of the world's arable land (Pan, J et al 2008) yet uses 25% of the world's insecticides (EJF, 2007), more than any other single major crops. As per USDA report, during 2010-11 (till June) the cotton production is around 24,891 (1000 MT tons) (USDA, 2009). The table 2.1 shows the total world cotton production and major producer countries.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>7729</td>
<td>8056</td>
<td>7991</td>
<td>7076</td>
<td>7185</td>
</tr>
<tr>
<td>India</td>
<td>4746</td>
<td>5225</td>
<td>4921</td>
<td>5117</td>
<td>5443</td>
</tr>
<tr>
<td>United States</td>
<td>4700</td>
<td>4182</td>
<td>2790</td>
<td>2654</td>
<td>3636</td>
</tr>
<tr>
<td>Pakistan</td>
<td>2155</td>
<td>1938</td>
<td>1960</td>
<td>2155</td>
<td>2286</td>
</tr>
<tr>
<td>Brazil</td>
<td>1524</td>
<td>1602</td>
<td>1193</td>
<td>1252</td>
<td>1481</td>
</tr>
<tr>
<td>Uzbekistan</td>
<td>1165</td>
<td>1165</td>
<td>1002</td>
<td>871</td>
<td>1002</td>
</tr>
<tr>
<td>Australia</td>
<td>294</td>
<td>139</td>
<td>327</td>
<td>348</td>
<td>479</td>
</tr>
<tr>
<td>Other</td>
<td>4258</td>
<td>3830</td>
<td>3218</td>
<td>2930</td>
<td>3379</td>
</tr>
<tr>
<td>Total</td>
<td>26573</td>
<td>26138</td>
<td>23400</td>
<td>22403</td>
<td>24891</td>
</tr>
</tbody>
</table>

**Table 2.1: World cotton production and major producing countries**

*Source: USDA, 2010.*

Despite the natural image cotton production has become increasingly coupled with severe a negative environmental impact which includes reduced soil fertility, a loss of biodiversity, water pollution, adverse changes in water balance and pesticide related problems including resistance (Mayers, 1999). Fig.2.3 shows the overall description of Life Cycle of Cotton and its impact on environment.

Conventional method of producing cotton is highly damaging to humans and the environment. Following are the few facts of impact –

- Cotton is ‘thirsty’ crop which requires large amount of water to grow. In areas where the rainfall is slight, around 20,000 litres of water is needed to produce 1Kg of cotton fibre.
• For cultivation required extensive use of chemicals such as pesticides and insecticides.
• In developed countries, picking is done by huge machines, which contributes to build-up of greenhouse gases.
• While growing cotton vast quantities of synthetic fertilisers are used and these fertilisers emits greenhouse gases which are sourced from non-renewable resources such as potassium, and their production requires the use of fossil fuels or natural gases.
• In some countries where cotton production is state controlled, such as Uzbekistan, cotton cultivation has been linked to human rights abuses, including forced labour and low wages (Performance Apparel Market, 2009).

2.6.2 Synthetic Fibre

Nylon and the polyester are among the most widely used synthetic fibres for manufacturing of various textile products. Both the fibres are manufacture from polymer solution obtained from the by-product of non-renewable petroleum recourses (Lewin & Pearce, 1998) and are essentially non-biodegradable. Till February 2007, the polyester production was around 25 million to tons (Yarns and fabrics, 2007), where as in year 2009 it’s around 31.9 million tonnes (Oerlikon, 2010; p.25); in case of Nylon in year 2007 it was touched 4,054 thousand tons (Yarns and fabrics, 2007) whereas in year 2009 its around 3.5 million tonnes (Oerlikon, 2010; p.29). The manufacturing of polyester and other synthetic fibres and fabrics is an energy-intensive process requiring large amounts of crude oil and releasing emissions including volatile organic compounds (VOC), particulate matter, and acid gases such as hydrogen chloride, all of which can cause or aggravate respiratory disease. Fig. 2.4 shows the description of Life Cycle of Polyester and its impact on environment.
Cotton Growing and Harvesting
The environment will be affected when conventional cotton is grown and harvested due to use of large amount of pesticide, fertilizer and defoliants.

Cleaning Raw Cotton
When the cotton has been picked, the fibres need to separate from seed along with impurities present in it & this process is called Ginning, where large amount of dust is emitted which can cause lung disease byssinosis in

Cotton Fiber Spinning
The spinning of cotton fibers also causes problems with dust. For the spinning process some producers use spinning oils which do not easily breakdown. These oils will be washed out of the cotton during subsequent processes and they will thus pollute the waste water.

Yarn weaving
Noise pollution is major pollution done by weaving. During the weaving process, the environment will be affected by the use of sizing agents which are used to impart the strength to yarn.

Yarn Knitting
Is some cases needle oil which do not breakdown easily are used during the knitting process, which be washed off during subsequent process.

Disposal
Every year, hug amount of clothes are disposed off which then used as a second had clothes or get landfill.

Wet Treatment
Wet treatment of woven and knitted raw material includes number of processes like desizing, scouring, bleaching, dyeing, printing, finishing. All the above mentioned processes have an impact on environment. For example, heavy metals from dyes & pigments, chlorine from bleaching, formaldehyde from DFA, APEO from various auxiliaries. To do this processes large amount of water is

Use and laundry
When consumers buy the clothes, the clothes often contains residuals from the chemicals that that were used during the various production processes & in some cases these residuals can cause irritation to skin. For laundry, large amount of energy is being used which emits the CO2.

Transport and sales
The fabrics and the finished clothing are often transported from one end of the world & back again. The heavy consumption of the fuel affects the environment. Further more certain chemicals are being used especially during sea transportation, called fumigating agent which are toxic in nature.

Sewing
The sewing process affects the external environmental especially since large amounts of fiber, textile & packing waste are disposed.

Source: Beyond Green, 2008, P. 153
Weaving
Like spinning, weaving one is very noise. Sizing is done before weaving during which number of chemicals are used which are having high content of organic compounds, which for example cause oxygen depletion when it will get mix with surrounding water and result kill of fish.

Polyester Manufacturing
Polyester is manufactured from refined raw oil. Raw oil is not renewable resource. During manufacturing process chemicals are added many of which are suspected of being carcinogenic.

Spinning
The noise level is very high when the fibers are spun and much waste from the fibres and yarns is seen. Spinning oils are also used and these do not easily break down when they are washed out later and discharge into the water stream.

Disposal
Every year, hug amount of clothes are disposed off which then used as a second had clothes or get landfills.

Use and laundry
When consumers buy the clothes, the clothes often contains residuals from the chemicals that that were used during the various production processes & in some cases these residuals can cause irritation to skin. For laundry, large amount of energy is being used which emits the CO₂.

Transport and sales
The fabrics and the finished clothing are often transported from one end of the world & back again. The heavy consumption of the fuel affects the environment. Further more certain chemicals are being used especially during sea transportation, called fumigating agent which are toxic in nature.

Wet Treatment
Wet treatment includes a large number of processes: prewashing, bleaching, dyeing, printing, after treatments and heat treatment. The spinning oil, dyes, auxiliaries are eliminated from the different process and cause harm to environment and human health.

Sewing
The sewing process affects the external environmental especially since large amounts of fibre, textile & packing waste are disposed.

Source: Beyond Green, 2008, P. 153
2.6.3 Impact On Human Health And Environment

As per World Health Organization Aldicarb, parathions, and methamidopho, are three most acutely hazardous insecticides to human health which are most commonly used in cotton production. Aldicarb is the cotton's second best selling insecticide and most acutely poisonous to humans, can kill a man with just one drop absorbed through the skin, yet it is still used in 25 countries and the US, where in 16 states its reported in their groundwater (EJF, 2007). Nitrogen based synthetic fertilizers are considered the most detrimental toxic chemicals to the environment, causing leaching and runoff that freshwater habitats and wells. Basically, these types of fertilizers are contributor to increased N$_2$O emissions, which are 300 times more potent than CO$_2$ as greenhouse gas (Kramer, et al 2006). The nutrients (phosphorus, nitrogen, potash and other minor nutrients) and pesticides leach out of the plant root and contaminate surface & ground water. The nitrite ions (NO$_2^-$), if it enters into the blood, it can inactivate the haemoglobin then which will reduce the oxygen carrying capacity of the blood (Hoekstra, et al 2005). In surface water, fertilizers can stimulate the growth of algae and other aquatic plants, which results in a reduction of dissolved oxygen in the water causes dead plants (Hoekstra, et al 2005). In every year 20,000 farmers are dying only because of accidental pesticide poisoning (Olins, 2008). Death by starvation is alarmingly prevalent and 200,000 cotton farmers commit suicide annually due to spiralling depts incurred from buying pesticide (Schacknat, K 2008).

As per SenthiKumar report (2007), over 0.75 kgs of toxic chemicals are required to grow conventional cotton needed to make one sheet set and around 0.5 kgs required to make T-shirt & pair of jeans.

2.7 Processing of textiles

Up to 2000 chemicals are used in textile processing, many of them known to be harmful to human (and animal) health. Some of these chemicals evaporate, some are dissolved in treatment water which is discharged to our environment, and some are residual in the fabric, to be brought into our homes (where, with use, tiny bits abrade and you ingest or otherwise breathe them in). A whole list of the most commonly used chemicals in fabric production are linked to human health problems that vary from annoying to profound (Ecotextile, 2009).
Among air, water & energy consumption, water is most important concern with textile industry regards to consumption and pollution. During textile wet processing water is the principal medium for removing impurities, applying dyes and finishing agents and for the generation of steam. USEPA (1996) report states that, average volumes of water use in wet processing like bleaching, dyeing, printing and finishing are around 360 m$^3$/ton of cotton. Here, the main concern is about amount of water discharged and the chemical load it carries when it discharge from effluent plant. All the substances like impurities associated to natural fibres, preparation agents, spinning lubricants, sizing agents etc are removed from the fabric during pre-treatment process before dyeing and finishing. The removal of auxiliaries such as spinning lubricants, knitting oil and preparation agents by wet treatment may lead to the discharge not only of hard to biodegrade organics substances such as mineral oils, but also hazardous compounds like polyaromatic hydrocarbons, APEO (Alkyl Phenol Ethoxylates) and biocides. Because of processes like desizing & scouring, BOD increases by 50% & 20-30% respectively where as Sodium hypochlorite bleaching gives rise to AOX (Adsorbable Organic Halogens) in the effluents (Ren, 2000). Apart from a few exceptions like thermosol process, pigments dyeing etc, most of the emissions originating from dyeing process are emissions to water. Water polluting substances originate from dyes themselves from e.g. aquatic toxicity, heavy metals, colour; auxiliaries contained in the dye formulation e.g. dispersing agents, anti foaming agents; basic chemicals and auxiliaries used in the dyeing processes e.g. alkali, salts, reducing and oxidising agents. Eventually, the consumption and emission levels are strongly related to majorly the type of fibre, dyeing technique, machinery etc. (European commission, 2003). An estimated, 56 billion pounds of cotton is processed each year, requiring 1 trillion gallons of water, 33 trillion gallons of oil and 20 billion pounds of chemicals “This amount of water is about what can be pushed out of the Amazon river in 24 hours at low flood stage” Sam Winchester, Klopman Distinguished professor Emeritus at North Carolina State University, said at the Cotton Inc conference (Tucker, et al 2008).

Air pollution is the introduction of the chemicals, particulate or biological material cause harm or discomfort to human being or other living organisms, or damages the natural environment into the atmosphere. During textile processing, oil mist and organic emissions produced when the textile material containing the lubricating oils, plasticizers and other materials that can volatilize or thermally degrade into volatile substances, are subjected to heat. Carbon di-oxide emission results in the generation of the green house gases such as water vapour, methane,
nitrous oxide, chlorofluorocarbon, and ozone (Slater, 2003). In brief, textile wet processing is more impacting, affecting to the environment than socially.

### 2.8 Waste

Waste is perceived to be a problem for many reasons, but the three reasons most often cited are:

- waste disposal can harm the environment and human health;
- space for landfills is claimed to be becoming scarce as councils strive for zero waste targets;
- Costs are increasing to use existing and replace landfills and waste is the end of a products life cycle that causes costly environmental impacts and depletes valuable resources (Waste Management – Productivity Commission Enquiry No. 38 2006, cited on Kerryn Caulfield, 2009).

Like all wastes, textile waste originates from the community via a number of streams including the fibre, textile and clothing manufacturing industry, consumers, the commercial and service industries. Textile waste is classified as –

- **Pre-consumer waste**
  Pre-consumer waste is defined as material discarded during the manufacturing process. This waste is generated from the production and processing of fibres, fabrics and garments. Examples of such waste includes: fibre, yarn and fabric waste during textile manufacturing and processing, thread waste, clippings, remnants and goods damaged during production. Through the efforts of industry approximately 75% of the pre-consumer textile waste that is generated is diverted from landfills and recycled. Pre-consumer waste also includes the non-textile waste such as packaging material (Performance Apparel Markets, 2009).

- **Post-consumer waste**
  Post-consumer waste defined as material discarded after consumer use. Destinations for such waste include the fibre reclamation, filling materials, incinerators, landfill, second-hand clothing and wiping clothes. These articles are discarded either because they are worn out,
damaged, outgrown, or have gone out of fashion. They are sometimes given to charities but more typically are disposed of into the trash and end up in municipal landfills (CTR, 1997). It is estimated that more than 11.9 million tons of textiles were generated in US during year 2007 which is around 4.7 % of total municipal solid waste (MSW) generation (EPA, 2008); whereas in UK it was around 1 million tonnes (Defra, 2007). Textile waste in landfill contributes to the formation of leachate as it decomposes, which has the potential to contaminate groundwater. Another product of decomposition in landfill is methane gas, which is a major cause of greenhouse gases, significantly contributing to global warming, although it can be utilised if collected. The decomposition of organic fibres and yarn such as wool produces large amounts of ammonia as well as methane. Ammonia is highly toxic in both terrestrial and aquatic environments, and can be toxic in gaseous form. Cellulose-based synthetics decay at a faster rate than chemical-based synthetics. Synthetic chemical fibres can prolong the adverse effects of both leachate and gas production due to the length of time it takes for them to decay. In the past, textile waste has been incinerated in large quantities, emitting organic substances such as dioxins, heavy metals, acidic gases and dust particles, which are all potentially harmful to both humans and the environment (Waste Management – Productivity Commission Enquiry No. 38 2006, cited on Kerryn Caulfield, 2009).

2.9 Consumption

From last 50 years consumption has been steadily increasing in industrial countries and this steady increase has been putting a heavy strain on the environment that devastating the earth's natural defence mechanisms because of which there is decrease in forest size & fish stocks, whereas at the same time increase in soil degradation and desertification. Additionally, pollution and waste are being produced beyond what the earth is able to absorb, making it even more important to monitor and reduce consumption rate (Green Gear & Gift Guide, 2008).

Textile–clothing industry represents some 12% of consumption in value and 7% in volume. In terms of consumption each rich country citizen spends around € 1500 on textiles, which is 30kg of fibres each year having little less than half of its on apparel, almost one third on home textiles and almost quarter is hidden in the car, a plane and in a filter. The average European and American buys around 30 kg of fibre; the vast majority of people in Asia and Africa do
hardly reach 3 kg, China has achieved a fibre consumption of 6 kg/person, Turkey and Brazil is around 10 kg/person. Just to put the 30 kg in perspective each an area of 600 m2 of fibre production somewhere in the world. The total global fibre production and consumption stands now at around 55 million tons; that is roughly 9 kg per human being. If each year fibre consumption increases by 1 kg/person, which adds 5 million tonnes fibre production a year which is equal to the entire cotton production of India & Pakistan combined or cultivates area equal to three times Belgium. If the consumption rate keep on going with this percentage it’s difficult to sustain the yearly growth in the fibre consumption. By 2020 there will be a fibre gap, a difference of 20% between global demand and global supply and to feel this gap there would be need to grow entire surface of India with cotton (Scheffer, 2008; p.131). In 2009-10 global fiber demand went up by 4.2% to 70.5 million tonnes. Man-made fibre increased by 4.0% to 44.1 million tonnes, whereas natural fibres advanced by 4.5% to 26.4 million tonnes (Oerlikon, 2010; p.21).

2.10 Toxic Laundry

After manufacturing final product the chain of polluting environment does not stop; still it continues during washing or laudry of clothes. During washing of clothes very toxic laundry detergents are being used, for e.g. Linear Alkyl Benzene Sulfonates (LAS) mostly listed as an anionic surfactant on labels are very carcinogenic and reproductive toxins. The phenols, commonly found in detergent soap, are seriously toxic to central nervous system, the heart, blood vessels, lungs, and kidney of human being. Optical Brightening Agents (OBA), which are used to make clothes white & not helpful for cleaning. When the effluent having these brighteners they shows toxicity to fish, cause bacterial mutations and can cause allergic reactions on exposure to sunlight. Detergent also has artificial fragrances, many of them made from petroleum distillates that cause allergies and irritation to both eyes and the skin (Scott, 2008). Commercial fabric softeners include benzyl acetate, linked to pancreatic cancer; benzyl alcohol causes upper respiratory problems. Furthermore, limonene, a known carcinogen, chloroform, a carcinogenic neurotoxin and aesthetic; linalool, a narcotic that causes nervous system disorder; and pentane, a chemical known to be harmful if inhaled (Scott, 2008). Regarding dry cleaning tetrachloroethylene or perchloroethylene (PERC) are commonly used toxic solvent. PERC is also a central nervous system depressant when inhaled in a closed,
poorly ventilated area; additionally PERC can cause dizziness, headache, sleepiness, difficulty in walking or speaking, unconsciousness and/or death (Scott, 2008).

2.11 Carbon Footprint & Textile-Clothing industry

According to Dev (2009), carbon footprint is consisting of the two parts, the primary and secondary footprint.

- Primary footprint includes direct emissions of carbon dioxide from fossil fuels like domestic energy consumption and transportation (e.g. car and plane). This type of emission has direct control.
- The secondary footprint includes indirect carbon dioxide emissions over the entire lifecycle of the products during its usage i.e. emissions associated with manufacturing and ultimate breakdown.

That is, the more we buy the more emissions, more impact on our behalf. According to estimates, textiles and clothing typically account for around 4% of the secondary carbon footprint of an individual in the developed world. He also raised the point on unavailability of universally accepted way to measure the carbon footprint; for example retailers in the UK might only consider the emissions within the UK distribution of the products, accounting for only part of the supply chain. However if the entire process from cotton cultivation till mass production in other part of world and delivery to UK retailers, what about this part carbon footprint? That should also consider into the total carbon footprint. In the developing world, where the textile industry represents a larger percentage of GDP and mills are often old-fashioned, the CO₂ emissions are greater (Ecotextile, 2009). According to Velavan, Rudramoorthy and Balachandran (2009) work, Indian Textile industry consumes 9-10% of total energy available in India and accounts for 20% of total production cost. Based on their work the authors have given the area wise CO₂ emission (Fig 2.5) by small-medium scale industry in India.
Fig 2.5: CO₂ emissions from textile sub sectors

*Source: Velavan et al., 2009.*

To show the emission of responsible pollutants for carbon footprint by textile industry at various stages, two examples are discussed below:

**Example 1:**

Steinberger, Friot, Jolliet & Erkman (2009), have carried out Life cycle analyses (LCA) of cotton t-shirt (weighing 0.25 kg) and polyester jacket (weighing 0.5 kg) manufactured in India and China respectively, whereas retailing in Germany. They have recorded the carbon dioxide (CO₂), nitrogen oxides (NOx), particulates (PMs), and sulphur dioxide (SO₂) emission as well as primary non-renewable energy use during its lifecycle. While calculating these the functional unit is “100 days of a garment being worn,” with 100 days, or once a week for 2 years, or every 2 days for two seasons, estimated to be a reasonable lifetime for a garment. Fig. 2.6 shows the system boundary and processes considered for the cotton T-shirt production–consumption chain. The system is divided into three boxes: India (producing country), Germany (consuming country), and Rest of World.

Steinberger et al, (2009) have considered the following area while calculating the Emissions of CO₂, NOₓ, particulates, and SO₂ for key energy processes in China, India, and Germany – Cotton Agriculture in India, Textile manufacture in India, Textile manufacture in China,
Electricity emissions in China and India, Transport stages, Freight in India, Retail in Germany, Use phase in Germany and Disposal in landfill and incineration.

The tables 2.2 & 2.3 shows the non-renewable primary energy and emissions of CO2, NOx, total particulates and SO2 for 100 days of garment use for cotton T-shirt and polyester jacket. As a result they found that, for the T-shirt, over 70% of the energy use and CO2 emissions occur in the consuming country, whereas for the jacket, more than 70% occur in the producing country. This reversal of proportions is due to differences in the use phase of the garments. For SO2, in contrast, over two thirds of the emissions occur in the country of production for both T-shirt and jacket. The difference in emission patterns between CO2 and SO2 is due to local electricity processes, justifying our emphasis on local energy infrastructure.

![Diagram](image)

**Fig 2.6: The system boundary and processes considered for the cotton T-shirt production Consumption chain**

Table 2.2: Non-renewable primary energy and emissions of CO$_2$, NO$_x$, total particulates and SO$_2$ for 100 days of garment use for cotton T-shirt


<table>
<thead>
<tr>
<th>Cotton T-shirt (0.25kg)</th>
<th>Primary energy</th>
<th>CO2</th>
<th>Uncertainty</th>
<th>NO$_x$</th>
<th>PM$_s$</th>
<th>SO2</th>
<th>Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>MJ</td>
<td>kg</td>
<td></td>
<td>g</td>
<td>g</td>
<td>g</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>240.11</td>
<td>14.00</td>
<td>10%</td>
<td>48.98</td>
<td>32.70</td>
<td>32.03</td>
<td>20%</td>
</tr>
<tr>
<td>Production: India</td>
<td>26%</td>
<td>29.6</td>
<td>15%</td>
<td>76%</td>
<td>43%</td>
<td>67%</td>
<td>25%</td>
</tr>
<tr>
<td>Cotton fiber</td>
<td>28.30</td>
<td>1.82</td>
<td>30%</td>
<td>17.11</td>
<td>5.43</td>
<td>9.83</td>
<td>50%</td>
</tr>
<tr>
<td>Yarn</td>
<td>13.07</td>
<td>0.96</td>
<td>10%</td>
<td>4.93</td>
<td>2.75</td>
<td>6.06</td>
<td>20%</td>
</tr>
<tr>
<td>Fabric</td>
<td>2.56</td>
<td>0.16</td>
<td>10%</td>
<td>0.96</td>
<td>0.46</td>
<td>0.99</td>
<td>20%</td>
</tr>
<tr>
<td>Colored fabric</td>
<td>10.37</td>
<td>0.63</td>
<td>10%</td>
<td>8.06</td>
<td>4.76</td>
<td>4.05</td>
<td>20%</td>
</tr>
<tr>
<td>Garment</td>
<td>2.23</td>
<td>0.08</td>
<td>10%</td>
<td>0.50</td>
<td>0.12</td>
<td>0.26</td>
<td>20%</td>
</tr>
<tr>
<td>Transport</td>
<td>6.05</td>
<td>0.37</td>
<td>20%</td>
<td>5.88</td>
<td>0.46</td>
<td>0.38</td>
<td>35%</td>
</tr>
<tr>
<td>Rest of World</td>
<td>0.4%</td>
<td>0.4%</td>
<td>20%</td>
<td>1.0%</td>
<td>0.1%</td>
<td>1.2%</td>
<td>20%</td>
</tr>
<tr>
<td>Transport</td>
<td>0.65</td>
<td>0.05</td>
<td>20%</td>
<td>0.51</td>
<td>0.05</td>
<td>0.38</td>
<td>35%</td>
</tr>
<tr>
<td>Sale and use: Germany</td>
<td>74%</td>
<td>7.1%</td>
<td>10%</td>
<td>23%</td>
<td>57%</td>
<td>31%</td>
<td>35%</td>
</tr>
<tr>
<td>Transport</td>
<td>0.22</td>
<td>0.01</td>
<td>20%</td>
<td>0.10</td>
<td>0.04</td>
<td>0.02</td>
<td>35%</td>
</tr>
<tr>
<td>Washing (50 times)</td>
<td>62.16</td>
<td>3.48</td>
<td>10%</td>
<td>4.25</td>
<td>10.89</td>
<td>3.87</td>
<td>20%</td>
</tr>
<tr>
<td>Drying (50 times)</td>
<td>114.23</td>
<td>6.44</td>
<td>10%</td>
<td>6.60</td>
<td>7.70</td>
<td>6.18</td>
<td>20%</td>
</tr>
<tr>
<td>Disposal</td>
<td>0.06</td>
<td>0.00</td>
<td>20%</td>
<td>0.08</td>
<td>0.04</td>
<td>0.00</td>
<td>35%</td>
</tr>
<tr>
<td>Retail (5 USD)</td>
<td>–</td>
<td>0.91</td>
<td>100%</td>
<td>2.12</td>
<td>1.21</td>
<td>0.72</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 2.3: Non-renewable primary energy and emissions of CO$_2$, NO$_x$, total particulates and SO$_2$ for 100 days of garment use for polyester jacket


<table>
<thead>
<tr>
<th>Polyester jacket (0.5kg)</th>
<th>Primary energy</th>
<th>CO2</th>
<th>Uncertainty</th>
<th>NO$_x$</th>
<th>PM$_s$</th>
<th>SO2</th>
<th>Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>MJ</td>
<td>kg</td>
<td></td>
<td>g</td>
<td>g</td>
<td>g</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>156.39</td>
<td>10.52</td>
<td>35%</td>
<td>35.97</td>
<td>21.50</td>
<td>45.00</td>
<td>75%</td>
</tr>
<tr>
<td>Production: China</td>
<td>71%</td>
<td>72%</td>
<td>50%</td>
<td>88%</td>
<td>85%</td>
<td>92%</td>
<td>80%</td>
</tr>
<tr>
<td>Resin</td>
<td>35.82</td>
<td>3.55</td>
<td>50%</td>
<td>4.14</td>
<td>2.38</td>
<td>4.48</td>
<td>80%</td>
</tr>
<tr>
<td>Yarn</td>
<td>29.23</td>
<td>2.25</td>
<td>50%</td>
<td>14.16</td>
<td>8.76</td>
<td>15.53</td>
<td>80%</td>
</tr>
<tr>
<td>Fabric</td>
<td>52.92</td>
<td>3.54</td>
<td>50%</td>
<td>11.82</td>
<td>6.55</td>
<td>20.54</td>
<td>80%</td>
</tr>
<tr>
<td>Colored fabric</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Garment</td>
<td>1.46</td>
<td>0.11</td>
<td>50%</td>
<td>0.73</td>
<td>0.46</td>
<td>0.77</td>
<td>50%</td>
</tr>
<tr>
<td>Transport</td>
<td>0.82</td>
<td>0.05</td>
<td>50%</td>
<td>0.80</td>
<td>0.06</td>
<td>0.05</td>
<td>80%</td>
</tr>
<tr>
<td>Rest of World</td>
<td>1.2%</td>
<td>1.1%</td>
<td>50%</td>
<td>3.8%</td>
<td>0.7%</td>
<td>2.6%</td>
<td>50%</td>
</tr>
<tr>
<td>Transport</td>
<td>1.84</td>
<td>0.11</td>
<td>50%</td>
<td>1.56</td>
<td>0.15</td>
<td>1.18</td>
<td>80%</td>
</tr>
<tr>
<td>Sale and use: Germany</td>
<td>28%</td>
<td>27%</td>
<td>10%</td>
<td>8%</td>
<td>15%</td>
<td>5%</td>
<td>20%</td>
</tr>
<tr>
<td>Transport</td>
<td>0.82</td>
<td>0.02</td>
<td>20%</td>
<td>0.19</td>
<td>0.07</td>
<td>0.05</td>
<td>35%</td>
</tr>
<tr>
<td>Washing (6 times)</td>
<td>14.92</td>
<td>0.78</td>
<td>10%</td>
<td>0.98</td>
<td>1.19</td>
<td>0.90</td>
<td>20%</td>
</tr>
<tr>
<td>Drying (6 times)</td>
<td>27.41</td>
<td>1.55</td>
<td>10%</td>
<td>1.58</td>
<td>1.85</td>
<td>1.48</td>
<td>20%</td>
</tr>
<tr>
<td>Disposal</td>
<td>0.14</td>
<td>0.51</td>
<td>20%</td>
<td>0.20</td>
<td>0.03</td>
<td>0.01</td>
<td>35%</td>
</tr>
<tr>
<td>Retail (10 USD)</td>
<td>–</td>
<td>1.83</td>
<td>100%</td>
<td>4.23</td>
<td>2.43</td>
<td>1.44</td>
<td>100%</td>
</tr>
</tbody>
</table>
Example II

To measure carbon footprint a joint project is carried out by Otto group, environmental consultancy Systain, The federal environmental agency and the German Oeko-Institute. This project is finished by September 2009, which is carried out on 3 garments sold by Otto group. As a result of project it’s found that, A Long Sleeve white Shirt, 100% cotton, size 40-42, net weight 222 gms, cotton from US, made in Bangladesh, distribution by Otto Germany gives a carbon footprint of 10.75 Kgs i.e. 50 times greater than weight of garment. The below pie chart (Fig.2.7) shows the distribution of CO₂ emission at each stage (Ecotextilenews, 2009).

As per report findings, the total transportation CO₂ emission is 290 gms which includes the transportation of cotton from cotton field in US to Bangladesh production unit which is around 35,000 Km and finally to Germany. Regarding overseas journey the cargo was transported by sea and by road. If this shirt had been shipped by air from Bangladesh to Germany, it would increase the emission by 4 Kgs CO₂. Surprisingly, the project found that, the distribution of garments within Germany results more emission than the emission by logistic chain around the globe (Ecotextilenews, 2009).

Fig 2.7: CO₂ emission of long sleeve shirt

Source: Ecotextile (2009).
Research has shown that a T-shirt's carbon footprint also depends on how frequently it is washed, and the manner in which it is washed and dried. Over the lifecycle, around 75 per cent of the T-shirt's carbon footprint will be caused by machine washing and drying. According to Institute for Manufacturing at Cambridge University on sustainable clothing discovered that 60% of the greenhouse gases generated over the life of a simple t-shirt come from the typical 25 washings and machine dryings. The carbon emissions created to generate the electricity used to wash clothing in warm temperature water and warm temperature tumble dryers exceeds the carbon emissions created during the growing, manufacturing and shipping of clothing. And this doesn’t include the electricity needed to iron clothing especially cotton clothing which wrinkles easily (Allwood, 2006).

2.12 Sustainable Textile Products

The global textile industry has taken several steps towards reducing its carbon footprint and meeting the challenges of building a more sustainable future. At the same time there is a growing awareness of environmental issues among consumers who are now increasingly insisting on textile products complying with environmental standards. These complementary trends will hopefully continue to drive the industry toward offering the consumer products that are not only red, blue, white etc. but also green. However, the current rate of growth in manufacturing, consumption and awareness is sufficient to reduce the carbon foot is still a question.

2.13 Sustainable textile fibres

In order to move to greater sustainability, companies and customers are searching for fabrics and apparel that are based on ecofriendly fibres. These fibres may be natural or synthetic but must have reduced environmental impact in their production and processing compared to conventional fibres. To some extent, it’s possible to call them people friendly because of reductions in the use of pesticides and synthetic fertilizers in their production systems meaning they are less hazardous to farmers (DyStar Sustainability Series, 2009).

Some of these fibres have long been a part of our textiles and apparel industries but have never been given high importance in order to fully utilize their ecofriendly benefits and better textile properties. A few examples are: organic cotton, recycled cotton, jute, ramie, organic silk,
lyocell, recycled polyester, corn, soya bean and few more. Fig 2.8 gives the overview and classification of these fibres (DyStar Sustainability Series, 2009).

Recently, with the increase in consumer interest and the establishment of third-party certification systems a greater focus has been given by the textile industry to the production of sustainable fibres and new alternatives have been investigated, researched and evaluated by the textile industry for various uses in textiles: Tencel®, recycled polyester, recycled and organic cotton, and bamboo are some of the more successful examples. But whether the sustainable and eco friendly nature of the fiber is maintained through to the final end depends critically on how the fiber is subsequently processed (DyStar Sustainability Series, 2009).

<table>
<thead>
<tr>
<th>Organic</th>
<th>Man-Made fibres</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Organic Cotton, wool, and silk</td>
<td>- Corn/Soya bean</td>
</tr>
<tr>
<td>- Hemp/Remie/Jute</td>
<td>- Pineapple</td>
</tr>
<tr>
<td></td>
<td>- Milk Weed</td>
</tr>
</tbody>
</table>

**Eco-Textiles**

<table>
<thead>
<tr>
<th>Recycled fibre</th>
<th>Natural</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Recycled cotton</td>
<td>- Natural Coloured Cotton</td>
</tr>
<tr>
<td>- Recycled Polyester</td>
<td></td>
</tr>
</tbody>
</table>

**Fig. 2.8: Sustainable fibres**

*Source: DyStar Sustainability Series, 2001.*

In this thesis, out of all the sustainable fibres, organic cotton is studied in depth since, among all the sustainable fibre, organic cotton and products based on organic cotton are being produced in large quantity, consumers are much more aware of it, retailers as well as consumers have accepted it and year by year demand is growing throughout world.
2.13.1 Organic Cotton

Cotton is the most consumed fibre among all the fibres. To overcome the issues involved in conventional cotton production, organic cotton farming is the one of the solution. Organic cotton is cotton that originates from organic agriculture. Agricultural production is considered ‘organic’ when it has been certified ‘organic ’ by independent inspection and certification bodies according to the rules and regulations that apply in that particular country, region, or envisaged consumer market. The International Federation of Organic Agriculture Movements (IFOAM), which is the representative body for organic agriculture worldwide.

2.13.1.1 ‘Organic agriculture’ definition and principles

According to International Federation of Organic Agriculture Movements (IFOAM) (2008) definition of ‘Organic Agricultural’ is-

“Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved”.

The above IFOAM definition of organic agricultural is based on four principles and those are (ITC, 2007):

a) The principle of health: Organic agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible.

b) The principle of ecology: Organic agriculture should be based on living ecological cycles, work with them, emulate them and help sust ain them.

c) The principle of fairness: Organic agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.

d) The principle of care: Organic agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.
In general, organic agriculture aims for an optimum and sustainable use of local natural resources for production without the application of external inputs like synthetic pesticides, chemical fertilizers, herbicides, defoliants and chemically treated or genetically modified seed (Ton, 2007) which guard the environment by promoting clean water, natural biodiversity, and healthy soils.

The farmers who wishing to convert to organic agriculture will have to go through a conversion period of one to three years, depending on their fields’ history. The conversion period enables the soil and the environment to recover from previous cultivation, while applying organic methods of production. The ‘in-conversion’ produce cannot be sold as ‘organic’, and does not usually fetch a premium in the market. The risks and costs of conversion are a major barrier to the adoption of organic agriculture (ITC, 2007). Organic production utilizes a range of strategies which are fundamentally different from those associated with conventional cotton farming. Fig.2.9 shows the difference between Organic Cotton & conventional cotton. One of the most important point to take into account while comparing organic and conventional cotton production costs is organic cotton is produced in an organic farm system which produces many other crops in rotation. The main difference between both the systems is the costs of maintaining or improving soil fertility (Elzakker, 1999; p.87).

2.13.1.2 Organic Cotton Vs Genetically Engineered/Modified Cotton (GMO)

Looking into health, environment and pest resistance problems caused by the synthetic chemical input, and profitability, many companies have started using GMO seeds to grow cotton. GMOs are organisms in which the genetic material (DNA) has been altered. The technology is often called “modern biotechnology” or “gene technology”, sometimes also “recombinant DNA technology” or “genetic engineering”. It allows selected individual genes to be transferred from one organism into another, also between non-related species. There are basically two types of GMO: Bt cotton and herbicide –resistance cotton. Bt (Bacillus Thuringiensis) cotton contains a gene that enables the plant to produce its own pest-killing toxins. In case of herbicide-resistance cotton, it’s developed to tolerate the specific herbicides, glyphosate and bromoxynil. However both types have their own problems (Myers, 1999; p.17).
Greenpeace Research Laboratories, University of Exeter, UK have carried out the project in India to understand and find out the differences between Bt and organic cotton cultivation and they found following results –

1) The cost cultivation is almost twice as expensive for Bt cotton farmers than for organic cotton farmers. The higher expense includes higher costs of seeds, pesticides & fertilisers (98% higher than the organic cotton, Table 2.4) and interests for loans. Higher loan costs are a direct consequence of higher cost of inputs for cultivation for Bt cotton farmers.

2) Bt cotton farmers continue to use a large amount and variety of chemical pesticides, especially insecticides. Bt cotton farmers commonly apply pesticides classified by the World Health Organisation as extremely or Highly Hazardous

3) Bt cotton farmers suffer more pest damage than organic farmers, due to heavy attacks from secondary pests and developing Bt resistance by bollworm. Organic cotton farmers rely exclusively on bio-pesticides and natural pest control, spending very little money on pest control and instead being capable of controlling pests effectively.

<table>
<thead>
<tr>
<th></th>
<th>Bt Cotton</th>
<th>Organic Cotton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most common pesticides used</td>
<td>Confidor, Monocrotophos, Methyl parathion, and Triazophos.</td>
<td>Neem tree extract, cow dung and urine preparation.</td>
</tr>
<tr>
<td>Money spent on pesticides in 2009 (Rs/ acres)</td>
<td>1,119</td>
<td>26 (- 98%)</td>
</tr>
<tr>
<td>Money spent on pesticides in 2008 (Rs/ acres)</td>
<td>973</td>
<td>54 (- 94%)</td>
</tr>
</tbody>
</table>

*Table 2.4: Pesticides and their cost used for Bt and organic cotton*


4) Cotton yields do not differ significantly between Bt and organic cotton farmers. The small yield increase in Bt and chemically-intensive cotton farms does not translate into income benefit for the Bt farmer, due to high cultivation costs.

5) Organic cotton farmers maintain more than twice the number of crops besides cotton in their farm than Bt cotton farmers. The net income from the farm as a whole is 90% higher for organic farmers compared to Bt cotton.
6) Organic farmers, with lower cost of cultivation and thus less debt, end up with a surplus net return. With reference to Table 2.5, by cultivating organic cotton farmer can earn 200% extra income compared to Bt cotton; whereas economic livelihood would 171% higher.

**Fig 2.9: Difference between Organic Cotton & Conventional cotton**

*Source: http://aboutorganiccotton.org/OCdiff.html.*

In brief, results clearly shows farmers producing non-Bt cotton i.e. organic cotton, by engaging in ecological and economically efficient farming, diversifying their cropping system and relying more on their community, achieve a better, more secure economic livelihood than
Bt cotton farmers. Bt cotton farmers, with very high cost of cultivation, high-chemical low-diversity farming and high debt are vulnerable and under high risk of household financial collapse. Overall, results shows that Bt cotton poses a serious financial risk to poor, rain-fed smallholding farmers in India. On the other hand, organic cotton is a clear pro-poor option for improving economic livelihood in rural communities (Tirado, 2009). To support above findings, refer the below tables 2.4 and 2.5 which gives the information about the cultivation price difference, use of pesticides Bt and organic cotton.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bt Cotton</td>
<td>Organic Cotton Farmers</td>
<td>Difference for Organic</td>
<td>Bt Cotton</td>
<td>Organic Cotton Farmers</td>
<td>Difference for Organic</td>
</tr>
<tr>
<td>Total cotton cultivation cost (Rs/acre)</td>
<td>8,764</td>
<td>4,624</td>
<td>-47%</td>
<td>7,450</td>
<td>4,074</td>
<td>45%</td>
</tr>
<tr>
<td>Net Income cotton (Rs/acre)</td>
<td>2,069</td>
<td>6,199</td>
<td>200%</td>
<td>16,093</td>
<td>10,734</td>
<td>-33%</td>
</tr>
<tr>
<td>Net Income other crops (Rs/acre)</td>
<td>2,900</td>
<td>2,735</td>
<td>-6%</td>
<td>4,570</td>
<td>6,599</td>
<td>44%</td>
</tr>
<tr>
<td>Net Income whole farms (Rs/acre)</td>
<td>4,775</td>
<td>8,934</td>
<td>87%</td>
<td>20,054</td>
<td>17,333</td>
<td>-14%</td>
</tr>
<tr>
<td>Accumulated dept 2008/09-2009/10 (Rs)</td>
<td>9,934</td>
<td>3,464</td>
<td>-65%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic livelihood (Income - Dept) 2009/10 (Rs/acre)</td>
<td>-7,136</td>
<td>5,040</td>
<td>171%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 2.5: Cost of cultivation and income from Bt and organic cotton*

*Source: Tirado, (2009); p.16.*

In contrast to above discussion, according to US-Based Monsato, a well known company for GM seeds, GM seeds will help to reduce the aggregate use of key resources by one third per
unit of output by 2030 versus 2000, which means producing seeds with higher yields that allows for more efficient use of water and nitrogen (fertiliser) therefore requiring less land, irrigated water and energy per unit of output (Ecotextilenews, 2008).

According to World Bank “World Development Report, 2008”, about 9 million smallholder farmers, mainly in China and India, have adopted transgenic Bt cotton for insect resistance. It has already reduced yield losses from insects, increased farmer’s profits, and significantly reduced pesticide use in India and China. However according to report, transgenic technology remains controversial, however, because of perceived and potential environmental and health risks.

The rapid adoption of Bt cotton in few countries like China and India attests to its profitability for most farmers. Available farm-level studies largely support higher profits from adoption of Bt cotton, and also document substantial environmental and health benefits through lower pesticide use. But the impacts vary across years, institutional settings, and agroecological zones. In some studies, farmers in China recorded a $470 per hectare increase in net income (340 %), largely because of a two-thirds reduction in pesticide applications. But some reports indicate much smaller reductions in pesticide use and regional variation in benefits. Overall, China represents a successful case in terms of productivity, farm incomes, and equity. In contrast initially in India experienced a loss, largely because of the use of poorly adapted varieties (World Development Report, 2008).

Fig 2.10 gives the overall information about the factors affecting the cost of Bt and organic cotton and those are –

- Seed cost
- Pesticide cost
- Fertiliser cost
- Animal feed cost
- Labour and machinery cost
- Interest on loan cost
European Environment Agency (2002), have discussed the possible negative impact of GM crop on environment, which includes –

*Source: Tirado, (2009); p.10.*
• the potential dispersal of the genetically modified organisms in the environment – for example through invasiveness;
• the potential transfer of the inserted genetic material to other organisms – for example through cross-pollination;
• potential impacts on non-target species; and
• Potential impacts on soil bacteria and the nitrogen cycle.

2.13.1.3 Confirmation to GMO cotton

There are many organisations and consumers are under impression that product labeled as organic ensures that it is GM free. However, the term ‘organic’ does not guarantee that a product is ‘GMO free’. According to the NOP (National Organic Program), the use of GM seeds are strictly prohibited, but the NOP standards are ‘process based’ which means testing to detect GM material in the organic products is not required (Ecotextilenews, 2010).

There are ways to find out the Bt or Organic Cotton by testing of GMO DNA and Bt-Protein and DNA test. A quick test for GM can be done in the field that cost just € 5. It looks for the protein produced by GM plants. It can be carried out on seeds, plants in the field and seed cotton before and during ginning. Once the fiber is ginned one has to rely on DNA testing. As in the food industry this laboratory based method uses the PCR technique. It cost around € 150 per sample, although quantitative conclusions are difficult. It’s mainly used when there is already ‘suspicion’ of GM contamination. The major causes of GM contamination are a crop grown in the field, transfer of pollen from a nearby field via wind or insect, co-mingling during harvest and handling (Ecotextilenews, 2010; p.24).

2.13.1.4 Standards

To claim cotton as an “Organic” It has to be certified by Third Party Certifying agency that will do the inspection to certify the product, land under organic cultivation. This inspection and certification done is based on various country organic agricultural standards like USDA (United States Department Of Agricultural), NOP (National Organic Program), NPOP (National Programme for Organic Production), JAS (Japanese Agricultural Standards) and EU council regulation 834/2007.
2.13.1.5 Organic cotton production

According to Organic exchange (OE) 2007-08 report, certified organic cotton is grown in 22 countries in the world. In terms of cultivation quantity during 2007-08 approximately 145,872 metric tonnes (MT) of organic cotton is produced which shows growth of 54% in cultivation of organic cotton from last year (Organic Exchange, 2008). This is the highest quantity ever cultivated in organic cotton history. In year 2008-09 the total production is around 175,113 MT. Currently organic cotton now represents approximately 0.78 % of total worldwide cotton production (Organic Exchange, 2009). For more details, refer Fig.2.11 which shows yearly organic cotton worldwide production from 1993-94 to 2008-09.

![Organic Cotton Production](image)

Fig 2.11: Yearly Organic Cotton worldwide production

Table 2.6: Top ten Cotton producing countries


<table>
<thead>
<tr>
<th>2006-07</th>
<th>2007-08</th>
<th>2008-09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkey</td>
<td>India</td>
<td>India</td>
</tr>
<tr>
<td>India</td>
<td>Syria</td>
<td>Turkey</td>
</tr>
<tr>
<td>China</td>
<td>Turkey</td>
<td>Syria</td>
</tr>
<tr>
<td>Pakistan</td>
<td>China</td>
<td>Tanzania</td>
</tr>
<tr>
<td>Israel</td>
<td>Tanzania</td>
<td>China</td>
</tr>
<tr>
<td>Tanzania</td>
<td>USA</td>
<td>USA</td>
</tr>
<tr>
<td>Uganda</td>
<td>Uganda</td>
<td>Uganda</td>
</tr>
<tr>
<td>USA</td>
<td>Peru</td>
<td>Peru</td>
</tr>
<tr>
<td>Peru</td>
<td>Egypt</td>
<td>Egypt</td>
</tr>
<tr>
<td>Syria</td>
<td>Burkina Faso</td>
<td>Burkina Faso</td>
</tr>
</tbody>
</table>

With reference to table 2.6 and fig. 2.12 among the countries those are producing organic cotton; India is top in the list contributing around 61.41% of total production of world, whereas Syria is next to India producing 12.57% leaving behind Turkey (15.61%). Apart from this, countries like Burkina Faso, Egypt have started cultivation of organic cotton and they are in top five countries.

Fig 2.12: County wise Percentage of Global Organic Cotton Production of year 2008-09

2.13.1.6 Trends in organic cotton and Retailers Programs

During 1990s, few environmentally motivated retailers, designers & textile manufacturer have started use of organic cotton in textiles-clothing, e.g. Esprit and Hennes & Mauritz (H&M), Mark & Spencer (M & S), Patagonia. Marks and Spencer tested organic and naturally dyed cotton in the early 1990s without much success. The items were too expensive, the Marks & Spencer marketing of the product was minimal and the public was not nearly as aware of the benefits of organic agriculture as they are now. In 1992-1994, Patagonia started to test out organic cotton T-shirts and sweatshirts and in 1995 other cotton accessories were added to the range. Nike targeted the high volume promotional t-shirt area of the company. In 1998, the company introduced 4 models in 5.4-ounce jersey using a 3% blend of organic cotton with conventional cotton. This was through one US vendor only and the total volume at that time was 30 million T-shirts. By 1999, volume was 75 million units, and the program had extended to sweatshirts and socks. Since the program began in 1997, Nike has used 2.2 million pounds of organic cotton (Breds, 2002).

The design, quality and colour range of organic cotton items improved significantly in the second part of the 1990s. The range of yarns and fabrics available expanded, which widened the offer and the quality of the organic cotton textiles and clothing for sale. Supply of organic cotton fiber was in excess though, while overall demand stagnated. Several large United States-based companies involved in organic cotton usage at the time, such as Levi’s and the Gap, withdrew from organic cotton use (Ton, 2007). Overall, global demand for organic cotton remained more or less stable up until 2000. Most demand came from Europe, particularly from Germany thanks to mail order companies such as OTTO and Hess Natur, and to a large number of small and medium-sized companies processing and selling ‘natural textiles’ including organic cotton items (Ton, 2007). From 2000 onwards many retails took interest in organic cotton and developed their own range of garments made from organic cotton in various blend ratios with conventional cotton.

- US apparel retailer Banana Republic (BR) in summer 2008 launched its “Look for the Green Elephant” program, offering a range of organic cotton apparel. The company used a green elephant icon on all products and packaging made with sustainable fibres.
- In 2008, C&A launched its “We Care”, global sustainability program, focusing on greenhouse gas reductions, green building design, waste reduction, and use of organic

- In 2007 JC Penney rolled out its program “Simply Green”, requiring that all products in the program hold fast to three basic principles of environmental responsibility. Materials in each product must be organic, renewable, or recycled. They have launched Organic Cotton based items include a wide variety of bedding items including, sheets, blankets, and towels*.

- In January 2007, Marks & Spencer (M&S) announced “Plan A – Because there is no Plan B.” The program includes measures regarding progress on key elements in organic, Fairtrade, and sustainable products**. According to recent report M & S have set five year deadline to become the world’s most sustainable retailer where it announces 80 major new commitments under its Plan A environmental initiative. They have planned to convert all its 36,000 product lines into Plan A products that have at least one sustainable quality such as carrying the Fairtrade logo or being produced from sustainable material. They have aim to convert 50% by 2015 and 100% by 2020. In 2009/10 alone, M & S Plan A cut CO₂ emissions by 40,000 tonnes, recycled 2 million used garments and used 1,500 tonnes of recycled polyester which is the equivalent of 37 million plastic bottles (Ecotextilenews, 2010).

- In spring 2007 Timberland announced it’s “Green Index™ Rating” – a measure of the environmental impact of its products in terms of climate impact, chemicals used, and resource consumption. Timberland has converted over 5% of its overall cotton purchase and 100% of its promotional T-shirts to organic cotton and has committed to increase its organic consumption to a minimum of 10% by 2010, the equivalent of more than one million pounds of organic cotton. The company’s ultimate goal is convert all of its cotton to certified organic ***.

---


** http://plana.marksandspencer.com/about

***http://www.timberland.com/corp/index.jsp?page=csr_green_index,
- Woolworths South Africa’s “Good Business Journey” in 2007 introduced a five-year plan to address sustainable growth, including organic cotton as a key component in the overall strategy. The company has announced that they have the first clothing ever made from local, South African grown organic cotton in stores for summer 2009 (Woolworths Holdings Limited, 2009).

- According to Ecotextilenews (2008, p.9) November, US retail giant Wal-Mart has instructed its global supply to cease sourcing cotton and cotton material from Uzbekistan in an effort to persuade the Uzbek government to end the use of forced child labour in cotton harvesting. Similarly, UK retailer Tesco which also urged its supplier to stop using cotton from the former Soviet Republic.

In 2008, the ten brands and retailers with the largest organic cotton programs were: Wal-Mart (USA), C&A (BE), Nike (USA), H&M (SE), Zara (ES), Anvil Knitwear (USA), Coop Switzerland (CH), Pottery Barn (USA), Green source (USA), and Hess Natur (DE); eventually all these retails consumed 67% of organic cotton of total cultivation i.e. around 97729.55 MT (Organic Exchange, 2008). Refer the Table 2.7 for top brands and retailers with Largest Organic Cotton Programs by fiber volume.

<table>
<thead>
<tr>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>6. Anvil Knitwear</td>
<td>6. Anvil Knitwear</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7. Coop Switzerland</td>
<td>7. Coop Switzerland</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8. Pottery Barn</td>
<td>8. Greensource</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11. Adidas</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12. Nordstrom</td>
</tr>
</tbody>
</table>

**Table 2.7: Brands and Retailers with Largest Organic Cotton Programs by Fiber Volume**

*Source: Organic Exchange, Organic cotton market report (2009).*
In 2009, 2008 ten brands and retailers are in the list with significant change in there ranking, however few brands like Zara, Potter Barn, and Hess natur are not in the top ten lists. There are few brands have shown drastic change in their sales and achieved the place in top twelve, e.g. Williams-Sonoma, Inc, Target, Adidas etc.

2.13.1.7 Organic Cotton retails sales

Rapid expansion of the global organic cotton market was driven in large measure is only because of consumer interest in green products, significant expansions of existing organic cotton programs by brands and retailers, launching of organic cotton programs by new entrants to the market, and positive response by farmers to these demand signals. Growing public sector interest in organic farming along with significant trade show and media coverage of organic and sustainable textiles also helped to prompt growth in the wholesale and retail segments of the market. Brands are continued to significantly expand their organic programs in 2008 and 2009. In 2007, global retail sales of organic cotton products reached an estimated $1.9 billion, representing and 83% increase over global sales in 2006. 2008 retail sales are estimated at $3.2 billion, reflecting an annual average growth rate of 63%. According to OE’s research, global retail sales of organic cotton apparel and home textile products reached an estimated $4.3 billion, representing a 35% increase from the estimated $3.2 billion market in 2008. This growth figure indicates little change from the 40% average annual growth rate from 2001 to 2009. It also shows considerable growth when the overall global apparel and household textiles market decreased almost 7 % from 2008.

Since 2004/05, the profile of organic cotton buyers has changed. There are more conventional traders involved in the sector and the committed social enterprises and small numbers of larger brands have been joined by mainstream and niche brands and retailers. In some instances, the newcomers see organic cotton as a market opportunity, rather than a way to help improve the sustainability of cotton and textiles. On the positive side, the expanded market is supporting the expansion and growth of organic cotton production and creating greater consumer awareness. However, there is still a need to create greater awareness and build a stronger infrastructure to create stable and sustainable growth that will allow the sector to address long-term sustainability issues (Organic Exchange, 2009).
To see the yearly growth in global sales of organic cotton refer Fig.2.13.

Fig 2.13: Global Retail Sales of Organic Cotton Products


The problems caused by over-supply and low price offers are clear in the sudden drop in production growth. Growth in the three seasons up to 2007/08 was 48%, 53%, and then an astonishing 152% (with the arrival of speculative production), before dropping back in 2008/09 to 20%. Next season may see even lower or stagnant growth. Some producer groups may shift to other crops if prices do not rise soon, at least back to a financially ‘sustainable’ level (Organic Exchange, 2009).

2.13.1.8 Organic Farming, Cotton and Sustainability

Organic agriculture in a global context is still a developing sector. According to the World Bank report, in 2005 the organically grown farmed area reached 32 million hectares, providing total retail sales of $23.9 billion US in the European Union, Canada, United States and Asia in 2006. A more recent report from Organic agriculture was present in several developing and emerging economies, including China and the Latin American countries with intermediate income (World Bank, 2008; p.132).

Alternative production strategies for diverse crops, including cotton, are not only related to organic production or social approaches such as Fairtrade. In the case of cotton, other initiatives have been proposed for sustainable development under conventional agriculture.
frameworks such as BCI (Better Cotton Initiative), which has pilots under way in a number of places including Brazil, India, and West Africa.

The sustainability debate continues around cotton. Today, there are distinct certification schemes for sustainable cotton as well as various production methods, including organic, Fairtrade, BCI and various systems such as: Integrated Crop Management (ICM), Integrated Pest Management (IPM) and Integrated Nutrient Management (INM) systems. To further confuse the issue to outside observers, sustainability claims are also made for biotech cotton. Producers may also use more than one system of certification (Organic Exchange, 2009).

Certainly the falling figures for pesticides use in cotton (down to some 8-10 % of global pesticides use from previous highs of 22-25%) point to a major change in recent years, which is not only explained by the fact that the rising costs of inputs (such as pesticides) led to farmers reducing their use, but also to increased awareness and intervention to reduce the use of synthetic pesticides. Organic cotton must not only maintain its profile as a leading sustainability option, but also prove it deserves its place at the table by demonstrating its positive socio-economic and environmental impacts (Organic Exchange, 2009).

2.13.1.9 Organic Cotton Price and Premium

The prices and related costs of growing organic cotton remain a topic of conversation across the entire supply chain. The price for conventional cotton does not cover the current cost of production which has led to subsidies in many countries and contributed to poverty in other cotton growing regions. It is important to examine the question of premium paid at various stages in the organic production and processing chain. The premium is not a part of cost price but it’s an amount paid to the farmer, processor or manufacturer as an incentive to convert to organic. Farmers are not usually willing to grow organic cotton (or any other crop) if there is not a clear positive price differential as a reward. A premium may be paid to motivate farmers to experiment, to balance a perceived risk or to make up the difference other crops in the rotation, although grown organically, may have to sell at conventional prices. The relationship between cost price, yield and the premium paid to the farmers is not always clear and be arbitrary. However, according to Elzakkar (1999), farmers are aware of the environmental improvements that organic production brings, but their main motivation is improved income in
the short-term rather than concern about their environment in the longer term (Elzakkar, 1999; p.93).

From the beginning of the growth and development of the organic cotton market, the goal has been for organic production system to be “sustainable”, with farmers receiving a fair price for their crops. The cost of organic cotton is intertwined with environmental, social, and economic components. As noted in the Fig. 2.14, sustainability requires the reconciliation of these three pillars and those are Social, Environmental and Economic.

According to Organic Exchange 2009 report, the variability of price is an issue that is becoming more problematic in the organic cotton market. Variability of price can be seen either as a threat, or as a challenge; one that must be met by developing pricing mechanisms that guide value chain and helps to identify the sustainable ‘floor’ price.

![Fig 2.14: Pillars of sustainability](image)


### 2.14 Fairtrade

Fairtrade is about better prices, decent working conditions, local sustainability, and fair terms of trade for farmers and workers in the developing world. By requiring companies to pay sustainable prices (which must never fall lower than the market price), Fairtrade addresses the injustices of conventional trade, which traditionally discriminates against the poorest, weakest producers. It enables them to improve their position and have more control over their lives.
(Fairtrade, 2009). Fairtrade cotton is cotton which has met the international Fairtrade standard for production of seed cotton and is therefore eligible to carry the FAIRTRADE Mark. The Mark is an independent product certification label which guarantees that cotton farmers are getting a better deal - receiving a fair and stable Fairtrade price and Fairtrade premium, receiving pre-financing where requested and benefiting from longer-term, more direct trading relationships.

According to Krier (2005 cited in ITC, 2007) the widely accepted definition of Fair Trade is -

Fair trade is a trading partnership, based on dialogue, transparency and respect that seek greater equity in international trade. It contributes to sustainable development by offering better trading conditions to, and securing the rights of, marginalized producers and workers especially in the South. Fair trade organizations (backed by consumers) are actively engaged in supporting producers, in awareness raising and in campaigning for changes in the rules and practices of conventional international trade.'

In narrow sense fair trade is defined in terms of its best-known component: fair prices for the products of producers in developing countries. In this context, a ‘fair price’ means a price that is higher than would be the case in a free-market situation, and one that enables local producers to develop a sustainable business and produce in environmentally and socially better conditions. In essence, fair trade means buying products from producers in developing countries on terms that are more favourable than free-market terms, and marketing them in developed countries at an ‘ethical price premium’ (Bird and Hughes, 1997 cited in Pelsmacker et al., 2006). This higher price to the consumer is warranted by the higher price that producers receive for their products and by the fair-trade control mechanisms in the trade channel. Some Fairtrade products are aimed at premium markets and will inevitably be more highly priced than others. But many Fairtrade products are competitively priced and don’t necessarily cost more than their conventional equivalents. There appears to be little correlation between price and ethics in the cotton and textile industry. Cotton products on sale in the UK for example already vary considerably in price depending on a range of factors including where you buy them, their quality, branding, designer labels as well as economies of scale. A typical T-shirt made from Fairtrade certified cotton may not be the cheapest on the market, but it does mean that shoppers can be confident that the cotton farmers have received a price that provides a
decent income and a little extra to invest in a better future for their families and communities (Fairtrade, n.d).

Fair trade’s strategic intent is ‘to deliberately work with marginalized producers and workers in order to help them move from a position of vulnerability to security and economic self-sufficiency to empower producers and workers as stakeholders in their own organizations, and to actively play a wider role in the global area to achieve greater equity in international trade’ (Krier, 2005 cited in ITC, 2007). Textiles and clothing made of fair trade cotton have been for sale in several European countries since 2005. This ‘fair trade’ cotton is produced by farmers whose producer organizations have been certified according to the standards of Fairtrade Labelling Organizations International (FLO), one of the four umbrella organizations referred to above. FLO is the leading ‘fair trade’ standard setting and certification body (ITC, 2007).

Fairtrade standards encourage producers to become certified organic where possible; it is not a prerequisite for Fairtrade certification. Where farmers are not certified organic, Fairtrade encourage them to implement a system of integrated crop management which enables them to establish a balance between environmental protection and business results through the permanent monitoring of economic and environmental indicators. All Fairtrade certified cotton producers are required to demonstrate increased diligence in choosing appropriate non-harmful chemicals or a biological or home-made alternative wherever possible. As would be expected, farmers are prohibited from using pesticides in the Pesticide Action Network’s “dirty dozen” list and those in the FAO/UNEP's Prior Informed Consent Procedure list. The Fairtrade environmental standard explicitly prohibits the use of GMOs in either the production or processing of their cotton (Fairtrade, n.d).

2.14.1 Key objectives of Fairtrade certification

The key objectives of these standards are:

- ensure that producers receive prices that cover their average costs of sustainable production;
- provide an additional Fairtrade Premium which can be invested in projects that enhance social, economic and environmental development;
- enable pre-financing for producers who require it;
• facilitate long-term trading partnerships and enable greater producer control over the trading process;
• Set clear minimum and progressive criteria to ensure that the conditions of production and trade of all Fairtrade certified products are socially, economically fair and environmentally responsible (FLO, 2009).

The Fairtrade system provides the following benefits to small-scale farmers and workers, consumers and the environment.

1) Small-scale farmers and workers: Approximately 1.5 million workers and farmers in 58 developing countries in Africa, Asia and Latin America benefit from Fairtrade.

2) Consumers: The Fairtrade system benefits consumers by having the opportunity to buy in line with their principles, Being empowered them to play their part in addressing global trade inequities, Getting in exchange high quality products.

3) Environment: Fairtrade rewards and encourages farming and production practices that are environmentally sustainable, such as integrated farm management systems which minimize pollutants, pesticides and herbicides, Organic agriculture techniques, banning the use of most dangerous pesticides (FLO, 2009).

There are now 746 Fairtrade certified producer organizations in 58 producing countries, representing over 1 million farmers and workers. With their families and dependents, FLO estimates that 5 million people directly benefit from Fairtrade. In November 2005 the first Fairtrade certified cotton is launched at a press launch themed ‘Cotton on to Fairtrade’ held at the Royal Horticultural Halls, London (FLO, 2009).

Finally, it’s important to note that FLO does not require fair trade cotton to be produced organically. However, the produce may well be certified organic. Market actors are increasingly looking for ‘organic fair trade’ cotton when developing policies of corporate social responsibility (CSR). Consumers of textiles and clothing do not want products to be just organic or fair trade; they want them to be both (ITC, 2007).
2.14.2 Sales of Fairtrade certified cotton

The sales of Fairtrade certified products have been growing on an average of almost 40% per year in the last five years. In 2006, Fairtrade certified cotton sales amounted to approximately 4.5 million pounds. In 2007 the sales shows around 8 fold (34.8 million pounds) and in 2008 its two fold (77.9 million pounds) increase in sales. However, in 2009 the sales has decreased upto 50.1 million pounds from last year.

Most case studies highlight the positive impact of Fair Trade on producer prices, incomes, and well-being. Some benefits of Fair Trade include building capacity (support services, improved market information and awareness), empowering local actors, mitigating gender imbalances, and providing clear environmental benefits. There are concerns, however, about the sustainability of Fair Trade. Producers in some developing countries face problems of rationing, because Fair Trade prices are set above market clearing levels and potential supply is exceeding demand. There are also concerns about long-term effects on investment and productivity and the efficiency of Fair Trade channels. But few evaluations have been carried out (World Bank, 2008; p.133).

2.15 Textile Dyes and chemicals and REACH

Dyes and chemical industry and use of it during textile production are both responsible for the pollution. Currently world demand for dyes and organic pigments is forecast to increase 3.9% per year to $16.2 billion in 2013, in line with real gains in manufacturing activity. In volume terms, demand will grow 3.5 % annually to 2.3 million metric tons (Freedonia Group Inc, 2009). Along with dyes and chemicals industry even have equal importance. Today, textile chemical industry is worth of $16.6 billion and in future global demand for textile chemicals will reach $19 billion in 2012 (Freedonia Group Inc, 2008).

As the world slowly awakens to the damaging effects of some of the chemicals that were synthesized by humans, ecology and pollution have become one the main focus issues. Every developed country wants a safe environment and all aspects of life and lifestyle are being looked at. The textile industry, which used up to 600 chemicals in production, from raw material to disposal is generally regarded among the most polluting. Since the late 1980’s and more rapidly in the 1990’s, requirements related to environmental protection, consumer health
and safety have brought in more laws and regulations than ever before. All the recent regulations in Europe have forced the processor to seriously look at the production process, the chemicals being used; dye manufacturers to look at the dyes that are being made and auxiliary manufacturers contemplate a change in the chemicals being produced (Nimkar, 2004).

To overcome the impact of dyes and chemicals EU have come with new regulation called REACH (EC 1907/2006) deals with the Registration, Evaluation, Authorisation and Restriction of Chemical substances and this new law enforced from 1st June 2007. One of the main reasons for developing and adopting the REACH Regulation was that a large number of substances have been manufactured and placed on the market in Europe for many years, sometimes in very high amounts, and yet there is insufficient information on the hazards that they pose to human health and the environment. There is a need to fill these information gaps to ensure that industry is able to assess hazards and risks of the substances, and to identify and implement the risk management measures to protect humans and the environment (European Commission, 2010).

The aim of REACH is to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances. At the same time, innovative capability and competitiveness of the EU chemicals industry should be enhanced. The benefits of the REACH system will come gradually, as more and more substances are phased into REACH (European Commission, 2010). REACH abandons the previous distinction between “existing chemicals” (i.e. products that were placed on the market before 1981) and new substances (introduced after 1981). New substances already have to be tested and evaluated for a range of risks to human health and the environment before they can be marketed. Unlike the roughly 4,000 ‘new’ substances, whose potential risks are known, very little is known about the approximately 100,000 substances defined as “existing chemicals”. REACH will alter that (DyStar, n.d).

The REACH Regulation gives greater responsibility to industry to manage the risks from chemicals and to provide safety information on the substances. Manufacturers and importers will be required to gather information on the properties of their chemical substances, which will allow their safe handling, and to register the information in a central database run by the European Chemicals Agency (ECHA) in Helsinki. The Agency will act as the central point in
the REACH system: it will manage the databases necessary to operate the system, co-ordinate the in-depth evaluation of suspicious chemicals and run a public database in which consumers and professionals can find hazard information (European Commission, 2010).

The Regulation applies not only to chemical substances as such but also to mixtures (preparations) and to substances in final consumer articles such as clothing e.g.

- Restrictions on the manufacture, placing on the market and use of dangerous substances, preparations and articles (Annex, XVII).
- Articles and packaging materials containing over 0.1% (by weight) SVHC substances (Substances of Very High Concern)
- Articles (products) containing substances which are intentionally released during their normal life-time use e.g. perfumery finishes on textiles (European Commission, 2010).

Hence REACH provisions are also applicable to consumer articles and so far, the ECHA has released a list of 15 chemicals classified (Table 2.8) as SVHCs (substances of very high concern), reproduced which triggers obligations for manufacturers and retailers under REACH. This list of SVHCs will continue to increase by inclusion of more chemicals (European Commission, 2010).

The Regulation also calls for the progressive substitution of the most dangerous chemicals when suitable alternatives have been identified. It has been known and accepted since the drafting of REACH that the need to fill the data gaps would result in an increased use of laboratory animals for the next 10 years. At the same time, in order to minimise the number of animal tests, the REACH Regulation provides a number of possibilities to adapt the testing requirements and use existing data and alternative assessment approaches instead (European Commission, 2010). However, the cost get register with REACH is one of the major challenges facing the sector in the coming years. According to DyStar (n.d) the chemical industry will have to spend an estimated EUR 2 billion on additional test and the production of over 80,000 registration dossiers.
<table>
<thead>
<tr>
<th>Substance name</th>
<th>CAS number</th>
<th>Possible uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthracene</td>
<td>120-12-7</td>
<td>Found in creosote and is a source of dyestuff</td>
</tr>
<tr>
<td>4,4’- Diaminodiphenylmethane</td>
<td>101-77-9</td>
<td>Used to produce polyurethane, as a curing agent in epoxy resin and may be found in some Azo dyes</td>
</tr>
<tr>
<td>Dibutyl phthalate (DBP)</td>
<td>84-74-2</td>
<td>Plasticizer for PVC, also used in adhesives, printing inks, cosmetics, paints and film/paper coatings</td>
</tr>
<tr>
<td>Cobalt dichloride</td>
<td>7546-79-9</td>
<td>Moisture indicator in silica gel</td>
</tr>
<tr>
<td>Diarsenic pentaoxide</td>
<td>1303-28-2</td>
<td>Used in some wood preservatives, agrochemicals, dyes and glass</td>
</tr>
<tr>
<td>Diarsenic trioxide</td>
<td>1327-53-3</td>
<td>Weed killer and wood preservative</td>
</tr>
<tr>
<td>Sodium dichromate, dihydrate</td>
<td>7789-12-0</td>
<td>Used as a mordant for acid dyes, leather tanning, preparation of ceramic glazes, and as corrosion inhibitors in paint</td>
</tr>
<tr>
<td>5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene)</td>
<td>81-15-2</td>
<td>Fragrance used in household and beauty products</td>
</tr>
<tr>
<td>Bis (2-ethyl(hexyl)phthalate) (DEHP)</td>
<td>117-81-7</td>
<td>Plasticizer for PVC and printing films</td>
</tr>
<tr>
<td>Hexabromocyclododecane (HBCDD)</td>
<td>25637-99-4</td>
<td>Used as a flame retardant for expanded polystyrene (EPS) and high impact polystyrene (HIPS), and also in textiles (particularly upholstery)</td>
</tr>
<tr>
<td>3194-55-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alkanes, C10-13, Chloro (Short Chain Chlorinated Paraffins)</td>
<td>85535-84-8</td>
<td>Used as a flame retardant and plasticizer in some rubbers, plastics (particularly PVC), textiles and adhesives/sealants.</td>
</tr>
<tr>
<td>Bis tributyltin oxide</td>
<td>56-35-9</td>
<td>Used as an algaecide in marine paints</td>
</tr>
<tr>
<td>Lead hydrogen arsenate</td>
<td>7784-40-9</td>
<td>Used in pesticides and insecticides</td>
</tr>
<tr>
<td>Triethyl arsenate</td>
<td>15606-95-8</td>
<td>Used as an intermediate in semi-conductor manufacturing</td>
</tr>
<tr>
<td>Benzyl butyl phthalate (BBP)</td>
<td>85-68-7</td>
<td>Plasticizer for PVC and printing films.</td>
</tr>
<tr>
<td>Triethyl arsenate</td>
<td>15606-95-8</td>
<td>Used as an intermediate in semi-conductor manufacturing</td>
</tr>
<tr>
<td>Benzyl butyl phthalate (BBP)</td>
<td>85-68-7</td>
<td>Plasticizer for PVC and printing films.</td>
</tr>
</tbody>
</table>

Table 2.8: Substances of very high concern


2.16 Ecological Testing of Textiles and Restricted Substance List (RSL):

Many substances are restricted for use in industry and consumer products including textiles and garments. Their use is limited for a number of reasons including consumer safety, worker safety and environmental issues (water toxicity or bioaccumulation for example). Certain chemicals are now restricted by legislation and so must not be present in consumer products. Others are restricted by brands and eco labels (DyStar, 2010).

An awareness of restricted substances is critical for all involved in the textile supply chain. Although the textile industry is becoming more aware of the substances that are restricted, it is of interest to consider the background to their listing and some of the reasons behind their restriction. The testing for restricted substances in textiles is a highly specialized area; it is equivalent to seeking the proverbial ‘needle in the haystacks’. However in the case of
restricted substances in textiles, not only are they sought after needles different, each of the 
haystacks are also different. Thus it tends to imply that each specific problem of testing 
brought to the analytical laboratory, a specific procedure must be developed or employed 
(DyStar, 2010).

According to Texanlab Laboratories Pvt. Ltd and DyStar Ecology Solutions RSL (Restricted 
Substance List) is probably one of the most complex fields of analytical chemistry because of 
the need for isolation and determination of substances at the milligram, microgram and 
sometimes pictogram levels. RSL testing essentially consists of the following steps:

1) Sampling – how a representative sample is obtained from the test specimen.

2) Extraction of digestion, Concentration, Cleanup, Derivatization if required.

3) Determination by Chromatography (for organic) or Atomic absorption or emission 
(for metals) or Spectrophotometry (both for metals and certain organic substances) 
methods.

4) Evaluation of obtained data.

The number of substances that can be restricted is vast and not all of the compounds listed are 
appropriate for textile products. The most common substances that may be considered when 
carrying out restricted substance testing are:

- Formaldehyde
- Chlorinated phenols (PCP, TeCP) and Orthophenylphenol (OPP)
- Banned Amines from Azo dyes
- Allergenic Disperse Dyes
- Carcinogenic Dyes
- Heavy Metals
- Organotin compounds
- Alkylphenol Ethoxylates (APEOs)
- Chlorinated Organic carriers
- Phthalates
- Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS)
- Pesticide residue
- Flame retardants
- Short chain chlorinated paraffin’s (SCCP)
- Polychlorinated biphenyl (PCBs)
- Polyaromatic hydrocarbons
- pH of the aqueous extract

Apart from the above mentioned list, different standards might be have few additional or different list, e.g. in above list AOX (Adsorbable Organic Halogens) are missing which is included in GOTS at input (raw materials) as well at residual parameter. That means, the RSL may change accordance with standards, requirements.

### 2.17 Conclusion

It is important to drive the textile development process towards sustainability and define a clear agenda for sustainable textile production, which can eliminate environmental hazards, improve process efficiency and reduce environmental pollution. With increasing consumption of clothing all over the world textile-clothing industry have come under intense scrutiny with regard to their impact on the environment. Problems such as global warming, due to increasing atmospheric Carbon Dioxide levels from the burning of fossil fuels, natural resource depletion, toxic waste disposal, and increasing air, water and soil pollution from both agriculture and textile-clothing industry are becoming issues of global importance requiring concerted international action to solve them. However lack of awareness about the environmental impact of textile and clothing industry is a major roadblock on the path to improved sustainability. With increased awareness and the right education of all actors in the supply chain, it’s possible to establish a more ethical, environmental and socially responsible industry.

Organic cotton continues to show strong growth despite the global economic slowdown, and is increasingly being seen as a part of a wider sustainable textiles strategy by major retailers. This raises a central question as to whether organic cotton is part of a textiles sustainability agenda or part of a renewed interest in natural fibres (especially cotton), or both. Organic
cotton can serve as an example and a test bed for sustainability approaches that can be adopted or adapted by the rest of the cotton sector

The STP industry is at a point where it has to choose how to re-commit to the values that drove it in the first place, and to making a strong place for itself in a dynamic and challenging market. STP approach covers the minimum use of resources (water and energy), minimum chemical consumption, minimum pollution load, toxic chemicals eliminated from supply chain, and harmful chemical residues eliminated from final textile. To overcome the unsustainable practice cultivation, production and consumption of sustainable fibres like organic cotton needs to increase. From last few years big brands have started using organic cotton in their products and its percentage is increasing year by year.

Global Trade is a reality. And so is the era of restricted chemicals. The days of using new chemicals without a full idea about the possible harmful effects on use are now over. The issue of sustainability and relevance of environment protection will be taken up ever more strongly and the textile industry cannot wish it away. The implications of such restrictions have to be understood by all, across the supply chain. Products will need to be manufactured in compliance with the requirements. Whilst a fragmented supply chain is often felt as a hindrance, it nevertheless needs to be aware of the requirements and individual steps to be taken so as to ensure a clean final product. It can be confirmed and cross checked by texting ecological parameter. The role of ecological textile testing is very crucial and important since whether product is sustainable or not can only verified by testing. Finally, requirements are not static. They change. In the areas of restricted chemicals, changes are expected to be rapid and at times disturbing. But these challenges will have to be faced and overcome by the industry if sustainability is ultimate goal.
CHAPTER 3: ECO-LABELLING

3.1. Introduction

This chapter reviews the literature concerning textile eco-labelling. Section 3.2, 3.3 reviews the eco-labelling history, the development, various eco-labelling definitions. Section 3.4 discuss about various types of eco-labels and how they are classified. Further, section 3.5 and 3.6 explains the features of eco-labels and how to obtain those labels through certification. Section 3.8 explains the benefits, weaknesses. Section 3.10 raises the issues, and significance of eco-labelling whole textile supply chain. It also discusses the important eco-standards like GOTS (Global Organic Textile Standards), Oeko-Tex, EU flower and how they differ from each other. Section 3.10 gives the overview of certification process along with its cost and benefits. Section 3.12 and 3.13 discusses the issues and significance of eco-labelling on textile consumers including consumers’ willingness to pay for eco-labeled STP. Section 3.14 briefs the eco-labelling market impact where section 3.15 explains how marketing of STP can be done. Finally Conclusions are drawn from the literature review about issues and significance of ecolabelling on textile, retailers and consumers and formulated into research questions about ‘how’ and ‘why’ ecolabeled STP can be used.

3.2 Background

Environmental concern is not new. Since the late 1960s and once the increasing and dangerous pressure of the production systems on the environment were recognized, several attempts have been made to move towards more sustainable and environmentally friendly approaches. They have ranged from green taxes and the definition of property rights to strict bans and other regulatory measures. Recently one of the approaches that have acquired increasing importance is that of ‘environmental labelling’ or ‘eco-labelling’ (Gallastegui, 2002). Eco-labelling seeks to inform consumers about the effects on the environment of the production, consumption and waste phases of the products/services consumed. Consequently, it seeks to fulfil two objectives: (i) to provide consumers with more information about the environmental effects of their consumption, generating a change towards more environmentally friendly consumption patterns, and (ii) to encourage producers, governments and other agents to increase the environmental standards of products/services (Gallastegui, 2002, Naumann, 2001).
There are basic two kinds of eco-labels; Voluntary and Mandatory. Mostly voluntary labels used for the promotion of the products on the basis of their environmentally friendly characteristics. Currently in textiles and clothing there are no eco-labels enforced by mandatory rules. Eco-labels are normally issued either by government supported or private enterprises once it has been proved that the product of the applicant has met the criteria. The criteria for the use of eco-labels are mostly based on the “cradle-to-grave” approach, i.e. the life-cycle analysis of the product. The cradle-to-grave approach for textiles and clothing is making the assessment of the impact on the environment of the product during its life-cycle processing of raw materials, production, distribution, consumption (maintenance, i.e. washing, ironing, dry-cleaning) and finally disposal of the product. Recently a new approach towards sustainability has enforced under the name Cradle to Cradle. This certification programme assesses the sustainability of product ingredients for human and environmental health, as well as their recyclability or compostability. The Cradle to Cradle Approved Ingredient certification makes it easier at the design stage to create ecologically-intelligent products by choosing materials that meet key sustainability criteria for material health and material reutilisation. Admittedly there are big differences between various eco-labelling schemes, some of which are based on detailed analysis of the environmental impacts as again some other systems may analyse only certain stages of the life-cycle.

### 3.3 History of Ecolabelling

The concept of eco-labelling came into existence to create a market based incentive for environment-friendly products and services and this concept was introduced in Germany for the first time in the late 1970s in the name of the Blue Angel Programme. The concept of Ecolabelling schemes became popular gradually in Germany and it took off completely in the 1990s when the industrialized countries around the world started developing these schemes for a wide range of products and services (RSC, 1998).

The products so labeled meet the criteria established within the relevant system as having been manufactured by processes and procedures with low or minimal environmental impact. Examples of such labels include “Blue Angel” (first ecolabel, Germany, 1977), “Green Seal” (US, 1989), “Nordic Swan” (Sweden, 1989), “Eco-mark” (Japan, 1989) (RSC, 1998).
In 1992, an EU Regulated Eco-label was announced under Council Regulation (EEC) No. 880/2 of 23 February 1992 on a Community Award Scheme. The Regulation established a voluntary eco-label scheme intended to promote the design, production, marketing and use of products which have a reduced environmental impact during their entire life cycle & provide consumers with better information on the environmental impact of products. The Fig. 3.1 shows the growth and development of ecolabels in European market from year 1970 to 2010.

![Fig. 3.1 Ecolabelling Development](Image)


### 3.4 Definitions of Eco-labelling

According UNOPS (2009), Piotrowski and Kratz (2005) there is a difference between “Environmental labels” and “Ecolabels”. The term Environmental labelling is rather broad and imprecise, where as the term eco-labels refer to special group of environmental labels. There are many labels and declarations of environmental performance and should be referred to as “environmental labels”; ecolabels are a sub-group and they respond to special criteria of comprehensiveness, self-determination and reliability. In brief, term ‘eco-label’ has been used
for a range of labels which are used to convey environmental information about a product to the consumer. On the other hand, environmental labels focus on consumption rather than the production of a given product; e.g. Recyclable material; eco-labels are used to communicate that the environmental impacts are reduced over the entire life cycle of a product without specifying the production practices.

Global Ecolabelling Network (GEN) (2004) defines, -

“An ecolabel is a label which identifies overall environmental preference of a product (i.e. good or service) within a product category based on life cycle considerations”.

There are several other definitions of the word “eco-label”, and all of them highlight aspects and characteristics that are considered important to mark the difference between a simple logo or product declaration and a proper ecolabel.

Egyptian Environmental Affairs Agency (1999) says,

“An eco-label provides brief information on environment related product qualities. It enables consumers to identify that product that are environmentally safe; that has been manufactured using eco-friendly materials and do not contain chemicals that are harmful to the user. Since, eco-friendliness, is an additional product quality which can be used for marketing and advertising purposes”.

Organization for Economic Cooperation and Development (OECD) identifies:

“an ecolabel is the voluntary granting of labels by a private or public body in order to inform consumers and thereby promote consumer products which are determined to be environmentally friendly than other functionally and competitively similar products”.

As has been identified by the International Organization for Standardization (ISO), the overall goal of these labels and declarations is:

"...through communication of verifiable and accurate information, that is not misleading, on environmental aspects of products and services, to encourage the demand for and supply of those products and services that cause less stress on the environment, thereby stimulating the potential for market-driven continuous environmental improvement".
In brief an ecolabel –

- Identifies the overall environmental preferences of a product;
- Provides information on environment related product qualities;
- Are tool for consumers to identify whether product is environmentally safe;
- Enables manufacturers to use ecofriendly raw material and ingredients;
- Is an additional product quality which can be used as a marketing tool;
- Can be issued by private or public body;
- Causes less stress on the environment
- Enables to earn premium on products.

3.5 Types of eco-label

According to EPA (1998), Eco-labels are the part of Environmental Labels (EL) and EL’s are classified as follows (Fig 4.2).

Based on classification one of the most important is whether or not the program relies on first-party or third-party verification. The third-party verification is performed by marketers on their own behalf to promote the positive environmental attributes of their products. Third-party verification is carried out by an independent source that awards labels to products based on certain environmental criteria or standards. EL programs can also be characterized as positive, negative, or neutral.

- **Positive labelling** programs typically certify that labeled products possess one or more environmentally preferable attributes.
- **Negative labelling** warns consumers about the harmful or hazardous ingredients contained in the labeled products.
- **Neutral labelling** programs simply summarize environmental information about products that can be interpreted by consumers as part of their purchasing decisions.

Third-party environmental labelling programs can be further classified as either mandatory or voluntary. Mandatory programs include hazard or warning labels, and information disclosure labels. Whereas voluntary labels are typically positive or neutral, and are further classified as report cards, seal-of-approval, or single-attribute certification programs (EPA, 1998; p. 9).
The following list includes some of the government sponsored and some private labelling schemes (Hyvarinen, 1999):

- Government sponsored schemes: Blue Angel (D), Eco Mark (JPN), Environmental Choice (CND), White Swan (Nordic Countries), EU, Eco-Mark (India), Green Label (Singapore)
- Private labelling schemes: Eco-tex, Oeko-Tex (textiles and clothing) (D). Green Seal (US), Bra Miljöval (Sweden), Britta Steinmann Collection (D) etc.

![Fig. 3.2: Classification of Environmental Labels](image)

Source: EPA, (1998); p. XV.

Likely environmental labels, ecolabels are even classified as mandatory and voluntary labels. One example of mandatory label is the EU energy label, assessing the energy consumption for household appliances on the scale from A to F, where A means least energy consumption and F most energy consumption. Voluntary labels are classified according to International Standards Organisation (ISO) (Baumann, 2007). ISO is the world's largest non-governmental organization that develops and publishes International Standards. ISO is a network of the national standards institutes of 163 countries. ISO enables a consensus to be reached on
solutions that meet both the requirements of business and the broader needs of society (ISO, 2010). There are now eco-labelling schemes both in developed and developing countries.

The ISO has classified the existing environmental labels into three typologies – Type I, II and III and has specified the preferential principles and procedures for each one of them.

- **Type I - Ecolabels (ISO 14024:1999):** labels refer to the environmental quality of a product compared with the rest of the products and are meant to encourage a switch towards more environmentally friendly consumption habits. These labels are the products of third party certification programmes and they are usually government supported. Their aim is to certify both products and production processes according to different criteria that relate to the entire life cycle of the product. These labels are voluntary. Examples of such labels are the Blue Angel (Germany) and the EU eco-label (OECD, 1997).

- **Type II - Self-declaration claims (ISO 14021:1999):** The labels belonging to this group do not share some of the usual characteristics of environmental labels, the main difference being that they are not awarded by an independent authority. These labels are developed internally by companies, and they can take the form of a declaration, a logo, a commercial, etc. referring to one of the company products (UNOPS, 2009).

- **Type III - Environmental impact labels (ISO 14025:2006):** Type III labels consist in qualified product information based on life cycle impacts. Environmental parameters are fixed by a qualified third party, and then companies compile environmental information into the reporting format and these data are independently verified. The environmental impacts are expressed in a way that makes it very easy to compare different products and sets of parameters, for example for public procurement purposes (UNOPS, 2009).

The main differences amongst these types are shown in the table 3.1. These three types of environmental labels (and declarations) can be adapted to create a variety of different environmental labelling programs. Their design characteristics can vary to support different program objectives, such as: increasing environmental awareness; identifying dangerous ingredients; assessing the overall environmental impacts associated with a specific product; or judging the adequacy of a company’s environmental policy.
In this research the standards, eco-labels discussed are having following attributes characterize:

(i) They are based on a criterion set by third parties and are voluntary.

(ii) They seek to identify products with less environmental impact throughout their entire life cycle.

(iii) Both the selection of product categories and the determination of criteria are carried out by independent experts, which consider interest groups and technical inputs.

(iv) Both the criteria and the selection thresholds are publicly available.

(v) The products that meet the criteria may use the eco-label for a fixed period of time after paying the fee and application costs (UNCTAD, 1994a cited in Gallastegui, 2002).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Criteria</th>
<th>Certified eco-labels (Type I)</th>
<th>Self-Declaration (Type II)</th>
<th>EPD (Type III)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The company needs to perform and LCA</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Certified by third party</td>
<td>Required</td>
<td>No required, but enhance creditability</td>
<td>No required, but enhance creditability</td>
<td></td>
</tr>
<tr>
<td>The eco-labels communicates</td>
<td>Better environmental performance with same quality</td>
<td>Improvement of one environmental aspect</td>
<td>Plain LCA data compares with other EPD</td>
<td></td>
</tr>
<tr>
<td>Communication with final consumer</td>
<td>Good</td>
<td>Good</td>
<td>Poor</td>
<td></td>
</tr>
<tr>
<td>Business to business</td>
<td>Possibly useful</td>
<td>Possibly useful</td>
<td>Good</td>
<td></td>
</tr>
<tr>
<td>Green Procurement</td>
<td>Good</td>
<td>Possibly useful</td>
<td>Good</td>
<td></td>
</tr>
</tbody>
</table>

*Table 3.1: Difference between voluntary eco-label types*

*Source: Eco Smes, (2003).*
3.6 Essential features of trustworthy ecolabelling schemes

Trustworthy eco-labels provide consumers with valuable information on environmentally friendly products and thus promote green consumerism. However, not every consumer is familiar with the term ‘eco’ or ‘bio’ and is probably not worried about the personal ecological footprint. The consumers often don’t know which road a product has made before it gets in the trolley or why a product gets an eco-label. Each day, consumers have to make choices to fill their needs. An ecological choice is not obvious, since more and more environmental logos and images decorate the product or its packaging. But what makes an eco-label trustworthy?

- Participation in the ecolabelling scheme is voluntary. Ecolabels do not aim at replacing the existing legislation, but they provide recognition (and a competitive advantage) to products that achieve higher standards of environmental protection than the minimum level imposed by law. Therefore, participation in an ecolabelling scheme cannot be imposed upon suppliers. Procurers and requisitioners must be aware of this aspect, and never require bidders to register under an ecolabelling scheme without accepting equivalent means of proof (UNOPS, 2009).

- The label should clearly communicate that the awarded product has reached *distinction in environmental performance* in comparison to average products in the same category (UNOPS, 2009).

- A reliable ecolabelling scheme is based on *sound scientific evidence*. Ecolabels are aimed at simplifying the transmission of technical information about environmental performance to the broad public; still, the information upon whom the labels are based must respect stringent, measurable and state-of-the-art scientific data. It is good practice that criteria are regularly updated to reflect the latest technological developments (UNOPS, 2009).

- Ecolabels are *based on life cycle considerations*; this means that all aspects of the “life” of a product, from design, production, operation and maintenance up to disposal are taken into consideration. From the perspective of UN procurement practitioners, life cycle considerations fall within the principle of best value for money, one of the cornerstones of the UN common system procurement. Taking into account the whole life cycle of a product helps ensuring that the most advantageous offer is identified,
revealing costs of resources use that otherwise may not receive proper attention (UNOPS, 2009).

- The certifying scheme should be *third-party and independent* from the certified company. The credibility of the certification depends from this. The transparency of the certification process differentiates an ecolabel from an environmental logo or an internal company certification, whose accuracy has not been autonomously assessed (UNOPS, 2009).

- The *objectivity* of the ecolabelling scheme is usually guaranteed by a large participation of stakeholders in the definition of the environmental criteria. Representatives of industry, government, retailers, consumer and environmental associations are usually involved (UNOPS, 2009).

- *Consistent and clear* An eco-label used on one product should have the same meaning if used on other products. Standards should be written in a way that can be verified in a consistent manner so that the label is consistent in meaning among different products (Anon, n.d.).

- *Transparency* The organization behind an eco-label should make information about organizational structure, funding, board of directors, and certification standards available to the public. If such information is withheld, it is difficult to determine the meaning and clarity of the standards or the independence of the certifying organization (Anon, n.d.).

- *Independent and protected from conflict of interest* Organizations establishing standards and deciding who can use a logo should not have any ties to, and should not receive any funding from the sale of certified products or contributions from logo users beyond fees for certification. Employees of companies whose products are certified or applying for certification should not be on the board of directors of the certifier (and no one affiliated with the certifier should be on the board of directors of the organization being certified). Some certifying organizations have explicit conflict of interest policies prohibiting such affiliations (Anon, n.d.).

- *Opportunities for public comment* All certification standards should be developed with input from multiple stakeholders including consumers, industry, environmentalists and social representatives in a way that doesn't compromise the independence of the certifier. For example, industry representatives can play an important advisory role
without having direct financial, decision making or management ties to the certifier (Anon, n.d.).

3.7 Eco labelling process

According to Piotrowski and Kratz (2005), following processes are involved in eco-labelling.

The first step is designing an eco-label is selecting product category for example, textiles, garments etc. This is done by a labelling board which responds to suggestions from industry, environmentalist, consumers, and other interested parties.

The second step is assessing the environmental impact of products in this product category throughout their life-cycle. Life-cycle analysis examines the material and energy inputs that go into the manufacture and use of a product and the solid, liquid, and gaseous waste that are generated at each stage of products life like raw material, production, distribution, packing use and disposal.

The third step is the most critical one, setting the criteria and thresholds for the award of an eco-label. Here, the ecolabelling body must not only take into consideration, what is technically feasible, but also often weigh various environmental impacts in different media like air, water and soil against one another. Different eco-labels engage in the weighing process to different degrees, like Oeko-tex 100 look into the harmful residues present on the product, in contrast GOTS tends to look environmental as well as residual parameters.

The final step is reviewing and refining the product category and criteria. Here, interested parties including industry and environmental and consumer groups are asked for their inputs, although they are often already included much earlier on in the process.

Under the EU Eco-label scheme the ‘Product Life-Cycle’ was divided into the following stages (RSC, 1998):

- Pre-production
- Production
- Packaging/Distribution
- Utilisation
• Disposal.

For each of these stages, environmental effects were considered according to the following criteria’s, which are referred to as ‘environmental fields’:

• Waste relevance
• Noise
• Air contamination
• Water contamination
• Effects on eco-systems
• Consumption of energy
• Consumption of natural resources
• Soil pollution & degradation.

With the exception of noise, the assembly and computation of data for all these are heavily dependent on chemistry. Thus the waste generated, and the energy and raw materials consumed at each stage are calculated in terms of the mass of the product or the individual materials required producing them [in cm$^3$/kg, MJ/kg and kg/kg, respectively], where as the volumes of air or water which would be contaminated to the environmental standard level by the total mass of each pollutant emitted to that medium are calculated (RSC, 1998).

The gathered data then assessed to understand the effects of products on the environment. The final computation gives product’s effects on the environment with sets of data relating to each of the five life-cycles. By comparing the quantitative totals for each life-cycle stage it is possible to assess which cause the greatest environmental impacts. It is also possible to determine which ‘environmental fields’ are the most critical at each life-cycle stage (RSC, 1998).

Issues relating to eco-labelling have been dealt with by many prominent international trade and environmental organisations, including (but not limited to) the United Nations (UN), the World Trade Organisation (WTO) through its International Trade Centre (ITC) and Committee on Trade and Environment (CTE), the US Environmental Protection Agency (US EPA), as well as the Organisation for Economic Co-operation and Development (OECD) and the International Organisation for Standardisation (ISO) (Naumann, 2001).
Atilgan, (2007) have shown the fourteen step flow chart to obtain the Eco-label (fig 3.3) for manufacturer. In the first stage, the factory administration notices the importance of the eco-label and decides to use it. At the performance control stage, the chemicals not allowed by the selected eco-labelling organisation are enlisted. Detailed monitoring of the chemicals is necessary at each stage of production. The quality control system is an important stage in obtaining an eco-label. The objective is to prove that the products introduced to the certificating institute are appropriate. At this stage, honesty is necessary because the institute is authorised to make tests any time it likes. Failing in these tests results is cancellation of the eco-label certificate (Atilgan, 2007).

According to Nadia (1999) ecolabelling process includes two phases. The *phase of negotiation* consists of a negotiation between the firms and the regulator in order to set up the ecolabelling criteria. These criteria typically consist of a list of maximum thresholds of polluting emissions, which have not to be surpassed by a product in order to be eligible for the ecolabel. These thresholds generally relate to the polluting emissions released by the product throughout its whole life cycle. A *market phase* follows. During this phase, products that meet the criteria can be labeled as doing so by the firms and compete in the marketplace.
Fig 3.3: The stages of obtaining an eco-label

In brief, to obtain an eco-label, manufacture need to follow the below procedure:

**Application**
- Recognise the right certification or authorise body who have authority to issue the eco-label.
- Apply for number of units which want to cover under scope of certification and products on which wants to use ecolabels

**Necessary changes**
- Do the necessary changes within the production line, raw materials, ingredients, manufacturing process, in unit or manufacturing plant.
- Overall, need to do the changes within social, environmental and technical areas with respect to standards requirements.

**Inspection and certification**
- If through with the inspection and certification, allow to use the eco-label on products covered under scope of certification.
- If not, then do the necessary changes again and get inspected again.

**Fig 3.4: Process to obtain certification for eco-label**

### 3.8 Benefits of Ecolabelling

Egyptian Environmental Affairs Agency (1999) have briefly summarised the benefits of ecolabelling as follows:

- **Enhanced export market opportunities** – manufacturers and retailers of textile goods will probably come under increasing pressure to comply with the international eco-labels. In future securing of an eco-label will greatly support the manufacturers and retailers in enhancing the export market opportunities.
- **Improved product quality** - through the removal of substances in the fabric that may be harmful to the customer.
- **Financial savings** – With process optimisation and improvements lots of water, chemicals and energy get saved.
• *Improved environmental performance* – by throwing out toxic, hazardous substances and conservation in water, energy and raw material usage. This leads to a reduction in the quantities and pollution potential of various emissions.

• The improvement of the factory’s image and its positive effects on the motivation of the personnel: Production which is sensitive to human and environmental ecology and the certification thereof not only increases the quality of the product, but also improves the reliability and the image of the company in public opinion. The environmental labels like the eco-label can be seen as a new ‘social image’ created by multinational companies and as a current issue for an increasing number of companies throughout the world. The improvement of the social image of the company enlarges the customer portfolio and improves its competitive power as well as the motivation of the personnel, affecting the productivity positively (Atilgan, 2007).

In addition, Eco-labelling has following benefits too:

• *Informing consumer choice*
Eco-labelling is an effective way of informing customers about the environmental impacts of selected products, and the choices they can make. It empowers people to discriminate between products that are harmful to the environment and those more compatible with environmental objectives. An eco-label makes the customer more aware of the benefits of certain products, for example, recycled polyester. It also promotes energy efficiency, waste minimization and product stewardship.

• *Stimulating market development*
When customers choose eco-labeled products, they have a direct impact on supply and demand in the marketplace. This is a signal which guides the market towards greater environmental awareness.

• *Encouraging continuous improvement*
A dynamic market for eco-labeled products encourages a corporate commitment to continuous environmental improvement. Customers can expect to see the environmental impacts of products decline over time.
• **Promoting certification**

An environmental certification program is a seal of approval which shows that a product meets a certain eco-label standard. It provides customers with visible evidence of the product's desirability from an environmental perspective. Certification therefore has an educational role for customers, and promotes competition among manufacturers. Since certified products have a prominent logo to help inform customer choices, the product stands out more readily on store shelves. Coveting the logo may induce manufacturers to re-engineer products so that they are less harmful to the environment.

• **Assisting in monitoring**

Another benefit of an official eco-labelling program is that environmental claims can be more easily monitored. Competitors and customers are in a better position to judge the validity of a claim, and will have an incentive to do so should a claim appear dubious.

The Fig. 3.5 shows how the ecolabelling beneficial for consumers, retailers, manufacturers and at the end environment.

### 3.9 Weakness of Eco-labelling systems

There are many studies (Erskine and Collins, 1996; Zarrilli et al., 1997 cited in Gallastegui, 2004; Morris, 1997) that identify several weaknesses of labelling systems and some of this are-

• the lack of objectivity in setting the criteria,
• the difficulty of setting product category boundaries since no two goods are perfect substitutes for one another and some of the products may have many different uses,
• the arbitrariness of the process of selecting and updating criteria, as it is not possible to estimate accurately all the damage that the entire lifecycle of the product can have on the environment,
• the lack of real rewards for environmental improvements (the awards are restricted in most cases to the best products),
• the shortness of the validity period of the label before its revision, especially problematic for capital intensive industries.
3.10 Eco-labelling, Textile and Retailers

The value of differentiating technology between products is not high within product category because the innovation is incremental or because there are many economically comparable innovations. The standard setting i.e. eco-labelling has the potential to enhance value by informing the consumer about the differences in the products. Another possible way to explain this is that when patents and trademarks cannot be used to differentiate and protect a process, standards can be used to create the differentiation. This is the emerging role of ‘eco-textile’ labelling i.e. defining the new product category of eco-textiles (Moore et al., 2009). According
to Nadia (1999) ecolabels offer firms the opportunity to signal consumers which products are more respectful of the natural environment.

STP are new product category or technology segment that represents in many cases, *minimal technical product advances over pre-existing alternatives*; however it’s not always true, there are expansive eco-textile innovations. STP may be cleaner and greener and may incorporate life cycle analysis into their value propositions but, in many cases STP are not technology advances from ‘non-STP (Moore et al., 2009).

Textile and garment manufacturers from developing countries are increasingly confronted with the need to adapt to eco-labelling requirements. Eco-labelling schemes currently serve primarily as a marketing tool and products with eco-labels tends to target niche markets. However, there is concern that access to developed markets will be significantly reduced due to consumer boycotts of non-labeled goods and aggressive advertising by protectionist domestic industries. Overall, more transparency is needed to ensure that eco-labels do not become a new market access barrier (Knappe, 2003). However, according to Lavallee and Plouffe (2004) ecolabelling is attracting more and more interest on the part of large companies who see this type of labelling as an essential factor to consider as part of their industrial and commercial strategies. This interest takes on an even greater impact in the current context of the globalization of markets because product certification may well become both a very effective means for protecting internal markets and an increasingly essential tool for gaining outside markets.

Changes in consumer behavior alter manufacturer behavior. That is, if a significant portion of the consumer population demands environmentally friendly products, the presence of an ecolabelling program may provide firms an incentive to differentiate and market their products along environmental characteristics. An increase in supply of these environmentally friendly products may increase consumer purchases simply through greater availability without changes in individual awareness (Teisl et al., 2002).

Without clear definitions, labelling schemes or legislation even well-known terms can be misleading Several studies show that most consumers distrust environmental claims made by manufacturers and retailers and that they are confused by the wide range of claims in the market-place (Cope and Winward, 1991 cited in Erskine et al., 1997; MacKenzie, 1991 cited...
in Erskine et al., 1997; Eden 1994). For example to prove the above fact, Kevin Tuerff, CEO of Green Canary Sustainability Consulting (2009), have raise the question to Federal Trade Commission (FTC) that, “Why would the big bad FTC go after a small business rather than a big retailer for violating consumer protection laws prohibiting false green product claims? According to him, FTC recently charged four sellers of clothing and other textile products with “bamboozling” consumers by deceptively labelling and advertising goods as being made of bamboo fiber, when they are made of rayon.

Retailers can play a role in environmental labelling programs. On the one hand, they can play a significant role in fostering environmental labelling by selecting products to sell based in part on environmental attributes. On the other hand, retailers have also attempted introducing their own environmentally-sensitive product lines like Green Elephant by Patagonia, The Garden Collection by H & M. Such actions on the part of retailers can diminish the effectiveness of independent labels on the retailers’ shelves because multiple, competing labelling may cause confusion. The extent of retailers’ impact, however, is tempered by the size of their operations. If they handle a significant market share of a particular product type, they will have the power to educate consumers through environmental labelling as well as to influence producer’s production/marketing strategies. By and large, however, most retailers will function only as intermediaries in the flow of environmental information from manufacturer to consumer due to their relatively small size in markets (EPA, 1998).

3.10.1 Eco-standards for textiles

According to Ecolabel Index, in textile and clothing industry 35 ecolabels are available across Asia, Australia, Oceania, Europe and other countries. The following table 3.2, 3.3, and 3.4 shows the country wise ecolabels and for which products they are applicable. Apart from country-wise labels, there are few additional labels like GOTS, Organic Exchange (OE) 100, Oeko-Tex (100, 100 plus, 1000) and Cradle to Cradle etc labels are widely accepted by many buyers (Table 3.5). For discussion GOTS, OE, EU flower and Oeko-Tex standards are chosen since they are mostly accepted by many buyers from various countries; GOTS is the first standards for organic which covers all the social, technical and environmental criterias together; Oeko-Tex 100, 100 plus and 1000 covers the similar criterias like GOTS however applicable for all kind of fibres.
To provide a better picture of labels and standards for textiles popular in the international market, some information on the Global Organic Textile Standard (GOTS), German Oeko-Tex and EU Flower labels are reported below. It is important to highlight that these labels are not Type-I eco-labels, and their contribution to the environmental sustainability of the textile sector, is different from the one provided by the EU Eco-label.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>India (IN)</td>
<td>Ecomark</td>
<td><img src="image" alt="Ecomark Logo" /></td>
<td>1402</td>
<td>Textiles</td>
<td>Taiwan (TW)</td>
<td>Green Mark</td>
<td><img src="image" alt="Green Mark Logo" /></td>
<td>1402</td>
<td>Secondary fibres and their products Textiles from secondary polyester</td>
</tr>
<tr>
<td>Japan (JP)</td>
<td>Eco Mark</td>
<td><img src="image" alt="Eco Mark Logo" /></td>
<td>1400 1402 1402</td>
<td>Clothing Technical Textiles Household Textiles</td>
<td>Australia (AU)</td>
<td>The Australian Ecolabel Program</td>
<td><img src="image" alt="Australian Ecolabel Logo" /></td>
<td>1401</td>
<td>Carpets (100% wool)</td>
</tr>
<tr>
<td>Korea (KR)</td>
<td>Kela</td>
<td><img src="image" alt="Kela Logo" /></td>
<td>1400 1402 1402</td>
<td>Clothing Shoes Bags</td>
<td>New Zealand (NZ)</td>
<td>Environmental Choice</td>
<td><img src="image" alt="Environmental Choice Logo" /></td>
<td>1401</td>
<td>Woollen carpets with covering (100% wool) Woollen carpets with covering (min. 80% wool)</td>
</tr>
<tr>
<td>Thailand (TH)</td>
<td>Thai Green Label</td>
<td><img src="image" alt="Thai Green Label Logo" /></td>
<td>1402</td>
<td>Textiles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.2: Examples of eco-labeled textile products in Asia, Australia and Oceania

*Source: Targosz-Wrona, (2009, p. 23).*
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic (CZ)</td>
<td>Ecological product</td>
<td></td>
<td>1402</td>
<td>Textiles</td>
<td>Poland (PL)</td>
<td>Eco-sign</td>
<td></td>
<td>1402</td>
<td>Textiles</td>
</tr>
<tr>
<td>Germany (DE)</td>
<td>Öko - Tex</td>
<td></td>
<td>1400</td>
<td>Products for children Products with direct contact with the skin Products with non-direct contact with the skin Decorations and accessories</td>
<td>Safe for infants</td>
<td></td>
<td></td>
<td></td>
<td>Products for children</td>
</tr>
<tr>
<td>European Union (EU)</td>
<td>EU-Flower</td>
<td></td>
<td>1402</td>
<td>Textiles Mattresses Shoes</td>
<td>Safe for children</td>
<td></td>
<td></td>
<td></td>
<td>Products for children</td>
</tr>
<tr>
<td>Croatia (HR)</td>
<td>Environmentally Friendly</td>
<td></td>
<td>1402</td>
<td>Towels</td>
<td>Human friendly</td>
<td></td>
<td>1400</td>
<td>Clothing</td>
<td></td>
</tr>
<tr>
<td>Netherlands (NL)</td>
<td>Milieuker</td>
<td></td>
<td>1402</td>
<td>Shoes Protective shoes</td>
<td>Slovak environment-friendly product</td>
<td></td>
<td>1402</td>
<td>Textiles</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.3: Examples of eco-labeled textile products in Europe.

*Source: Targosz-Wrona, (2009, p. 23).*
Table 3.4: Examples of ecolabels used in other countries.


Table 3.5: Private Labels

| Oeko-Tex 100 | Oeko-Tex 1000 | Oeko-Tex 100 plus | Cradle To Cradle | GOTS | OE 100 |

Table 3.5: Private Labels
3.10.1.1 Global Organic Textile Standard (GOTS)

An alternative to the EU Flower label specifically for the textile industry was introduced in October 2007. The Global Organic Textile Standard (GOTS) was first established by four associations (International Association National Textile Industry (IVN), Germany, Soil Association, England; Organic Trade Association, USA and Japan Organic Cotton Association) for niche markets only with the idea of sourcing the material from the same suppliers. According to GOTS new database, nearly 1500 companies with 2,800 facilities were certified to the organic apparel and textile standards in 2009, a 40% increase over 2008. The public database contains almost 400 dying facilities, more than 200 spinning, knitting, and weaving units and approximately 140 printing and manufacturing facilities. While more than 700 companies are listed with an export business, currently about 50 import operations hold GOTS certificates as well (Ecotextilenews, 2010; p.7). Certified locations are scattered throughout 55 countries. The ten countries with the highest number of certified facilities are India, Turkey, China, Pakistan, Japan, South Korea, Italy, Germany, Bangladesh and the United Kingdom (GreenBiz Staff, 2010).

Contrary to the EU Eco-label, GOTS it is not a Type-I label GOTS adheres to ISO 65 and is a private company certification which provides the companies with yearly certification. The standards for GOTS were established in 2005 for business to business communication and not as a label; however, given the increased retailer interest, and the potential interest of consumers, a label will be launched in the course of 2008.

The aim of the standard is to define requirements to ensure organic status of textiles, from harvesting of the raw materials, through environmentally and socially responsible manufacturing up to labelling in order to provide a credible assurance to the end consumer (Global Standards, undated). It covers the entire chain of textiles from the production, processing, manufacturing, packaging, labelling, exportation, importation and distribution of all natural fibres. The final products may include, but are not limited to fibre products, yarns, fabrics and clothes. The standards focus on compulsory criteria only.

The label provides for two subdivisions- i) “organic” or “organic in conversion” (stands for a product from an operation or portion thereof, which has completed at least 12 months under organic management and is under the supervision of a certification body), and ii) "made with
x% organic materials" or "made with x% organic - in conversion materials" with regard to these standards. This distinction is provided since it takes a long time to reach the level of acquiring GOTS certification. It is applicable to all kinds of textile products.

The number of companies adhering to the GOTS standards has been steadily on the rise with many in Europe, China, India, Latin America and other countries. The largest markets for GOTS certified textiles are in Germany, The Netherlands, UK and USA. The main challenge faced by GOTS at the moment is the unforeseen rapid increase of the demand for the certification, and the related need to keep the pace with the development of specific criteria for the different types of products.

3.10.1.2 Oeko-Tex Standard 100

A number of years ago, the Austrian Textile Research Institute in Vienna presented a test regulation for harmful substances, the OTN 100, which has since been applied to textiles, clothing and carpets. Similarly, since 1991, the Hohenstein Research Institute in Germany has been carrying out pollution analyses in accordance with the 'Hohensteiner Oeko-Check'. Their combined experience was utilised by bringing the Austrian Textile Research Institute and the Hohenstein Research Institute together as the 'International Association for Research and Testing in the Field of Textile Ecology' - sometimes shortened to Oko-Tex or Oeko-Tex (McCarthy and Burdett, 1998). Today it is used in approximately 80 countries where half of the certificates come from Europe while the other half come from Asia (especially China, India).

Oeko-Tex's first task was to draw up the 'Oeko-Tex Standard 100' specification for testing textiles, clothing and carpets based on their human ecological characteristics. This Standard contains detailed analytical procedures for specific substances that are ecologically hazardous for humans, and also stipulates individual limit values based on scientific research. If a textile product complies with the conditions laid down in the Standard, the supplier is awarded the right to label the goods as being 'Confidence in Textiles - Passed for Harmful Substances according to Oeko-Tex 100'. Today there are three different kinds of Oeko-Tex certificates are available –

‘Oeko-Tex Standard 100’, ‘Oeko-Tex Standard 1000’ and the ‘Oeko-Tex 100 plus’.
The most important Oeko-Tex label is the *Oeko-Tex Standard 100*. It is a globally uniform testing and certification system for textile raw materials, intermediate and end products at all stages of production. It is not a proper “Type I-Eco-label” as it does not consider all the main environmental impacts over the lifecycle of a product. It tests for harmful substances which are prohibited or regulated by law, chemicals which are known to be harmful to health, and parameters which are included as a precautionary measure to safeguard health. The certificate is rewarded in four different product four classes according to how close it is to the consumers’ skin. Approximately 70,000 products from 6,000 to 7,000 companies carry the Oeko-Tex Standard 100 (Oeko-tex, 2009).

The Standard sets extremely stringent conditions for baby and toddler products; for example, the limit value for formaldehyde is 20 ppm. For products that come in contact with the skin, such as bed linen, underwear, shirts and blouses, 75 ppm is the limit. Products that do not come into lasting contact with the skin, such as outerwear (women’s and men’s suits, coats) and furnishings (table linen, decorative fabrics, curtains, furniture fabrics and mattresses) must have a formaldehyde content lower than the limit value of 300 ppm. By way of comparison, an apple usually contains at least 20 ppm. In cosmetic products, formaldehyde is used as a preservative. In products such as mouthwashes, the content need only be declared if it exceeds 100 ppm. According to the law, the formaldehyde content of textiles must be declared if the value is 1500 ppm or higher (McCarthy and Burdett, 1998).

The *Oeko-Tex Standard 1000* is an example of a label including environmental aspects regarding the production process. In order to qualify for certification according to the Oeko-Tex Standard 1000, companies must meet stipulated criteria in terms of their environmentally-friendly manufacturing processes and provide evidence that at least 30 percent of total production is already certified under Oeko-Tex Standard 100.

The required criteria include

- Use of environmentally-damaging auxiliaries and dyestuffs prohibited
- Compliance with standard values for waste water and exhaust air treatment
- Optimisation of energy consumption
- Avoidance of noise and dust pollution
- Defined measures to ensure safety at the workplace

95
• No child labour
• Introduction of basic elements of an environmental management system

The company is monitored by an independent auditor from one of the member institutes of the "Oeko-Tex® International - Association for the Assessment of Environmentally Friendly Textiles". The certificate is valid for three years. The additional cost of certifying and production process according to Oeko-Tex® Standard 1000 offers textile and clothing companies the following advantages:

• Effective public relations documentation of the objectively stipulated ecological measures in place at a production site.
• Increased production efficiency and thus reduced costs.
• Waste minimisation
• Increased acceptance of a company's products on the market.

The Oeko-Tex Standard 100plus product label provides textile and clothing manufacturers with the opportunity to highlight the human-ecological optimisation of their products as well as their efforts in production ecology to consumers. Companies can receive this award if their manufactured products have been successfully certified according to Oeko-Tex® Standard 100 and they are also able to provide evidence that the entire production chain - in other words, all production sites involved in manufacturing a product - seamlessly comply with the requirements of the Oeko-Tex® Standard 1000.

The applicant must operate and maintain an effective quality assurance system. The institute is authorised to carry out random tests on subsequent sale products. These tests are normally carried out twice per year, and the costs of testing are payable by the applicant. If random testing reveals a deviation from the established limit values, additional testing will be undertaken. If further deviations are found, authorisation may be withdrawn (McCarthy and Burdett, 1998).

3.10.1.3 EU Eco-Label (EU Flower)

The Flower is the symbol of the European Eco-label, a voluntary scheme designed to encourage businesses to market products and services that are kinder to the environment, as
part of a broader strategy aimed at promoting sustainable consumption and production. This program was developed with input from representatives of industry, commerce, environmental and consumer organizations, and trade unions. The flower label can be found throughout the European Union as well as in Norway, Liechtenstein, and Iceland.

The label is awarded only to those products with the lowest environmental impact in a product range, based on studies analyzing the impact of the product on the environment throughout its life-cycle, starting from raw material extraction in the pre-production stage, through production, distribution, and disposal. The award of the label is independently verified and endorsed by the European Commission.

The flower on a hang-tag guarantees consumers that the textile was produced with limited use of substances harmful to human health or the environment and reduced water and air pollution. The tag also indicates performance guarantees for shrink resistance to home laundering, and colour resistance to washing, rubbing, and light exposure.

Following are the benefits of EU Eco-label:

- **Legal Compliance – Integrated Product Policy (IPP)** A key step in assessing a product for the EU Flower is the completion of an environmental lifecycle assessment. The EU is currently introducing an IPP that will use instruments such as greener standards and environmental taxes to force producers to take account of the environmental impact of their products throughout their lifecycle. Products with the EU Flower will have been assessed for such impacts and will usually comply with these schemes.

- **Opening New Markets:** The EU Flower is recognised across the EU and has been shown to help sales in other EU markets.

- **Reducing Costs** Cleaner production required to reach Eco-label criteria can be cheaper and more efficient. It also prevents potential costs associated with waste and pollution.

- **Preferred Supplier:** There is a demand for environmentally friendly products among consumers and retailers. As a symbol of environmental quality the EU Flower could help you to become a preferred supplier – particularly in the Government sector.

- **Eliminates confusion about the overall impact of the product:** The whole life cycle is assessed so consumers are confident that the product is environmentally superior from cradle to grave.
- **Confidence:** The EU Flower is independently verified – environmental claims are endorsed and verified by the EU.

- **Trustworthy:** an EU scheme Research shows that the EU is one of the most trusted sources of environmental information for Irish people.

Finally, Table 3.6 and 3.7 shows the difference between GOTS, OE, EU flower and Oeko-Tex standards. Table 3.6 shows the technical parameter differences where as table 3.7 discuss about the residual testing parameter.
### Comparison between GOTS, Oeko-Tex, OE, and EU Flower standards

<table>
<thead>
<tr>
<th>Standards</th>
<th>GOTS</th>
<th>Organic Exchange</th>
<th>EU Flower</th>
<th>Oeko-Tex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters</td>
<td><img src="image1.png" alt="GOTS Logo" /></td>
<td><img src="image2.png" alt="Certified to OE 100 Standard" /></td>
<td><img src="image3.png" alt="EU Flower" /></td>
<td><img src="image4.png" alt="Confidence in Textiles - Oeko-Tex 100" /></td>
</tr>
<tr>
<td>General</td>
<td>The International Working Group on Global Organic Textile Standard is comprised of four reputed member organisations, namely OTA (USA), IVN (Germany), Soil Association (UK) and JOCA (Japan), which contribute to the GOTS. There are 12 certification bodies that are currently approved to certify entities of the textile supply chain and their products according to GOTS. These standards are interested in Toxicological, environmental and social parameters.</td>
<td>The OE 100 and OE Blended are voluntary private standards. There are 5 certification bodies that are currently approved to certify entities of the textile supply chain and their products according to OE 100 &amp; blended standards. These standards are only interested in organic cotton percentage in final product.</td>
<td>The flower is the official eco-label of EU. The demands are developed by the EU Commission in co-operation with the relevant industry. Certification is done by national independent bodies. These standards are interested in Toxicological and environmental parameters</td>
<td>A private label developed by some key knowledge centres in the textile manufacturing business. Demands are revised by an international association. Certification is done by national knowledge centres. These standards are interested in Toxicological parameters only. Products are classified in four different classes i.e. I (for babies product), II (Products with direct contact to skin), III (Products without direct contact to skin) and IV (Decoration material).</td>
</tr>
<tr>
<td>Raw Fibre</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotton (type)</td>
<td>Minimum 70% Certified organic cotton</td>
<td>Certified organic cotton 100%</td>
<td>Minimum certified organic cotton 5%</td>
<td>Residues of 22 pesticides should be less than 0.05 ppm.</td>
</tr>
<tr>
<td>Other fibres</td>
<td>Upto 30% Non-organic fiber but should not be from GMO source.</td>
<td>Not allowed</td>
<td>Upto 95% any textile fiber</td>
<td>Spinning solution additives, spinning additives and preparation agents for primary spinning (including carding oils, spin finishes and lubricants): At least 90 % (by dry weight) of the component substances shall be sufficiently biodegradable or eliminable.</td>
</tr>
<tr>
<td>Textile Manufacturing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spinning</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additives include paraffin, paraffin oils and substances derived from natural raw materials are only allowed.</td>
<td>Spinning solution additives, spinning additives and preparation agents for primary spinning (including carding oils, spin finishes and lubricants): At least 90 % (by dry weight) of the component substances shall be sufficiently biodegradable or eliminable in waste water treatment plants.</td>
<td>Controlled only on the final fabric</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weighting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NL</td>
<td>Compounds of cerium shall not be used in the weighting of yarn or fabrics.</td>
<td>NL</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weaving/Knitting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starch, starch derivatives, other natural substances and CMC allowed. Polyvinyl alcohol (PVA) and Polyacrylate (PAC) maximum 25% of the total sizing in combination with natural substances only</td>
<td>95 % (by dry weight) of the component substances of any sizing preparation applied to yarns shall be sufficiently biodegradable or eliminable in wastewater treatment plants, or else shall be recycled.</td>
<td>Controlled only on the final fabric</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Desizing and washing</strong></td>
<td>GMO free enzymes allowed. Additional chemicals should approve as per GOTS Input standards (discussed in table 3.7).</td>
<td>APEO and EDTA not allowed</td>
<td>Controlled only on the final fabric</td>
<td></td>
</tr>
<tr>
<td><strong>Stripping or depigmentation</strong></td>
<td>NL</td>
<td>Heavy metal salts (except of iron) or formaldehyde shall not be used for stripping or depigmentation.</td>
<td>NL</td>
<td></td>
</tr>
<tr>
<td><strong>Bleaching</strong></td>
<td>On basis of oxygen only (peroxides, ozone,) Additional chemicals should be GOTS approved.</td>
<td>AOX emissions in the bleaching effluent shall be less than 40 mg Cl/kg. In certain cases, the level shall be less than 100 mg Cl/kg.</td>
<td>Controlled only on the final fabric</td>
<td></td>
</tr>
<tr>
<td>Process</td>
<td>Requirements</td>
<td>pH 6.5-9 of water emitted to receipt.</td>
<td>Controlled only on the final fabric</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------</td>
<td>-------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Mercerisation</td>
<td>Alkaline must be recycled. Additional chemicals should be approved as per GOTS Input standards (discussed in table 3.7).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dyes, pigments, Dyes &amp; pigment auxiliaries.</td>
<td>Natural dyes, auxiliaries, synthetic dyes, pigments must be approved as per GOTS Input standards (discussed in table 3.7).</td>
<td>No azo dyes that cleave to a list of aromatic amines, No dyes classified as carcinogenic, mutagenic, and toxic for reproduction according to dir. 67/548/EEC. No potentially sensitising dyes if fastness to perspiration &gt;4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Printing</td>
<td>Discharge printing methods using aromatic solvents, plastisol printing methods using phthalates and PVC, azo dyes that release carcinogenic amine compounds (MAK Group III 1, 2, 3) are prohibited. Additional chemicals should be GOTS approved.</td>
<td>Printing pastes &lt;5% VOC. No plastisol based printing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finishing</td>
<td>Mechanical, thermal and other physical finishing allowed. Flame proofing auxiliaries are exceptionally permitted if their use is legally required in the country and for the product in question. Additional chemicals should be GOTS approved.</td>
<td>At each wet-processing site, at least 95 % by weight of the detergents, at least 95 % by weight of fabric softeners and at least 95 % by weight complexing agents used shall be sufficiently degradable or eliminable in wastewater treatment plants.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste water treatment</td>
<td>Waste water must be treated in an internal or external functional wastewater treatment plant before discharged to surface waters. COD &lt; 25 mg/l.</td>
<td>COD from wet processing &lt; 25g/Kg. If onsite treatment pH should be 6-9, temperature &lt; 40 degree Celsius.</td>
<td>NL</td>
<td></td>
</tr>
<tr>
<td><strong>Accessories</strong></td>
<td>Should be made from Natural or synthetic fiber. In case of metal part should be free from chrome and nickel. Plastic component must free from PVC.</td>
<td>Controlled only on the final product</td>
<td>Controlled only on the final fabric</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Social criteria</strong></td>
<td>Employment is freely chosen, Freedom of association and the right to collective bargaining are respected, Working conditions are safe and hygienic, Child labour must not be used, minimum Living wages, Working hours are not excessive, No discrimination is practiced, Regular employment is provided, and Harsh or inhumane treatment is prohibited.</td>
<td>Ethical notion is not in European Commission Regulation.</td>
<td>NL</td>
<td></td>
</tr>
<tr>
<td><strong>Emissions during production (expressed as an annual average)</strong></td>
<td>Viscose fibres- 1) sulphur content of the emissions of sulphur compounds to air from shall not exceed 120 g/kg filament fibre produced and 30 g/kg staple fibre produced. 2) Zinc - 0.3 g/kg. Polyamide - N2O during monomer production, shall not exceed 10 g/kg polyamide 6 fibre produced and 50 g/kg polyamide 6.6 produced. Polypropylene - Lead-based pigments shall not be used.</td>
<td>NL</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Storage, Handling, Processing, packing and Transportation.</strong></td>
<td>Must be stored and transported in such a manner as to prevent contamination by prohibited substances and commingling with conventional products or substitution of the contents. Packaging material must not contain PVC (For GOTS only). Transport means and routes must be documented. Intermediate or finished product must be labeled to differentiate from conventional product.</td>
<td>No chlorophenols, PCB’s and organotin compounds during transportation or storage.</td>
<td>NL</td>
<td></td>
</tr>
<tr>
<td><strong>Product Labelling</strong></td>
<td>1) &quot;Organic&quot; or &quot;organic - in conversion&quot;. 2) &quot;made with 100% organically grown&quot; &quot;Made with X% organically</td>
<td>&quot;Confidence in Textiles - Tested for harmful substances&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with x % organic materials’ or &quot;made with x % organic - in conversion materials&quot;</td>
<td>cotton” if product has 100% OC, “Made with organically grown cotton,” for products that contain 95% or more OC, as long as the remaining content is not cotton.</td>
<td>grown cotton”</td>
<td>according to Oeko-Tex® Standard 100&quot;</td>
<td></td>
</tr>
</tbody>
</table>

*Table 3.6: Comparison between GOTS, Oeko-Tex, OE, and EU Flower standards*
## Comparison of residual parameters between GOTS, Oeko-Tex, OE, and EU Flower standards

<table>
<thead>
<tr>
<th>Criteria</th>
<th>GOTS</th>
<th>EU Flower</th>
<th>Oeko-Tex 100</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>As a Input</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aromatic solvents</td>
<td>FB</td>
<td>FB</td>
<td></td>
</tr>
<tr>
<td>(Chloro-) Phenols (as TCP, PCP) mg/kg</td>
<td>FB</td>
<td>FB</td>
<td></td>
</tr>
<tr>
<td>Complexing agents and active detergents</td>
<td>Prohibited are:</td>
<td>FB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- APEO;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- EDTA, DTPA and similar persistent complexing agents.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formaldehyde and other short-chain aldehydes</td>
<td>FB</td>
<td>No limit on input</td>
<td></td>
</tr>
<tr>
<td>Genetically modified organisms (GMO's) and their derivates (including enzymes derived from genetically modified micro-organisms)</td>
<td>FB</td>
<td>NL</td>
<td></td>
</tr>
<tr>
<td>Fungicides and Biocides</td>
<td>FB</td>
<td>FB</td>
<td></td>
</tr>
<tr>
<td>Halogenated solvents</td>
<td>FB</td>
<td>FB</td>
<td></td>
</tr>
<tr>
<td>Heavy metals (mg/kg)</td>
<td>Heavy metal free as defined by ETAD, metal complex dyes - FB, exception for iron and copper (up to 5% in blue, green and turquoise dyestuffs).</td>
<td>Ionic impurities in the dyes used shall not exceed the following: Ag 100 ppm; As 50 ppm; Ba 100 ppm; Cd 20 ppm; Co 500 ppm; Cr 100 ppm; Cu 250 ppm; Fe 2500 ppm; Hg 4 ppm; Mn 1000 ppm; Ni 200 ppm; Pb 100 ppm; Se 20 ppm; Sb 50 ppm; Sn 250 ppm; Zn 1500 ppm. Ionic impurities for pigments used shall not exceed the following: As 50 ppm; Ba 100 ppm, Cd 50 ppm; Cr 100 ppm; Hg 25 ppm; Pb 100 ppm; Se 100 ppm, Sb 250 ppm; Zn 1000 ppm.</td>
<td>No limits for input products</td>
</tr>
<tr>
<td>Fluorocarbons</td>
<td>FB</td>
<td>NL</td>
<td></td>
</tr>
<tr>
<td>Quaternary ammonium compounds</td>
<td>Prohibited, except for auxiliaries used for fixing purposes in the dyeing process, provided they meet all other GOTS criteria.</td>
<td>FB</td>
<td></td>
</tr>
<tr>
<td>Oral Toxicity (LD 50)</td>
<td>&gt; 2000</td>
<td>NL</td>
<td></td>
</tr>
<tr>
<td><strong>Aquatic Toxicity (LC50, EC50, IC50)</strong></td>
<td>&gt; 1 mg/l</td>
<td>NL</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>----------</td>
<td>----</td>
<td></td>
</tr>
</tbody>
</table>

**Residual Testing**

<table>
<thead>
<tr>
<th>Chlorophenols (PCP, TeCP) (mg/kg)</th>
<th>0.01</th>
<th>0.05</th>
<th>0.05 - 0.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amines (amine-releasing azo dyes (MAK Group III 1,2,3) (mg/kg)</td>
<td>30</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>AOX (mg/kg)</td>
<td>0.5</td>
<td>Manmade cellulose fibres (including viscose, lyocell, acetate, cupro, triacetate) &lt; 250</td>
<td>NL</td>
</tr>
<tr>
<td>Disperse dyes (classified as allergenic or carcinogenic) (mg/kg)</td>
<td>&lt; 30</td>
<td>FB</td>
<td>50</td>
</tr>
<tr>
<td>Formaldehyde (mg/kg)</td>
<td>16</td>
<td>20 for babies, 30 (products are in contact with skin), 75 (others).</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>4.5 - 9</td>
<td>NL</td>
<td>4.0-9.0</td>
</tr>
<tr>
<td>Heavy metals (mg/kg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antimony (Sb)</td>
<td>0.2</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Arsenic (As)</td>
<td>&lt; 0.2</td>
<td>0.2-1.0</td>
<td></td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>&lt; 1.0 (outerwear), &lt; 0.2 (others)</td>
<td>0.2-1.0</td>
<td></td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>&lt; 0.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>&lt; 2.0 (outerwear), &lt; 1.0 (others)</td>
<td>1.0 - 2.0</td>
<td></td>
</tr>
<tr>
<td>Chromium VI (Cr-VI)</td>
<td>&lt; 0.5</td>
<td>Under DL</td>
<td></td>
</tr>
<tr>
<td>Cobalt (Co)</td>
<td>&lt; 4.0 (outerwear), &lt; 1.0 (others)</td>
<td>1.0 - 4.0</td>
<td></td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>&lt; 50 (outerwear), &lt; 25 (others)</td>
<td>25-50.0</td>
<td></td>
</tr>
<tr>
<td>Nickel (Ni)</td>
<td>&lt; 4.0 (outerwear), &lt; 1.0 (others)</td>
<td>1.0-4.0</td>
<td></td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>&lt; 0.02</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Selenium (Se)</td>
<td>&lt; 0.2</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Organotin compounds (mg/kg)</td>
<td>&lt; 0.05</td>
<td>No check on finished goods</td>
<td></td>
</tr>
<tr>
<td>TBT, TPhT</td>
<td>NL</td>
<td>0.5 - 1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 0.05</td>
<td>0.5 - 1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>1.0 - 2.0</td>
<td></td>
</tr>
</tbody>
</table>

Not allowed to use | 0.5 - 1.0 |
| Not allowed to use | 0.5 - 1.0 |

NL = No limits
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specifics</th>
<th>Comparison Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBT, MBT, DOT, phthalates (mg/kg)</td>
<td>[0.1, 2.0]</td>
<td></td>
</tr>
<tr>
<td>Orthophenylphenol (mg/kg)</td>
<td>&lt; 1.0</td>
<td>No check on finished goods</td>
</tr>
<tr>
<td>Rubbing fastness, Dry</td>
<td>3 to 4</td>
<td>4</td>
</tr>
<tr>
<td>Rubbing fastness, wet</td>
<td>2</td>
<td>2 to 3</td>
</tr>
<tr>
<td>Perspiration fastness, alkaline and acid</td>
<td>3 to 4</td>
<td>3 to 4</td>
</tr>
<tr>
<td>Light fastness</td>
<td>3 to 4</td>
<td>4 to 5</td>
</tr>
<tr>
<td>Shrinkage values when wet</td>
<td>max 8%</td>
<td>(-8% to +4%)</td>
</tr>
<tr>
<td>Knitted/hosiery</td>
<td>max 3%</td>
<td>(-6% to +4%)</td>
</tr>
<tr>
<td>Woven:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saliva fastness</td>
<td>&quot;FAST&quot; for baby and children's clothing</td>
<td>&quot;FAST&quot; for baby and children's clothing</td>
</tr>
<tr>
<td>Washing fastness when washed at 60°C</td>
<td>3 to 4</td>
<td>3 to 4</td>
</tr>
</tbody>
</table>

**Table 3.7: Comparison of residual parameters between GOTS, Oeko-Tex, OE, and EU Flower standards**

* n.d. - Not Detected,
DL - Detection Limit,
NL - No Limitation
3.11 Certification

Whereas environmental labels deal mainly with product-related characteristics, environmental certification schemes assess the overall environmental policy and management of a company. Like ISO Type I labels, certification schemes are voluntary and give information on process and production methods (PPMs), that is, on the environmental impacts of the company’s resource use, production techniques, emissions, etc. But unlike environmental labels, they give information on the impacts of a company’s entire activity, and not those associated with a particular product. In a sense, environmental certification is a kind of life-cycle analysis for a company, whereas Type I labels do the same for each of its products (Rotherham, 1999). Certification provides a comprehensive system for ensuring that certain standards of organic production and processing are met.

The system includes:

- Developing rules or standards (standard setting).
- Verifying and evaluating performance against those standards (inspection).
- Recognizing procedures who successfully meet the standards (certification).

Production and process of STP are a very complex and therefore it require highly efficient and professional certification mechanism. Certification provides the product with credibility, assures the buyer that the product has been produced as per standards and enables the product to be marketed at premium price. Eventually buyers and consumers must trust the certification procedure. This is particularly relevant for organic fibres where the market has flooded by products described in vague terms such as ‘Green’ and ‘Eco’ (Rundgren, 1999).

To differentiate between sustainable and traditional textiles a de jure (third party) standards are desirable. The unverified, market-based self-labelling the de facto (without outside monitoring) approach for textile ecolabelling invites fraud due to lack of third-party verification (Moore et al., 2009). Rowen. J, (2008) think that, certification is still a confusing mass of agencies, guidelines and regulations with sometimes little enforcement. The symbols are new and often unknown to both retailers and consumers. Marketing departments at home textiles suppliers have had their green claims readily in place for a number of years, but now retailers and consumers are starting to demand those words and labels backed by solid third-
parties certifications that give confidence to all the marketing claims. And the question on everyone's mind is which ones matter most? Dunn (2008, cited in Rowen 2008) added, "There are so many certification programs, but eventually better programs will bubble up to the top and stick."

3.11.1 Certification demand and flow

In certification there are two kinds of certificates, one is ‘Scope Certificate (SC)’ and other one is ‘Transaction Certificate’ (TC); e.g. under GOTS, OE, these both certificates are used whereas in case of Oeko-Tex, only scope certificate get issued. The meaning of both the certificates are-

*Scope certificate:* The scope certificate issued to the company describes the name of company, name of products and production facility which are inspected and certified accordance with standards.

*Transaction certificate:* Transaction certificate can only be issued against the sales of products if the applicant has the scope certificate.

That means, scope certificate is the approval for the company to do the production accordance with respective standards, whereas transaction certificate is the guaranty and proof against the sales of particular product produced from certified company and both these certificates are issued by certification body only. Further first it’s discussed about the flow and process of scope certification and then it’s about transaction certificate.

a) Scope certificate:

Most of the companies look forward to have certification only if its requirement of customer. There are various steps are involved to get certify manufacturing facility. From the literature reviewed to date, Fig. 3.6 shows the flow of the certification across the supply chain. Requirement of certificate initiate with buyers. Generally they demand for scope certificate to the garment manufacture (GM) to prove that their manufacturing facility is certified and which products are certified as being produced in accordance with standards. If the manufacturer is not certified, they contact the certification body for the certification. From this researcher’s experience, certification is time consuming process; however it depends on the standards,
factory condition, number of factories under one application understanding of standards by applicant, and changes within the factory with respect to compliance with standards.
Fig 3.6: Certification Flow
If all the points are covered as in figure 3.6, the process would take around a minimum of 30-45 working days to issue a certificate from certification body. If during inspection any non-compliance (NC) occurs the process would be lengthened further. The certification body only issue the certificate once the applicant shows the ratification of NC.

If a buyer placed an order to GM, then, in the absence of production facilities, the buyers would need to source the required certified raw material to process into fabric. Then they will contact the factories from where they wish to buy the fabric, however that facility must also be certified and to prove it, processor need to provide scope certificate to GM then only they will get the order, if there is no certificate then they need to contact the certification body to get certify their facility, i.e. again 30-45 days. This process keep on continue till supplying of certified cotton to spinner. If the supplier is already certified, for example GM and fabric processor, then GM should check for which standards the processor is certified, because if GM has the order of supplying goods accordance with GOTS, then they have to source the GOTS certified fabric from GOTS certified processor; if the processor is any other certified (e.g. OE) then it doesn’t work.

As mentioned above, the GM doesn’t have other production facility except garmenting, if the ordered garment has embroidery and printing, then either GM should acquire certification for those facilities under his scope or else, they have to suggest those manufactures to get certify themselves.

With reference to fig. 3.6, the processors, weaver need to source the certified dyes and chemicals for production purpose, e.g. for production of GOTS product all the dyes and chemicals needs to be certified as per GOTS input standards (Table 3.6). If the dyes and chemical manufacture is certified then they will provide the scope certificate or if they are not certified, then they will contact the ecological testing lab to get it done testing for the required parameters accordance with standards and after testing contact the certification body for certification. Here, its important to note that, for testing of one product for e.g. accordance with GOTS input parameters it takes minimum 35 days to get the test reports, since to test biodegradability which is one of the parameter among many GOTS input parameter requires 28 days for testing.
In brief, certification is a complex, time consuming and costly process however it creates the transparency within supply chain.

**b) Transaction certificate**

Transaction Certificate (TC), part of certification process, provides transparency within the supply chain and it gives assurance to buyer about the compliance of products with standards. The certification body issues the TC against the each application made by their certified clients. This TC on receipt from certification body, manufacture delivers it to the company who has purchased the product from it. In brief, TC is the assurance certificate issued by certification body to the manufacture against sale product to confirm the product is manufactured accordance with standards. Fig. 3.8 illustrates the process of issuing TC; for example, if weaver has purchased the yarn from spinner, then spinner apply for TC to certification body.

![Fig. 3.7 Transaction Certificate Flow](image-url)
Certification body verifies the documents and issues the TC against product. Then spinner will forward that copy to the weaver as a proof to confirm the compliance with standards. Similarly, when weaver sold the fabric to processor, then weaver will contact certification body and he will submit the raw material i.e. yarn TC and request for fabric made from that yarn. This process continues till the TC of garment reaches the buyer.

3.11.2 Cost and benefits of certification

An important factor in the success of any eco-labels is its ability to cover its certification costs and therefore stay in business. According to EPA (1998), the ease with which programs will be able to cover costs varies depending on two questions:

- Can the program charge enough in application, testing, audit and other fees to cover its costs; and
- Can the program subsidize its environmental labelling activities from other program activities?

Cost of certification can be high in relation to the value of the product and thus can become prohibitive. This is especially true for textiles because of the number of process are involved from production to consumer. It may be more expensive for companies in developing countries to obtain labels and certifications, “due to factors such as the lack of existing management structures (EMS), the novelty of EMS, insufficient infrastructure, and high auditing costs if companies have to rely on international consultants and certification companies” (Vossenaar 1999, cited in Rotherham, 1999). In addition to capital costs, the absence of necessary knowledge and skills and a lack of mutual recognition between different national programs can further disadvantage some countries (UNCTAD 1997).

The objective of certification is to gain access to the market for products (Rundgren, 1999), but there are other positive benefits which include:

- **Better planning**: Certification requires producer to have documentation and production planning, which can increase both efficiency and profits (Rundgren, 1999).
• **Better Marketing and extension:** data collected in the process of certification can be very useful for market planning as well as for extension and research (Rundgren, 1999).

• **More transparency:** the basic principle of transparency required certification programmes to say who and what is certified. This facilitates more direct contacts between producer and consumers (Rundgren, 1999).

• **Credibility and visibility:** Certification improves the ‘image of product and increases its credibility and visibility (Rundgren, 1999),

• Enables access to niche and mainstream market (Getz et al., 2006),

• Generating higher prices (Getz et al., 2006),

• Promoting environmental sustainability (Getz et al., 2006).

Auriol and Schilizzi (2003) have studied the problem of quality-certification when quality is a credence attribute and certification is perfect. It has shown that the costlier the certification process, the fewer will be the firms able to afford certification. In this sense certification cost is a major factor in deciding market structure, with high costs leading to a monopoly for certification, and ultimately to no certification at all.

To overcome the certification and labelling cost, Grodskay (1993, p.193) have suggested two approaches, one is “Carrot” approach i.e. by rewarding firms that sell environmentally friendly products with an exemplary ecolabels; second “stick” approach i.e. legally binding standards. Ibanez and Grolleau (2007) have used these two approached for their analysis and they have suggested how those approaches can be utilised -

- “carrot” approach - the firm who preserve the environment appreciate them by subsidizing a recognized labelling;
- “Stick” approach - increase of labelling cost for polluting firms by enforcing stricter labelling guidelines and severe punishment in case of deceptive use of environmental claims.

According to Getz and Shreck (2006), despite much analysis of third-party certification, little is known about how certification is enabled or enacted at the point of production. The insights of those few who have explored some of the political and social effects of certification at the point of production are worthy of further examination. In this study researcher has analysed
the ‘how’ certification process works within the organic textile-clothing industry and ‘why’ its required.

### 3.12 Ecolabelling and Consumer

The power of consumer interest in and response to environmental problems is undeniable. The continued funding and expansion of both governmental and non-governmental environmental programs throughout the world, many of which have been in existence for over 25 years, is compelling evidence of the strength of individuals’ concerns about environmental issues. Intermittent consumer activism in the marketplace, as seen in reactions to companies’ environmental performance or disclosure of environmental attributes of particular products, has been well documented and is often referred to as the power that labelling programs seek to harness (EPA, 1998).

Over the years, a majority of consumers have realized that their purchasing behaviour had a direct impact on many ecological problems. Customers adapted to this new threatening situation by considering environmental issues when shopping (e.g. checking if the product is wrapped in recycled material) and by purchasing only ecologically compatible products (e.g. organic cotton, recycle polyester). Perhaps the most convincing evidence supporting the growth of ecologically favourable consumer behaviour is the increasing number of individuals who are willing to pay more for environmentally friendly products (Laroche, Bergeron, Barbaro-Forleo, 2001).

According to EPA (1998), labelling is also tied to consumer right-to-know initiatives in several developed markets, for example US. The premise is that consumers have a right to know about the ingredients contained in a product, as well as each ingredient’s health and environmental hazards, so that they can use this information to make informed decisions regarding the products they purchase. The US Federal Trade Commission’s (FTC) Guides for Environmental Marketing Claims was a direct result of an increase in consumer right-to-know developments. The concept of a consumer’s right to know, however, is relatively new and not widely recognized.

Consumer activism has played a role in creating a market for environmental labelling programs. The EPA (1998) however, has documented confusion and misunderstanding among
consumers regarding environmental issues, particularly when making choices among products. Environmental claims can create misunderstanding because they often pertain to product characteristics, such as ozone-friendly, with which a consumer generally has little or no experience or cannot physically perceive; consumers therefore have difficulty in evaluating the credibility or value of the claim. Furthermore, claims such as recyclable and compostable relate to more than just the inherent qualities of the product being promoted; they also reflect the context in which a product is used, recycled, or disposed.

Like the market for health foods, the market for eco-textiles consists of four main types of consumers:

1) **Committed consumers**, who already buy environmentally responsible products out of strong environmental convictions;

2) **Health-conscious consumers**, i.e. those caring for their children`s and their own health, and fearing allergies and skin diseases;

3) **Sympathetic consumers**, who occasionally buy environmentally responsible goods for environmental considerations;

4) **Casual purchaser**, who are motivated by considerations other than environmental.

For eco-textiles sales to enter the mainstream textile and clothing mass market, the last category, the casual purchasers, is seen as particularly important for developing sustainable textile market. For these consumers, factors such as design, colour, quality, and price overrule environmental considerations which may, or may not, share with other consumers (Elzakker, 1999).

**3.12.1 Factors affecting consumer’s behaviour**

Patents and trademarks are tools that protect significant technical or design advances within textile products and technologies. However, advances, can also be differentiated and communication via ecolabelling standards. Answering to the following question gives an idea of role of the ecolabel for a particular product. If a sustainable product and conventional product are not ecolabeled, can the consumer tell the difference? Answering ‘no’.
Ecolabelling can be used to inform the consumer of improvements, although not readily apparent, in textile ecology (Moore et al., 2009).

Based on lots of research, survey, discussions, and studies the factors which may influence consumers’ willingness to buy environmentally friendly products have been identified. These factors can be classified into five categories demographics, knowledge, values, attitudes and behaviour (Laroche et al., 2001). The Fig 3.8 shows the theoretical framework for these factors.

![Theoretical framework of factors affecting consumer willingness to pay for sustainable products](Fig3.8.png)

*Fig 3.8: Theoretical framework of factors affecting consumer willingness to pay for sustainable products*

*Source: Laroche, Bergeron, Barbaro-Forleo, (2001).*

### 3.12.1.1 Consumers’ demographic characteristics

The demographic variables who received most attention include age, gender, and education and material status. According to Laroche, Bergeron, Barbaro-Forleo (2001), efforts to identify environmentally friendly consumers can be traced back to the early 1970s. Berkowitz and Lutterman (1968, cited in Laroche et al., 2001), as well as Anderson and Cunningham (1972 cited in Laroche et al., 2001), were pioneers in studying the profile of socially responsible consumers. Overall, their combined results represent a highly socially conscious person are female, pre-middle aged, with a high level of education (finished high school) and above average socioeconomic status.
Early research i.e. before 80s identified the green consumer as being younger than average. Surprisingly, this trend has been reversed in the after 80s and several recent studies identified the green consumer as being older than average although most findings about the impact of consumers’ demographic characteristics on their environmentally conscious behavior are contradictory it is clear that they exert a significant influence. However, most authors agree that demographics are less important than knowledge, values and/or attitude in explaining ecologically friendly behavior (Laroche et al, 2001).

In later studies during 90s researchers found the similar studies; the majority of the evidence suggests that green consumers are relatively young (Klineberg, McKeever and Rothenbach, 1998; Roberts, 1993 cited in Rucker, 2009), female (Diamantopoulos, Schlegelmich, Sinkovics and Bohlen, 2003; Shrum, McCarty and Lowrey, 1995; Stern, Dietz and Kalof, 1993 cited in Rucker, 2009), well educated (Klineberg et al., 1998; Olli, Grendstad and Wollebaek, 2001 cited in Rucker, 2009) and married (Diamantopoulos et al., 2002; Laroche et al., 2001 cited in Rucker, 2009).

According to Laroche, Bergeron, Barbaro-Forleo (2001) review, consumers with medium or high incomes would be more likely to act in an ecologically compatible manner due to their higher levels of education and therefore to their increased sensitivity to social problems. However, in certain reviews they found the results did not support his hypothesis environmentally friendly behavior was consistent across income groups. Moreover, they found that the environmentally conscious consumer is less educated and has a lower income than the average. This brought them to conclude that income and education are not good predictors of environmental concern or purchase behavior.

Researchers have also presented contradictory conclusions concerning the relationship that level of education has to environmentally friendly behaviour. Some researchers found that education plays no role in the consumption of environmentally friendly products (Balderjahn, 1988). Others reported a positive relationship between level of education and consumption of environmentally friendly products (Butler and Francis, 1997; Fraj and Martinez, 2006). Still others reported an inverse relationship between level of education and environmentally friendly product consumption (Butler and Francis, 1997). However, Wang (2007, cited in Lin, 2010) found in his research that, in terms of demographics, the variables taken into consideration when investigating potential organic cotton consumers included age, gender,
and ethnicity, level of education and family size, none of which revealed any significant differences between consumers willing to pay more and consumers not willing to pay more.

3.12.1.2 Consumers’ knowledge

The consumer’s knowledge of environmental issues, the existing alternatives and there solutions is another factor which has sometimes proved to affect the consumer’s buying behaviour. In consumer research knowledge is such a characteristic that influences all phases in the decision process. Specifically, knowledge is a relevant and significant factor that affects how consumers gather and organize information (Alba and Hutchinson, 1987), how much information is used in decision making (Brucks, 1985). Fraj-Andrés & Martínez-Salinas (2007) said that “higher level of ecological knowledge intensifies the individuals’ affective ecological behaviour-verbal ecological behaviour relationship”. Similarly according to Lin (2010), consumers who are willing to pay more for organic cotton would exhibit significantly different environmental shopping behaviour and attitudes and possess greater environmental textile knowledge than those not willing to pay more.

3.12.1.3 Consumers’ values

Schwartz (1994 cited in Laroche et al., 2001) defines human values as desirable goals, varying in importance that serves as guiding principles in people’s lives. To explain Consumers’ values more elaborately Laroche et al., (2001) has given an example of recycling; it’s a behavior that someone “ought” to do, even though the immediate individual rewards for engaging in it are usually limited. Therefore, if an individual engages in recycling, it would be expected to be driven by strong values. Hence, we may gain a much clearer understanding of the motivational determinants of environmentally friendly behavior by considering the impact of values.

According to Triandis (1993), there are two major values that influence consumer behaviors are individualism and collectivism. On one hand, individualism represents how much a person focuses on how an individual can depend on themselves. Individualist people engage in voluntary associations and they make sure that they remain distinct individuals, even when they belong to groups Laroche et al., (2001). They also compete with others for status, which depends on their accomplishments much more than on their group memberships (Triandis,
Eventually type of individual is not very conducive to environmental friendliness. In contrast, collectivism means supportive, helpfulness, and consideration of the goals of the group relative to the individual. Being a collectivist one may do without individual motivations which is good for the group.

Mohammed Abdur Razzaque (1995), have investigated the relationships between ‘consumers’ values and demographic variables’ and between ‘values and psychographic variables’. He found that several demographic and psychographic variables are correlated with a number of value dimensions. The demographic variable such as "age", and the psychographic variables "religiosity", "sociability", "social responsibility" and "conservatism" were significantly related to most of the value dimensions.

### 3.12.1.4 Consumers’ attitudes

Fishbein and Ajzen (1975 cited in Lin, 2010) define attitude as ‘a learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object’ (p. 15). According to Laroche et al., (2001), there are two most studied attitudes in the ecological literature, with respect to environmentally friendly behavior, are importance and inconvenience. Amyx et al., (1994 cited in Laroche et al., 2001) define perceived importance, with respect to the environment, ‘as the degree to which one expresses concern about ecological issues’. Inconvenience refers to how inconvenient it is perceived for the individual to behave in an ecologically favourable fashion.

Dickson (2000, p. 25) measured consumers altruistic attitudes related to apparel purchases from socially responsible businesses, apparel businesses that had taken steps to meet high ethical or environmental standards. His measures included, “I would buy clothing from a socially responsible business just to help support their business practices” and “I would settle for a lower quality garment in order to buy something from a socially responsible clothing business”. However Dickson (2000) did not find this measure of altruism to be a significant predictor of support for or intention to buy from socially responsible apparel business. According to Fraj and Matinez (2006) research, many people feel strongly about environment problems, but less involved in terms of their shopping habits and daily customs. This may be because individuals believe that their responsibility as consumers for ecological effects is limited and rests firmly on the shoulders of government and/or economic institutions. This
attitude may impact the willingness of consumers to spend more for environmentally friendly products. Research suggests that consumers whose attitudes relate to social responsibility and norms possess a higher likelihood of consuming organic items (Moore et al., 2006). The higher cost of organic cotton also plays a role in consumers’ attitudes about organic cotton products and affects their shopping behaviour (Wang, 2007 cited in Lin, 2010)

3.12.1.5 Consumers’ behaviors

Abdul-Muhmin (2007) specified that past environmental consumer behaviour is conceptualized simply as the extent to which a consumer has previously performed environmentally friendly actions. According to him, willingness to perform environmentally behaviour is positively related to environmental concern, perceived psychological consequences of environmentally friendly behaviour. Suchard and Polonski (1991 cited in Laroche et al., 2001) stipulate that ecologically conscious consumers will try to protect the environment in different ways (e.g. recycling, checking that a package is made of recycled material, purchasing only green products). However, it is not clear how consumers’ willingness to spend more for green product will be correlated with other ecologically favourable behaviors (Laroche et al., 2001).

Fraj and Matinez (2006) research shows that, ecological consumer behaviour better explained by affect than environmental attitude. And at the same time, affects appears quite significant in determining attitudes. Affects influences behaviour more when people had weak attitudes than when people had strong ones. Although implementation of eco-labels is widespread, research concerning its impact and effectiveness is limited and aggregate quantitative results are rare. Much of the research has measured effectiveness either by identifying changes in consumer awareness after exposure to label information or by asking consumers whether eco-labelling programs would affect their purchase behavior. However, a change in awareness does not necessarily translate into a change in behavior and consumers do not necessarily follow their own purchasing assertions (Teisl et al., 2002).

3.12.1.6 Self- Identity

In recent studies of Hustvedt & Dickson (2009) consumer `self-identity` is another psychographic variable that has been related to both socially responsible and sustainable
product consumer. Self-identity can be defined as the “relatively enduring characteristics that people ascribe to themselves”, and is often synonymous with self-perception or self-concept (Sparks and Guthrie, 1998, p. 1396 cited in Hustvedt and Dickson, 2009). Measuring generalized environmental attitudes or values may be helpful for understanding the psychology of environmental consumers, but when studying specific behaviour, generalized attitudes are not as useful as specific, behaviour-related attitudes (Hustvedt and Dickson, 2009).

According to Bruce et al., (2006) there are three sources of imperfections in the market for eco-labels that might prevent consumer preferences from being revealed in following ways-

- **First**, because most environmental attributes are public goods, economists anticipated that the free rider problem would discourage consumers from revealing their preferences in the market place, thereby preventing vigorous markets from developing. However, empirical testing shows that many consumers are willing to pay a premium for eco-labeled products (Imkamp, 2000; Loureiro et al., 2002; Makatouni, 2002; Moon et al., 2002).
- **Second**, a number of authors have noted that mandatory eco-labelling schemes may introduce imperfections into product markets. For example, Kirchhoff (2000) models that suggest that firms may be encourage to over-invest in pollution reduction; whereas Matto and Singh (1994) and Dosi and Moretto (2001) identify circumstances in which eco-labels may encourage firms to reduce their investments in environmental protection.
- **Third**, a large number of researchers (Lathrop and Centner, 1998, and Thøgersen, 2000) have noted that eco-labels will not provide consumers with the opportunity to expose their preferences about firms’ environmental policies if consumers find it difficult to check on the honesty of firms’ claims.

### 3.12.2 Consumer approach towards Eco-labeled STP

Hemmelskamp and Brockmann (1997) have analysed the factors affecting the relationship between environmental behaviour and environmental consciousness of consumers. They conclude that ‘success of an eco-label is to be expected particularly for those products where the individual consumer can expect a personal positive advantage by utilizing the labeled
product’. To prove Hemmelskamp and Brockmann conclusion, the best example would be the work carried out by Hustvedt and Dickson (2009), where they found that consumers are motivated by their beliefs about the beneficial outcomes of the purchase, for themselves, the organic industry and the environment. According to a published organic consumer profile, organic users prefer organic items based on health concerns (Montoro et al., 2006). Consumers may believe in the existence of valuable health benefits, especially for younger from wearing organic-cotton apparel. Nolan (2006, cited in Gam et al., 2010) have explained the reason for it that, consumers with young children may be the most sensitive to environmental risks, such as pesticide residues and toxic dyes in cotton fabric, based on their concerns for their children’s health and for the future of their children’s world. According to Hustvedt et al, (2009) and Hustvedt and Dickson, (2009) outcome of purchasing organic cotton apparel for consumers found important was “improving my health or the health of my family”.

Montoro et al., (2006) found in their study that ‘People who were active in protecting the environment and consumed organic food were willing to purchase organic cotton products’. However, health claims because of the use of sustainable products like organic cotton have not been thoroughly debunked (Nimon et al., 1999). Unlike organic food producers, organic cotton apparel manufacturers and retailers do not typically make health related claims about their products. Therefore this discussion suggests that organic cotton apparel benefits from the aura of health associated with organic food products.

3.13 Eco-labeled STP pricing and Consumers willingness to pay

Price has been found to be one of the most decisive factors in determining when consumers actually purchase apparel products. According to Wang (2007, cited in Gam et al., 2010), consumers willingness to pay and purchase clothes made from sustainable raw material like organic cotton is a complex issue. Empirical testing has shown, however, that many consumers are willing to pay a premium for eco-labeled products (Imkamp, 2000; Loureiro et al., 2002; Makatouni, 2002; Moon et al., 2002) and that they do purchase such products (Lathrop and Centner, 1998; Teisl et al., 2002).

The most important cost factor is usually the ‘product price’, but costs arise not only while customers pay for a product but before and afterwards, too (Kaas, 1992 cited in Meyer, 2001;
Huser, 1996 cited in Meyer, 2001). Before actually buying a product customers have to search for it (search cost). Quite often they have to be informed and have to weigh up different alternatives (information cost). These activities are perceived by most customers as cost in form of time spent or money paid (cost of supply). Green products are usually less available than conventional products, leading to higher search cost. Furthermore, their environmental quality has to be explained in more detail since it is often a hidden characteristic (Darby and Karni, 1973 cited in Meyer, 2001). After having bought a specific product, additional cost may arise. Cost of change is caused by products that demand a different way of use. Customers, then, have to learn new behaviour and unlearn old. Some products prove to be more expensive in usage (cost of usage), too, although customers do not have to change behaviour. Think of fuel cost for cars or electricity cost for household appliances. Last but not least, customers have to dispose of most products, which might result in further cost (cost of disposal).

According to Gam et al., (2010) study in one of US, only 35% (27 out of 84) were willing to pay more for OCC and only 10.7% (9 out of 84) were willing to accept more than a 10% increase in price for OCC. In contrast, Wang (2007, cited in Lin, 2010) study in California, US, found that 52% of survey participants would pay a 50% price premium and 25% of the participants would pay 100% more for an OCC over conventional cotton clothing. From above results it’s clear that, willingness to pay for STP like product made from organic cotton varies place to place, country to country.

In 90s premium asked on the organic cotton product is reported 30-45% higher and 12.5% higher cost for organic cotton apparel (Nimon and Beghin, 1999). Hustvedt (2006) in this study found that the price difference between organic and conventional cotton clothing is approximately 63% when the clothing has a similar style, quality and functionality. Market research by researchers in this study found that likelihood of purchasing organic cotton products decreased about 6% as the price of an adult T-shirt increased 20%. Eventually results showed that consumers are less likely to purchase OCC when it has a 60% higher price.

According to Ethical Clothing Report from TNS Worldpanel Fashion (2008), nearly three quarters (72%) of British consumers think ethical production of the clothes they buy is important and this percentage has grown sharply from 59% last year. They also found that, there is dramatic shift in attitudes occurred among young consumers. Last year 60% of under-
25s said they bought the clothes they wanted and didn’t care how they were produced however this year only 36% say they do this. However over a quarter (27%) people have said that, ‘they would pay more for ethically produced clothing’.

According to Bruce and Laroiya (2007) the ‘label’ is intended to convey information to consumers about the steps the firm has taken to protect the environment. If consumers value these steps, they may be willing to pay a premium for the product to which the eco-label has been attached, thereby creating a ‘market’ for environmental protection. As long as this market operates smoothly, government agencies will not need to estimate consumer preferences as those preferences will be reflected in the prices consumers are observed to pay and in the quantities they purchase.

Recently Jin Gam, Cao, Farr and Kang (2010) have done study on mothers’ willingness to purchase organic cotton clothing (OCC) for their children and they found very interesting results. According to them, a mother’s environmental concerns, environmental purchasing behaviour and recycling behaviour significantly affected their involvement in OCC, which further significantly determined mother’s willingness to purchase OCC. As a result they found that mothers were not willing to pay a premium for purchasing children’s OCC. A majority (59.5%) of the mothers who selected OCC in the buying scenario indicated fabric softness was the main reason for their selection. The participants in this study claimed that they could not see any difference between OCC and conventional cotton clothing, demonstrating that the respondents did not look upon the higher price of OCC as worth the benefits based solely on environmental factors and without other advantages such as design and quality. Out of total participants, only 30% participants selected 30% or 60% higher price than conventional cotton clothing.

3.14 Eco-labelling- Market Impact and International Trade

Analysing the market impact of labelling schemes is analytically complicated, because (i) it is very difficult to separate the effect of other factors from the effect of the label, and (ii) data about the market impact is usually confidential commercial information. Available data collected indicates, however, that sales have increased when labels have been used (OECD, 1997), even if, generally speaking, labeled products have not had a major impact in the market (Gallastegui, 2004).
3.14.1 Market Impact

The market impact of labeled goods depends on the level of environmental awareness and the consumer demand for green goods. In many cases, demand has encouraged the supplier to apply for the labels. Official labelling schemes have, nevertheless, not contributed much to reduce confusion among consumers given the many labels available in the market (Gallastegui, 2004). When measuring the impact of labels opinions vary. According to OECD (1997) ‘market impact of eco-labeled products is the only indication of an eco-labelling programme’s successes and it can be measured by the number of licenses and products covered under scheme.

There are quite a large number of studies have reported on the effect of labelling schemes on markets. Regarding the theoretical framework, Mattoo and Singh (1994, 1997) developed a model for the study of the market impact of labelling. The authors assume, first, that the supply of a certain good is divided into goods produced with an environmentally friendly method and ordinary goods; and, second, that demand includes two types of consumer, the environmentally friendly consumers and the regular or environmentally neutral consumers. The label allows the consumer to identify the good as friendly or unfriendly depending on which method has been used to produce it. The conclusion they reach is that ‘labelling reduces output of unfriendly products only if, at the pre-labelling undifferentiated equilibrium price, the quantity demanded by the concerned consumers is greater than the quantity supplied by environmentally friendly method’ (Gallastegui, 2004).

3.14.2 International Trade

To many developing countries, the current debate involving eco-labelling represents another form of industrialised countries blocking out developing country exports. Developing countries fear that stricter product standards relating to environmental criteria are increasingly being used as a trade barrier for their exports. Some concerns have been raised by various international institutions, and by many (mostly) developing countries, that eco-labelling, while professing to be environmentally beneficial, is in fact having a negative impact on global trade patterns. This is due to the fact that the demand for and promotion of eco-labeled products in a particular host country (or region) may preclude those countries and industries, where eco-
labels are not in existence (or whose existence is not widespread), from successfully penetrating such markets (Naumann, 2001).

Rotherham (1999) added that, even to protect domestic industry environmental labelling and certification programs can be used strategically by host countries to create technical barriers to trade. The reality of the situation is, however, that "upward" pressure in the procurement chain (i.e. end-consumers, retailers and downstream manufacturers) increasingly discriminates against non-complying manufacturers and their products. National authorities can develop complex schemes unsuited to foreign producers. Eco-labels can become barriers to trade, and may increasingly be used as a guide for protectionism. In this way, developed countries may effectively restrict developing country access to their markets (Naumann, 2001).

According to ITC, (2009) report ‘Consumer Conscience’ for conventional exporters, fully exposed to the tough realities of international trading conditions, ‘fair’ and ‘ethical’ trade often looks like unfair competition, because it privileges some producers over others. To development specialists it sometimes seems hard to distinguish from charity or work for welfare schemes. Worse, fair trade – providing a privileged, protected channel to rich markets and niche consumers, along with a premium price for a small number of marginal producers has been criticized for locking out small farmers who usually cannot afford the cost of the proliferating certifications. In contrast according to Jose-Antonio and Neuchatel (2010), although ecolabels based on voluntary Life Cycle Assessment (LCA) are neither covered by the Technical Barriers to Trade Agreement nor by the WTO, however developing countries are concerned about the discriminatory effects caused by the implementation of the eco-labels.

The WTO Agreement on Technical Barriers to Trades preamble states:

... “no country should be prevented from taking measures necessary to ensure the quality of its exports, or for the protection of human, animal or plant life or health, of the environment, or for the prevention of deceptive practices, at the levels it considers appropriate, subject to the requirement that they are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail or a disguised restriction on international trade”.

This issue has been the object of a large theoretical and juridical literature, even before famous trade disputes like the US restrictions on imports of "non-dolphin-safe" tuna or "turtle-safe"
shrimps. Table 3.8 highlights the intended as well as unintended effects associated with the introduction of an eco-label.

<table>
<thead>
<tr>
<th>Intended Effects</th>
<th>Unintended Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Green Market Expansion</td>
<td>• Protectionism Abuse</td>
</tr>
<tr>
<td>• Environmental Consciousness</td>
<td>• Deterioration of Terms of Trade</td>
</tr>
<tr>
<td>• Investment Innovation</td>
<td>• Innovation Distortion</td>
</tr>
<tr>
<td></td>
<td>• Oversupply of Eco-label</td>
</tr>
<tr>
<td></td>
<td>• Free Rider Problem</td>
</tr>
</tbody>
</table>

Table 3.8: Intended and Unintended effects
Source: Jose-Antonio and Neuchatel, (2010).

The launch of an eco-label program is expected to boost export earnings through products differentiation. It may also allow innovative firms to exploit at their fullest environmentally friendly production methods. In developing countries, the introduction of an eco-labelling scheme can potentially offer new opportunities to attract capital investment to expand environmentally sustainable niche market (Jose-Antonio and Neuchatel, 2010).

3.15 Marketing activities for Ecolabelling
To promote the ecolabelling, increase the awareness of ecolabelling Sawhney (2008) have suggested the following ways for the promotion of eco-labeled STP-

- Networking through participation in conferences and workshops for increasing the visibility of eco-labeled products, conferences and workshops can be very helpful. They bring together specialist from different backgrounds of textile production, retailers, producers, consumer protection agencies, suppliers of raw materials and focus specific issues related to ecological production. They can help to knit contacts and spread the idea of producing eco-labeled products.
- A personal dialogue and networking at the workshops and conferences is a good way of creating an interest in the products. In that way they could even help to find partners for a joint venture in order to gain the label.
- There is also a need for the efficient and intensive use of the label on the products and on related material for informing consumers and business partners. One simple, yet
important step is, to place the label on a prominent spot on the product so that consumer buying the product can easily view the label. If possible and enough space on the product or its packing is available, the producer could even deliver extra-information about the label and its background, the production of the good and what therefore makes the product special.

- To include information on the company websites or brochures more and more consumers gain their information from the internet which is why this chance should not be missed out to inform costumers about the label and what stands behind it. Giving clear and transparent information about the label, why the company acquired it and what standards it therefore complies to could also be a major benefit for the overall reputation of the company and its products.
- To create a website to promote educational issues about eco labeled textiles to the consumers and downstream along the value chain.
- Develop a guide on eco-labeled textile and to promote via the different information channels technical and business associations, websites, reliable NGOs, etc.

3.16 Challenges for eco-labelling

Every right step towards betterment has to face challenges. Eventually according to BSD Global (n.d.) ecolabelling is facing following challenges:

1) Misleading or fraudulent claims

An eco-label has no value to the environmentally-conscious customer if it is misleading or fraudulent. Trust is a major component of a labelling programme's credibility, and the label must be above suspicion. Terms such as 'recyclable', 'biodegradable' and 'ozone friendly' must be used accurately. When claims are used arbitrarily in advertising and labelling, customers will become confused, discouraged, and sceptical - even of legitimate claims.

2) Uninformative claims

Labels that provide trivial or irrelevant 'green' information do nothing to reduce environmental impacts.
3) Unfair competition
Some companies are concerned about unfair competition. They are reluctant to rely on the assurance of an overseas eco-labelling program that specific environmental criteria are being met. Indeed, some companies may intentionally misrepresent their products as 'environmentally friendly' in order to bolster profits. This amounts to unfair competition for those companies which must spend the time and money to adhere to regulations.

4) Green consumerism
Many environmentalists are critical of consumerism. They argue that 'green consumerism' is a self-contradicting term, and believe that the goal should be to reduce consumption, not merely redefine it. 'Green shopping' will do little to bring about the more fundamental economic and social changes that are required to protect the planet, they claim. Indeed, consumer preference and market forces cannot, by them, guarantee environmental protection.

5) Feasibility
Another concern is that only a small number of products can realistically be labeled as 'green'. Since the vast majority of goods will not be covered by eco-labelling programs, some critics point to regulation as a more effective tool than the development of voluntary standards.

6) Methodologies
Differences in testing and certification methods have created difficulties in the application of an eco-label to a particular product category. For example, should the label represent an overall assessment of a product's environmental burden over its entire life cycle, or some subset of it? What techniques can be used to measure environmental impact? Who determines what specific environmental impacts are the most important? And what criteria are appropriate in rating impacts?

In addition to above challenges, according to Nadai (1997 cited in Lavallee et al., 2004) ecolabel are 'non verifiable expert property' for the consumer, and explains that the main obstacle to ecolabel development lies in the difficulty in finding a compromise between the economic feasibility and the scientific rigor which are essential to the credibility and veracity of the label. Nadai added that “The ecolabelling criteria are the result of an environmental appraisal made of a product, and the consumer is unable to evaluate the accuracy of this
appraisal; for the consumer, uncertainty remains as to the environmental quality. The agents who are responsible for establishing the environmental diagnosis of the product are thus able to manipulate the diagnosis, if they so wished, to increase their profits in the market place. This leeway accounts for the difficulties encountered in negotiating criteria, and, consequently, in the development of ecolabels”.

Lavallee and Plouffe (2004) done the analysis of ecological labelling process and concluded that 'cradle-to-grave' analysis for ecolabeled products and services is not always, in fact, respected, and that at the present time ecolabel delivery criteria are not sufficiently stringent. From one program to another, the determination and weighting of criteria are based on different methodology and on practices which do not appear to be sufficiently transparent, despite the presence of consultative committees. The manner in which ecolabelling criteria are defined in some programs reflects "the prominence of competitive logic over ecological logic (Boy, L. 1998 cited in Lavallee et al., 2004)." Fortunately, the evolution of ecolabelling programs around the world tends to address the issues of criteria setting and methodological transparency.

Finally, it’s worth to mention the absence of standardized approaches to environmental labelling and certification schemes can lead to confusion in the marketplace. Inconsistent performance requirements, claims that lack credibility, misleading information, and incomparable reporting frameworks make it impossible for consumers and other stakeholders to act on their environmental preferences. This may also make it difficult for companies to identify stakeholder preferences and for justified environmental claims to be considered credible (Caldwell 1996, cited in Rotherham, 1999; EPA 1998).

3.17 Conclusion

Eco-labelling is emerging worldwide as a differentiating factor in retail markets for textile and apparel purchase. Consumers are becoming more concerned with the adverse impacts of industrial pollution on the environment and their health, resulting mounting pressure on textile, fashion industry to adopt more eco-friendly, chemicals and manufacturing processes. Eco-labelling is a set of voluntary tools aimed at stimulating the demand for products and services with lower environmental burdens by providing relevant information on their life
cycle to address purchaser’s demands. Eco-labeled STP certifies that products do not contain chemicals which might be harmful to the consumer. There are many survey conducted by many researchers, government and private agencies, co-operate companies which indicate a substantial increase in the number of consumers concerned with harmful residues on textiles and the ecological impacts of textile production. Despite the increase of ecolabels in the market, little yet understood regarding consumer willingness to pay for the credence attributes of agriculturally derived apparel products Eco-labels are policy instruments that attempt to communicate distinctions in similar products based on their relative environmental impact. While there are many positive attributes associated with ecolabels, there are also negative consequences when such labels are used as tread barrier. However, researchers also felt that ecolabels are the manifestation of industries efforts to become or to be perceived as environment-friendly.

Emphasis is placed on human ecology; in other words, the possible harmful effects of the final merchandise, particularly clothing, on the human body. Eco-labelling schemes have greater impact when ecolabels become a purchasing requirement for retailers and or when they are used as tools to identify green products. In this context, the demand for eco-labeled products has encouraged and sometimes even forced manufacturers to obtain an eco-label for their products. The impact of the eco-label on the market and environmental effectiveness of eco-labelling in terms of measuring improvements to the environment due to eco-labeled STP is difficult to evaluate. The eco-label is only one of many factors that can influence the market penetration of STP. The fear of losing market share, rather than the drive to increase it, can also be a motivating factor. It should be stressed that market impact of eco-labeled STP is only one indication of an eco-labelling programme's success. The effectiveness of an eco-label ultimately depends on the extent to which consumers perceive, recognise and act on the information it conveys.

Industry cannot ignore the environmental impacts of its activities. Grasping the opportunities this presents and taking an enlightened approach to environmental protection can bring about considerable benefits:

(a) Greater efficiency, because all operations must be studied and analysed

(b) Enhanced company status in the eyes of customers and financial institutions
(c) Improved company performance, because of increased awareness of environmental responsibility throughout the whole of the staff.

Eco-labelling protocols are certainly awakening the minds of many in the textile chain to these questions, and such protocols are here to stay.

The demand for sustainable clothing from “ethical” consumers, significant improvements in enforcement of environmental laws by regulatory authorities and better compliance by manufacturers clearly demonstrate a growing recognition of the importance of moving towards a more sustainable model for the textile and clothing industries. However eco-labeled STP is facing problems for developing countries like lack of an infrastructure for testing, auditing and verification procedures in developing countries. The high cost of the procedures, the lack of technical know-how and the difficulty of controlling the various stages of the life-cycle have also made the export efforts more difficult. The competitiveness may also be affected by higher costs incurred in compliance with the requirements. As regards the markets it should be remembered that at present the eco-labels are not more than a market niche and eco-labels seem so far to be primarily a commercial and marketing tool, rather than an eco-consideration.
CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

This chapter reviews the various research approaches and discusses the appropriate methods of data collection and examines the purposes, problems and its benefits. An appropriate research design for the research aims and objectives is discussed. The conduct of the research is documented in section 4.5. Methods used to analyse the data gathered are discussed in section 4.7.

4.2 Background

Research in common parlance refers to search for knowledge. Once can also define research as a scientific and systematic search for pertinent information on a specific topic. Research comprises defining and redefining problem, formulating hypothesis or suggested solutions; collecting, organising and evaluating data; making deduction and reaching conclusion, and at the last testing conclusion to determine whether they fit the formulating hypothesis. The aim of the research is to understand the issues across the textile supply chain which affects the growth of ecolabeled Sustainable Textiles products. The objective of this chapter is to identify and examine various approaches to research and choose the proper research methodology for this study.

4.3 Research Philosophy

According to Easterby-smith et al. (2002), understanding of research philosophy can help to clarify research design, and help the researcher to recognize which design will work better in the field of investigation. He also added that to think the philosophical issues such as relationship between data and theory will seriously affect the quality of management research.

There are two main research paradigms that are used by market researchers; those are Positivist and Interpretivist (Malhotra & Bricks, 2003). However, Saunders et al., (1997) added another approach i.e. Phenomenological.

4.3.1 Positivism

The positivism approach, believes that the research phenomena should be scientific in the manner of natural sciences (Malhotra & Bricks, 2003; Saunders et al., 1997). According to
Easterby-smith et al., (1991), positivism approach emphasis on the need to search for factual explanations and fundamental laws. Saunders et al., (1997) has enlisted number of distinguishing features of Positivist research:

- Is deductive
- Seeks to explain casual explanations between variables
- Normally uses quantitative data
- Employs control to allow the testing of hypotheses
- Uses highly structured methodology to facilitate replication.

4.3.2 Interpretivist
The Interpretivist stress the dynamic respondents-constructed ad evolving nature of reality, recognizing that there may be a wide array of interpretations of realities of social acts. This approach may see respondents as ‘peers’ seeking the right content and means of observing and questioning to suit individual respondents. The Interpretivist recognises that their own values affect how they question, probe, and interpret (Malhotra & Bricks, 2003).

4.3.3 Phenomenology
The phenomenological approach to research based on the way people experience social phenomena in the world they live. It can be contrasted with the positivist approach which treats the social world in the way it would be approached by natural scientist, something with which the phenomenologist would feel uncomfortable. In case of Phenomenology study of small sample of subjects may be more appropriate than large number as with the positivist approach (Saunders et al., 1997).

4.4 Research Methods

4.4.1 Deduction Research Method
Gill and Johnson (2002, p.34), have defined the Deduction research method as, “a method entails the development of a conceptual and theoretical structure prior to its testing through empirical observation”. This method accentuate on standardized procedure to eliminate possible bias and allow replications of the study by others. According to them, the process of
deduction is divided into stages like, ‘Concept’, ‘Rules’, Operationalization’, and ‘Instructions’.

4.4.2 Induction Research Method

“The logical ordering of induction is the reverse of deduction as it involves moving from the ‘plane’ of observation of the empirical world to the construction of explanations and theories about has been observed” (Gill and Johnson, 2002, p.40). Many researches working within the inductive tradition, explanations of social phenomena are relatively worthless unless they are grounded in observations and experience.

4.4.3. Research Methods Comparison

Gill and Johnson (2002, p.44) have differentiated the different methods in terms of the various logics they bring to bear in conducting research. These methods are known as ‘Nomothetic Method’ and ‘Ideographic Method’ where they these methods are differentiated (Table 4.1) in terms of their emphasis on deduction or induction, their degree of stricture, the kinds of data they generate and the forms of explanation they create.

<table>
<thead>
<tr>
<th>Nomothetic Method Emphasize</th>
<th>Ideographic Method Emphasize</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deduction</td>
<td>Induction</td>
</tr>
<tr>
<td>Explanation via analysis of casual relationships and explanation by covering-laws.</td>
<td>Explanations of subjective meaning systems and explanation by understanding.</td>
</tr>
<tr>
<td>Generation and use of quantitative data</td>
<td>Generation and use of qualitative data</td>
</tr>
<tr>
<td>Use of various controls, physical or statistical, so as to allow the testing of hypotheses.</td>
<td>Commitment to research in everyday settings, to allow access to and minimize reactivity among the subject research.</td>
</tr>
<tr>
<td>Highly structured research methodology to ensure replicability of all above mentioned points.</td>
<td>Minimum structure to ensure all above points as a result of Induction.</td>
</tr>
</tbody>
</table>

Table 4.1: Difference between Nomothetic and Ideographic method.

*Source: Gill and Johnson (2002, p.44)*

136
4.5 Types of Data

According to Saunders, Lewis and Thornhill (1997), research is something that undertakes in order to find out the things in systematic way, there by increases the knowledge. Basically there are two types of data to be collected through research, called ‘Primary Data’ and ‘Secondary Data’. Researchers use different methods of research depending on what type of data they want to collect (Malhotra et al, 1999).

4.5.1 Primary Data

Malhotra and Briks (2003) define primary data as, “data originated by the researchers specifically to address the research problem”. Primary data is data collected by the researcher, for example surveys, observations, focus groups, interviews and questionnaires. The key point here is that the data collected is unique to the researcher and their research and, until it is published, no one else has access to it (Myers, 1997).

4.5.1.1 Advantages of Primary Data

Following are the advantages of Primary data:

- Its upto date
- Collected from known sources
- Data is secured, since no body cant access before publication.
- Data collected for specific reason and to for specific question.

4.5.1.2 Disadvantages of Primary Data

Following are the disadvantages of primary data:

- Time consuming and cost involved in designing, collection of instrument, selecting samples, collecting and analysing data.
- Can be expensive since money is involved.
- Researcher error and bias may limit confidence in the results, and finally, the question of whether the method chosen is the most suitable for meeting the research aims and objectives (Yin, 1994).
4.5.2 Secondary Data
Malhotra and Briks (2003) define secondary data as, “the data that have been collected for purpose other than the problem at hand”. Secondary data include both quantitative and qualitative data and can be used in both descriptive and explanatory research. This data is collected by others but can be re-used by others (Saunders et al., 1997). Secondary data includes both raw data and published summaries. Most organisations collect and store a variety of data to support their operations for example copies of letters, minutes of meetings and accounts of sales of goods or services; access to these documents will need to be negotiated if a particular organisation produces them. Saunders et al. (1997) has classified the secondary data as follows:

a. Internal
   - Ready to use
   - Requires further processing

b. External
   - Published materials
   - Compuised databases
   - Syndicated service

4.5.2.1 Advantages of Secondary Data
Following are the advantages of secondary data (Malhotra et al., 2003, Saunders et al, 1997):

- Easily available, relatively inexpensive and quickly obtained.
- It may have fewer resource requirements
- Data available very quickly and it’s a quality data.
- It can provide comparative and contextual data
- It helps to develop an approach to the problem and sampling plan
- It helps to answer certain research questions and test some hypothesis
- Interpret primary data with more insight

4.5.2.2 Disadvantages of Secondary Data
Following are the disadvantages of secondary data (Malhotra et al., 2003, Saunders et al, 1997):
• Data have been collected for purposes other than the problem at hand, their usefulness to the current problem may be limited.
• Data may be lacking in accuracy or may not be completely current or dependable and therefore before using secondary data, it is important to evaluate them.

4.5.3 Research Approach:
Qualitative and quantitative approaches to marketing research are underpinned by two broad philosophical schools, names positivism and Interpretivism. Qualitative research is an unstructured, primarily exploratory design based on small samples, intended to provide insight and understanding, whereas on the other hand, Quantitative research is a technique that seek to quantify data and typically, applies some form of statistical analysis (Malhotra et al, 1999). Either of these two approaches may be used depending on the assumptions of the methodology. The quantitative is termed the traditional, the positivist, the experimental or the empiricist paradigm whereas, the qualitative paradigm is termed the constructivist approach or naturalistic, the interpretative approach or the post positivist or postmodern perspective.

4.5.3.1 Qualitative Research:
According to Easterbay-Smith, Thorpe & Lowe (2002) explains qualitative techniques as:

“An array of interpretative techniques which seek to describe, decode, translate and otherwise comes to terms with the meaning, not the frequency, of certain more or less naturally occurring phenomena in the social world”.

Creswell (1998, p. 15) defines qualitative research as:

“An inquiry process of understanding based on distinct methodological traditions of inquiry that explore a social or human problem. The researcher builds a complex, holistic picture, analyses words, reports detailed views of informants, and conducts the study in a natural setting”.

Qualitative research is complex, involving fieldwork for prolonged periods of time, collecting words and pictures, analysing this information inductively while focusing on participant views, and writing about the process using expressive and persuasive language. Qualitative research is multimethod in focus, involving an interpretative naturalistic approach to its subject matter. This means that in qualitative research need to study things in their natural setting, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them (Malhotra et al., 2004). According to Gordon and Langmaid (1988), qualitative
research answers such questions as ‘what’, ‘why’, or ‘How’ but it cannot answer the question ‘How many’?

Qualitative research involves the studied use and collection of a variety of empirical materials – case study, personal experience, introspective, life story, interview, observational, historical, interactional, and visual texts that describe routine and problematic moments and meaning in individuals lives (Creswell, 1998). However, qualitative research encompasses a variety of methods than can be applied on a flexible manner to enable respondents to reflect upon and express their view or observe their behavior. It seeks to encapsulate the behavior, experience and feeling of respondents in their own terms. Qualitative research is useful to generate hypotheses and variables that should be included in quantitative approaches. With qualitative research researcher builds a complex, holistic picture, analyses words, reports detailed views of informants, and conducts the study in a natural setting (Creswell, 1998). Hence, qualitative research is mainly concerned with the understanding and not of the measurement of things. However, authenticity rather than reliability is often the issue in qualitative research. Good qualitative data are more likely to lead to new integrations, helping researchers to get beyond initial conceptions and generate or revise conceptual frameworks (Silverman, 2001).

According to Creswell (1998) there are five Qualitative traditions inquiry & those are as follows:

- **A Biographical study:** Denzin (1989a) defines the biographical method as the “Studied use and collection of life documents that describe turning point moments in an individual life” (Denzin, 1989a cited Creswell, 1998).

- **A Phenomenology study:** Whereas biography reports the life of a single individual, a phonological study describes the meaning of the lived experiences for several individuals about concept or the phenomenon.

- **A grounded Theory Study:** Although a phenomenological study emphasizes the meaning of an experience for a number of individuals, the intent of a grounded theory study is to generate an abstract analytical schema of phenomenon that relates to particular situation. This situation is one in which individuals interact, take actions or engage in a process in response to phenomenon, that’s why this to achieve the aim and objective of this research, Grounded Theory is suitable.
- **Ethnography**: Ethnography is a description and interpretation of a cultural or social group of system.
- **A Case Study**: A case study is an exploration of a bounded system or a case over time through detailed, in depth data collection involving multiple sources of information rich in context.

Table 4.2 gives detailed idea of distinguishes between inquiries with respect to different dimensions:

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>BIOGRAPHY</th>
<th>PHENOMENOLOGY</th>
<th>GROUND筹ED THEORY</th>
<th>ETHNOGRAPHY</th>
<th>CASE STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus</td>
<td>Exploring the life of an individual</td>
<td>Understanding the essence of experiences concerning a phenomenon</td>
<td>Developing a theory grounded in data from the field</td>
<td>Describing and interpreting a cultural and social group</td>
<td>Developing an in-depth analysis if single case or multiple cases</td>
</tr>
<tr>
<td>Discipline Origin</td>
<td>Anthropology, Literature History, Psychology, Sociology</td>
<td>Philosophy, Sociology, Psychology</td>
<td>Sociology</td>
<td>Cultural Anthropology, Sociology</td>
<td>Political science, Sociology, Evaluation Urban studies, Other social science</td>
</tr>
<tr>
<td>Data Collection</td>
<td>Primarily, interviews and documents</td>
<td>Long interviews with up to 10 people</td>
<td>Interviews with 20-30 individuals to saturate categories and detail a theory</td>
<td>Primarily, observations and interviews with additional artifacts during extended time in the field</td>
<td>Multiple sources documents, archival records, interviews, observations, physical artifacts</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>Stories, Epiphanies, Historical content</td>
<td>Statements, Meanings, Meaning themes, General description of the experience</td>
<td>Open coding, Axial coding, Selective coding, Conditional matrix</td>
<td>Description Analysis, Interpretation</td>
<td>Description, Themes, Assertions</td>
</tr>
<tr>
<td>Narrative Form</td>
<td>Detailed picture of an individual’s life</td>
<td>Description of the experience</td>
<td>Theory or theoretical model</td>
<td>Description of the cultural behavior of a group or individual</td>
<td>In-depth study of a case or cases</td>
</tr>
</tbody>
</table>

**Table 4.2: Dimensions for comparing five research traditions in qualitative research**

*Source: Creswell, 1998, p.65*
4.5.3.2 Advantages of Qualitative research:

Miles and Huberman (1994) have highlighted the strengths of Qualitative research as follows:

- They focus on naturally occurring, ordinary events in natural settings, so that it’s to handle on what real life is like.
- Richness and holism with strong potential for revealing complexity, such data provide thick descriptions.
- Such data collected over sustained periods makes them powerful for studying any process.
- Advocated as best strategy for discovery exploring a new era, developing hypotheses.

4.5.3.3 Disadvantages of Qualitative research

Following are the disadvantages of qualitative research method:

- The very subjectivity of the inquiry leads to difficulties in establishing the reliability and validity of the approaches and information.
- It is very difficult to prevent or detect researcher induced bias.
- Its scope is limited due to the in-depth, comprehensive data gathering approaches required (Key, 1997).

4.5.4 Quantitative research:

Quantitative research is “explaining phenomena by collecting numerical data that are analysed using mathematical based methods (Muijs, 2004). Qualitative data ranges from simple counts such as the frequency of occurrence to more complex data such as price or test scores. Quantitative analysis techniques range from table or diagram showing frequencies of occurrences, establishing statistical relationships between variables or complex statistical modelling (Saunders et al, 2009).

A quantitative approach is one in which first postpositivist claims are used for developing knowledge, employs strategies of inquiry such as experiments and surveys, and collects data on predetermined instruments that yield statistical data (Creswell, 2003). Statistics is a body of methods and theory that is applied to quantitative data, because the degree, the amount, the measurement and the numeral data are not the main source for this research. Research on Sustainable textile has to depend on more sensitive explanations through in-depth company
interviews in order to categories the update information and the efficiency data, particularly the changing influence of sustainability on textile supply chain. It is not always not possible or desirable to use structural quantitative techniques to obtain information from respondents or to observe them.

4.5.4.1 Advantages of quantitative research
Following are the advantages of quantitative research:

- Excellent way of finalizing results and proving or disproving a hypothesis.
- After statistical analysis of the results, a comprehensive answer is reached, and the results can be legitimately discussed and published.
- Quantitative experiments also filter out external factors, if properly designed, and so the results gained can be seen as real and unbiased.
- Quantitative experiments are useful for testing the results gained by a series of qualitative experiments, leading to a final answer, and a narrowing down of possible directions for follow up research to take. (Shuttleworth, 2008).

4.5.4.2 Disadvantages of quantitative research
Following are the disadvantages of quantitative research:

- Quantitative experiments can be difficult and expensive and require a lot of time to perform.
- Quantitative research design also tends to generate only proved or unproven results, with there being very little room for grey areas and uncertainty (Shuttleworth, 2008).

4.5.5. Qualitative Vs Quantitative Research:
The differences between these two approaches are located in the overall form, focus, and emphasis of study (Maanen etd, 1979, 1983). The following table 4.3 displays assumptions of quantitative and qualitative paradigms based on the methodological approach:
Table 4.3: Quantitative and Qualitative Paradigm

<table>
<thead>
<tr>
<th>Qualitative Methods</th>
<th>Quantitative Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods include focus groups, in-depth interviews, and reviews of documents for types of themes</td>
<td>Surveys, structured interviews &amp; observations, and reviews of records or documents for numeric information</td>
</tr>
<tr>
<td>Primarily inductive process used to formulate theory or hypotheses</td>
<td>Primarily deductive process used to test pre-specified concepts, constructs, and hypotheses that make up a theory</td>
</tr>
<tr>
<td>More subjective: describes a problem or condition from the point of view of those experiencing it</td>
<td>More objective: provides observed effects (interpreted by researchers) of a program on a problem or condition</td>
</tr>
<tr>
<td>Text-based</td>
<td>Number-based</td>
</tr>
<tr>
<td>More in-depth information on a few cases</td>
<td>Less in-depth but more breadth of information across a large number of cases</td>
</tr>
<tr>
<td>Unstructured or semi-structured response options</td>
<td>Fixed response options</td>
</tr>
<tr>
<td>No statistical tests</td>
<td>Statistical tests are used for analysis</td>
</tr>
<tr>
<td>Can be valid and reliable: largely depends on skill and rigor of the researcher</td>
<td>Can be valid and reliable: largely depends on the measurement device or instrument used</td>
</tr>
<tr>
<td>Time expenditure lighter on the planning end and heavier during the analysis phase</td>
<td>Time expenditure heavier on the planning phase and lighter on the analysis phase</td>
</tr>
<tr>
<td>Less generalizable</td>
<td>More generalizable</td>
</tr>
</tbody>
</table>

Source: http://www.orau.gov/cdcynergy/demo/Content/phase05/phase05_step03_deeper_qualitative_and_quantitative.htm

According to Creswell (2003), the key difference between qualitative and quantitative research is, quantitative researchers work with a few variables and many cases, whereas qualitative researchers rely on a few cases and many variables.

4.6 Data Collection Methods

4.6.1 Research Aim and Objective

This research, methodology will target on investigating sustainability in textile supply chain. Taking incremental steps in supply chain processes to make it happen that is need to believe in sustainability; and need to be aware about the social, economical and ecological benefits of environmentally sustainable products and development processes. So the care for the environment must influence the supply chain to use Sustainable Processes, run business
operations in an environmentally friendly way, work to conserve energy and reduce waste. According to Rodie (2008), “Marketers of environmentally responsible products must be able to substantiate their claims in a way that consumers can understand”. Within textile-clothing industry, there are certain manufacturers and retailers taking steps to reduce the environmental impacts of their products and they want to make sure about their efforts.

**Aim:** To understand the issues across the textile supply chain affects the growth of ecolabeled Sustainable Textiles products.

The main *objectives* of this research:

1) Conduct literature review to understand the issues and significance of ecolabeled sustainable textile goods on textile consumer’s and textile industry.

2) Conduct in-depth interviews with 2 textile manufacturers, 3 dyes & chemicals manufacturers, 1 textile testing laboratory, 1 certification body, 1 ecolabelling body, and 1 retailer to understand ‘how’ and ‘why’ they may use ecolabeled STP.

3) Compare and contrast literature review with research results to identify further research and issues for the textile industry to consider.

To achieve the above mentioned object, Qualitative Method suits because –

- The research questions start with *how* or *what* so that initial forays into the topic describes what is going on. In contrast, with Quantitative method question starts with *why* and look for comparison.
- Topic gets explored i.e. variables cannot easily identified, theories are not available to explain the behavior of participants & here theories need to be developed.
- It gives detailed view of topic
- Writing in literary style.
- Sufficient time and resources to spend on extensive data collection in the field and detailed data analysis of text information.
- The study emphasizes the researcher’s role as an *active learner.*
In brief, qualitative research increase understanding, expand knowledge, clarify the real issues, generate hypotheses, identify a range of behaviour, explore and explain consumer motivations, attitudes and behaviour, identify distinct behavioural groups, provide input to future stage of research or development. Therefore, this research will focus on qualitative research only, despite the advantages and extensive research supporting the linkage of qualitative and quantitative approaches. This is due to the time constraints and access to the organisations. Moreover, the objects are mainly qualitative in nature they require depth, the richness, and attention to details, enabled by the approach. The flexibility of the qualitative approach will also facilitate gathering alternative explanations.

4.6.2 Data collection process
Creswell (1998) stated that, data collection is a series of interrelated activities which are aimed for gathering good information to answer emerging research questions. As shown in Fig.4.1, a qualitative research engages in a series of activities in the process of collecting data.

Data collection is the selective approach to the studying research topics. The data collection methods are highlighted according to the various demand of qualitative research. First of all, this importance of identifying and classifying which data and information would be collected in order to choose the suitable method of recording qualitative data cannot be overemphasized. Qualitative research collection methods can be expensive and time consuming, although it can be argued that qualitative data in research provides a more realistic basis for analysis and interpretation.

Fig 4.1: Data collecting activities
Source: Creswell, 1998, p.110
4.6.3 Data collection in Qualitative research

According to Creswell (2003) there are four basic forms of information to collect in qualitative research: Observation, interview, document and audio-visual material. The following table will give the brief information on those methods and there advantages and disadvantages (Table 4.4).

In this thesis, the collection of documents or publications from the chosen companies is essential prior to interviews that the author could avail himself of the appropriate information and be acquainted with individual company profile and achievement.
<table>
<thead>
<tr>
<th>METHOD</th>
<th>OPTIONS WITHIN TYPES</th>
<th>ADVANTAGE OF THE TYPE</th>
<th>LIMITATIONS OF THE TYPE</th>
</tr>
</thead>
</table>
| Observation | - Complete participant - researcher conceals role.  
- Observer as participant - role of researcher is known  
- Complete observer-researcher observes without participating | - Researcher has firsthand experience with informant.  
- Researcher can record information as it occurs  
- Unusual aspects can be noticed during observation.  
- Useful in exploring topics that may be uncomfortable for informants to discuss. | - Researcher may be seen as an intruder.  
- “Private” information may be observed that researcher can’t report  
- Researcher may not have good attending and observation skills.  
- Certain information may present special problems in gaining rapport. |
| Interviews | - Face-to-face; one on one (in-person interview)  
- Group interview | - Useful when informants can’t be directly observed  
- Informants can provide historical or document information  
- Allows researcher control over the line of questioning | - Provides “indirect” information filtered through the views of interviewees.  
- Provides information in a designed “place,” rather the natural field setting.  
- Researcher’s presence may bias responses.  
- Not all people are equally articulate and perceptive. |
| Documents | - Public documents such as minutes of meeting, newspapers.  
- Private documents such as journal, diary or letter  
- Email discussions | - Enables a researcher to obtain the language and words of informants.  
- Can be accessed at a time convenient to researcher-an unobtrusive source of information.  
- Represents data that are thoughtful in that informants have given attention to compiling.  
- As written evidence, it saves a researcher the time and expense of transcribing. | - May be protected information unavailable to public or private access  
- Requires the researcher to search out the information in hard to find place.  
- Requires transcribing or optically scanning for computer entry.  
- Materials may be incomplete.  
- The document may not be authentic or accurate |
| Audiovisual Materials | - Photographs  
- Videotapes, Film  
- Art objects | - Maybe an unobtrusive method of collecting data.  
- Provides an opportunity for the informant to share the reality directly.  
- Creative in that it captures attention visually. | - May be difficult to interpret.  
- May not be accessible publicly or privately.  
- The presence of an observer may be disruptive and affect responses. |

Table 4.4: Qualitative data collection types, options, advantages, and limitations - Source: Creswell, 2003, p.186-187
4.6.4 Interviews
Interviews are associated with both positivist and phenomenological methodology. Focus group and depth interviews are the ‘Direct Approach’ method to do qualitative research (Malhotra et al, 1999). It is the most fundamental way of all collecting data in qualitative methods (Easterbay-smith, Thorpe and Lowe, 2002). Interviews can help to gather valid and reliable data which are relevant to research question (s) and objects (Saunders et al 1997). A depth interview is an unstructured, direct, personal interview in which single respondent is probed by an experienced interviewer to uncover underlying motivations, beliefs, attitude and feelings on topic (Malhotra et al, 1999). These are the methods of collecting data in which selected participants are asked questions in order to ascertain the ways they think process and aim at the target. Although interviewing is often claimed to be the best methods of gathering information, its complexity can sometimes be underestimated.

According to Denscombe (1998), Saunders et al., (1997) there are three types of research interview; structured, semi-structured unstructured interviews, and In-depth interview.

A) Structural interviews
Structural interviews involve tight control over the format of the questions and answer. These types of interviews are often associated with social surveys where researchers are trying to collect large volumes of data from a wide range of respondents. It has also been labeled as an informant interview, since it is the interviewee’s perceptions which guide the conduct of the interview (Denscombe, 1998). In such type of interviews, questionnaires are based on predetermined and standardized or identical set of questions (Saunders et al., 1997).

B) Semi-Structural Interviews
With Semi-Structural Interviews, the interviewer has a clear list of issues to be addressed and questions to be answered. However, with the semi-structured interview and interviewer is prepared to be flexible in terms of order in which the topics are considered and perhaps more significantly to let the interviewee develop ideas and speak more widely on the issues raised by the researcher. The answers are open-ended, and there is more emphasis on the interviewee elaborating points of interest. They are non-standardized interviews used to explore in-depth general area of interest (Denscombe, 1998). This type of interviews has cost-benefits, but also limitations in the depth of data (Gordon, 1988).
C) Unstructured Interviews / In-depth interviews

Unstructured Interviews are informal. In unstructured type of interview emphasis is placed on the interviewees thoughts. Here the role of researcher’s is to be intrusive as possible to start the ball rolling by introducing a theme or topic and then letting the interviewee develop his/her mind and pursue his/her train of thoughts (Denscombe, 1998). Like semi-structured interviews, unstructured interviews are even non-standardised.

4.6.4.1 Advantages of Interview

According to Malhotra & Birks (1999), depth interview has the following advantages:

- **Depth:** It allows the interviewers to control the conversation to conduct the interviewees to the main points of research problems. Interviewers can gain deeper and more precise information from interviewees by good communication skill. In addition, interviewees are targeted so as to focus directly on the topic of the case study and also provide an important insight into the situation.

- **Accuracy:** During the interview, interviewees have more time to consider their answers and interviewers and this can obtain more accurate information. The interviewers can look up files of documents to make a visual check ensure that the answers are complete.

- **Better Explanations:** To gain a deeper understanding of research projects for interviewees, these questions can be adapted further explanations or clarification.

However, if questions are poorly constructed or the interviewee gives a biased response, the results will be certain bias or incorrect.

4.6.4.2 Disadvantages of Interview

- It is very time-consuming both in terms of conducting the interview and analysing it.
- Its costly (for the above reason)
- There is tendency for people to start thinking in terms of ‘how many’ rather than in ‘how’, ‘why’, or ‘what’. (Gordon and Langmaid, 1988).
4.6.5 Interview Forms

A variety of interview forms are in exit which are useful for different purpose. Kvale and Brinkmann (2009) have suggested following forms of interviews:

- Computer assisted interviews
- Focus group interviews
- Factual interviews
- Conceptual interviews

With the broad variety of interviews and subjects, its understandable that there are no general standards procedures and rules for research interviewing. The different interview forms further related to different knowledge.

4.6.5.1 Computer assisted Interviews

Computer assisted interviews are can be conducted through email or by chat. Chat interviews are more synchronous in time that email interviews, often approaching a conversational format, with rapid turn taking, which is similar to that of face-to-face interactions. Such kind of interviews are self-transcribing in the sense that the written text itself is the medium through which researcher and respondents express themselves, and the text is thus basically ready for analysis the minute it has been already typed. The drawback of computer assisted interview is, both interviewee and interviewer should be relatively skilled at written communication. The medicated interaction introduces a possibly unfruitful reflective distance without cues from bodies and spoken language (Kvale and Brinkmann, 2009).

4.6.5.2 Focus group Interviews

A Focus Group usually consist of six to ten subjects led by moderator (Chrzanowska, 2002 cited in Kvale and Brinkmann, 2009). It is characterised by a non-directive style of interviewing where the prime concern is to encourage a variety of viewpoint on the topic in focus for the group. The aim of the focus group is not to reach consensus about or solution to, the issue discussed, but to bring forth different viewpoint on an issue.
4.6.5.3 Factual Interviews
Obtaining valid factual information may be crucial in many interviews. The intricacies of interviewing for factual information are well documented in studies of witness psychology. The importance of the wording of questions was forcefully brought out in an experiment where different groups of subjects are shown and after words asked about the subject.

4.6.5.4 Conceptual Interviews
The purpose of an interview can be conceptual clarification. The questions in conceptual interviews explore the meaning and the conceptual dimensions of central terms, as well positions and links within conceptual network. Doing conceptual interviews can serve to uncover respondents discourse models.

4.6.6 Telephonic Interview:
Telephone interviews are used extensively in quantitative research (While, & Bergen, 1996; Carr & Worth, 2001 cited in Novick, 2008) and are often discussed in the survey methodology literature. In contrast, relatively few qualitative studies employ telephone interviews (Sturges & Hanrahan, 2004 cited in Novick, 2008), and there is little methodological discussion of the telephone mode in the qualitative research literature. When qualitative telephone interviews are discussed, they tend to be depicted as the less attractive alternative to face-to-face interviews. Denscombe (1998) noted that telephone interviews are considered a suspect research method, since it may lead to a biased sample. In addition, he argued that there have been recent doubts about the reliability of the data gathered using telephone interviews and that some researchers have not been willing to sacrifice the quality of their data for the economies that telephone interviews can bring. He added that, telephone contact is still more intrusive than methods such as questionnaires and although it reduces the level of non-responses through non-contact, it suffers from a higher non-response rate overall.

4.6.6.1 Advantages of Telephonic Interview
Following are the advantages of telephonic interview:

- Telephone interviews enable a researcher to gather information rapidly.
- Like personal interviews, they allow for some personal contact between the interviewer and the respondent.
• Decreased cost and travel
• Ability to reach geographically dispersed respondents (Novick, 2008).

4.6.6.2 Disadvantages of Telephonic Interview
Following are the advantages of telephonic interview:

• Telephone interviews need to be relatively short or people feel imposed upon.
• Many people don’t have publicly listed telephone numbers.
• limited telephone coverage in certain areas
• lower response rates
• Absence of visual or nonverbal cues (Novick, 2008).

4.6.7 Case Studies
Denscombe (1998), stated that, case studies focus on instance of a particular phenomenon with view to providing an in-depth accounts of events, relationships, experiences or processes occurring in that particular instance. According to Yin (1998), case studies contribute uniquely to the knowledge of individual, organisational, social, and political phenomena.

From the literature reviewed, case studies have two common features:

• They are a source of qualitative data, which have been described as a source of well-grounded, rich descriptions that preserves chronological flow from which fruitful explanations could be derived (Miles and Huberman, 1994).
• Case studies are used to explain causal links in real-life events, describe real-life events and evaluate issues about the events being studied (Yin, 1994).

Denscombe (1998) noted that the case study is one of several ways of doing social science research, such as experiments, surveys and histories. Case studies are the preferred strategy when ‘how’ or ‘why’ questions are being posed, when the investigator has little control over events and when the focus is on a contemporary phenomenon within real-life context. Yin (1994) highlighted that case study research can include both single and multiple cases studies. Denscombe (1998) indicated that the selection of cases requires making a choice among a number of possible events, people and organisations; the choice needs to be justified. He identified different justifications:
• Selection on the basis of ‘suitability’.
• Selection on a ‘pragmatic’ basis.
• Selection on the basis of ‘no real choice’

4.6.7.1 Advantages of case studies

• Deal with subtleties and intricacies of complex social situations.
• The analysis is holistic rather than based on isolated factors.
• Allows to use variety of research methods i.e. it more or less encourages the use of multiple methods in order to capture the complex reality under scrutiny.
• Case study approach fosters the use of multiple sources of data, facilities the validation of data through triangulation.
• Since the approach is concerned with investigating phenomena as they naturally occur, there is no pressure on the research to impose controls or to change circumstances.
• This approach fit in well with needs of small scale research through concentrating effort on one research site.
• Theory -building and theory testing research can both use the case study approach to good effect (Denscombe, 1998).

4.6.7.2 Disadvantages of case studies

• Its most vulnerable to criticism is in relation to the credibility of generalizations made from its findings.
• Case studies are often perceived as producing soft data
• The boundaries of the case can prove difficult to define in an absolute and clear-cut fashion.
• Access to documents, people, and setting can generate ethical problem in terms of things like confidentiality (Denscombe, 1998).

4.6.8 Questioners Design
Malhotra & Birks (2003) defines a term “Questionnaire” as ‘A structured technique for data collection consisting of series of questions, written or verbal that a respondents answers’. In other words, the questions designed is the basic method of collecting data, through asking questions of people who are concerned about the research topic to gain the desired
information. This method can obtain the data that is specific information about the defined problems and result in a better appreciation of the problems after analysis and interpretation. Therefore, the questions designed for interview is very important for this research.

According to Saunders et al, (1997), the design of questionnaires will affect the response rate, the reliability and validity of the data; and this can be maximised by:

- Careful design of individual questions
- Clear layout of the questionnaire form
- Lucid explanation of the purpose of the questionnaires
- Pilot testing.

4.6.8.1 Types of variable
Dillman (1978 cited in Saunders et al., 1997) highlighted sorts of data collected through questionnaires have been grouped into four distinct types of variables:

- Attitudes
- Beliefs
- Behaviours
- Attributes

These distinctions are important since they will influence the way questions are worded. *Attitude* variables record how respondents feel about something. They differ from *belief* variables where researcher’s record what respondents think or believe is true or false. As a consequence, questions about belief should imply neither good nor bad, only an assessment of what the respondent thinks.

In contrast, data on behaviours and attributes are more straightforward to collect (Robson, 1993 cited in Saunders et al., 1997). *Behavioural* variables contain data on what people did in the past, do now, or will do in the future. By contrast, *attribute* variables contain data about the respondents characteristics.
4.6.8.2 Designing individual questions

The design of each question should be determined by the data need to collect. When designing individual questions researchers should do one the three things (Bourque and Clark, 1994 cited in Saunders et al., 1997):

- Adopt questions used in the other questionnaires
- Adapt questions used in other questionnaires
- Develop own questions.

Adopting or adapting questions may be necessary if researchers wish to compare his findings with another study. This can allow reliability to be assessed. Most types of questionnaires include a combination of open and closed questions. An open question allows respondents to give answers in their own way; whereas closed questions provide a number of alternative answers from which respondents is instructed to choose. This type of questions is usually quicker and easier to answer as they require minimum writing (Saunders et al., 1997). For instance, a positivistic approach suggest structured closed questions, as used in market research surveys, however, verbal or visual prompts may be required. A phenomenological approach suggests unstructured i.e. open-ended questions, where the questions have not been prepared beforehand. Unstructured or semi-structured interviews are likely to be very time consuming and there may be problems with recording the questions and answers, controlling the range of topics and analysing the data. Questions are likely to be open-ended and probes may be used to explore answers in more depth. In open-ended questions each respondent can give personal response or opinion in his/her own words; on the other hand in close ended questions, respondents answer is selected from number predetermined alternatives. Designing questions is a crucial element of many data collection (Hussey et al, 1997).

In this thesis, most of the questions designed are open-ended in which an investigator can ask key respondents for the facts of matter as well as for the respondent’s opinions about the events. Appendix 1 shows the list of questioners asked to each interviewee from each segment of textile supply chain.
4.7 Research Design:

Research design is a plan, structure, and strategy of investigation to conceived as to obtain answers to research questions or problems (Kumar, 2005). Furthermore, it is the logic that links the data to be collected and the conclusions to the initial question in the study. According to Malhotra & Birks (1999), “A research design is a framework or blue print for conducting a marketing research project. A research design is an action plan for getting here to there, where here may be defined as the initial set of questions to be answered and there is some set of conclusions about the questions (Yin, 1994). Yin (1994) have highlighted that, research design is as a ‘blueprint’ of research dealing with at least four problems: what questions to study, what data are relevant, what data to collect, and how to analyze the results.

4.7.1 Components of Research Designs

According to Yin (1994), there are five components of research design:

1) a study questions,
2) its propositions, if any,
3) if unit(s) of analysis,
4) the logic linking the data to the propositions, and
5) the criteria for interpreting the findings.

Study questions: The researcher’s first task is to identify and clarify the nature of study questions. The aims and objectives of this research are mentioned in section 3.4.2.

Study propositions: where each proposition directs attention to something that should be examined within the scope of the study. The aim, objectives and the study’s questions have been addressed in the literature review, and will be in the analysis and discussion.

Unit of analysis: relates to defining what the ‘case’ or ‘individual’ is. This study’s unit of analysis is individual segment of textile supply chain, so information about them must be collected (propositions will help identify and narrow the relevant information needed about the individual, since it would be impossible to collect everything). Yin (1994) highlighted the importance of defining the unit of analysis and how it relates to the way the initial questions have been defined. Each unit of analysis calls for a slightly different research design and data
collection strategy. The more accurate the research’s aims and objectives, the more appropriate the unit of analysis; hence, obtaining the best results.

Linking data to propositions and criteria for interpreting the findings: (Data analysis step) by pattern matching, an approach proposed by Campbell (1975, cited in Yin 1994), whereby several pieces of information from the same case may be related to some theoretical proposition. Currently there is no precise way of evaluating these types of findings; however, different patterns may be sufficiently contrasting that findings can be interpreted in terms of comparing at least two propositions.

4.7.2 Sampling Design and Analysis:
Sampling is one of the components of a research design. According to Malhotra et al., (2004), sampling design process includes five steps and those are:

1) Define target population
2) Determine the sample frame
3) Select sampling technique
4) Determine sample size
5) Execute the sampling process

Looking into its aims and objectives for this research, target population is defined as follows:

- **Elements:** The companies across the textile supply chain involved in processing of ecolabeled STP.
- **Sampling Units:** Companies representatives.
- **Extent:** Manufacturers of textile, dyes & chemicals, testing laboratories from developing countries i.e. India; retailers, certification bodies (UK), ecolabelling issuing company (Switzerland) origin from developed countries (Europe).
- **Time:** if the research is possible within the timeframe for the project.

While selecting the sampling frame i.e. companies’ representatives for interviews following factors are considered:

- Size of the company in terms of sales
- Production capacity
• Kinds STP can manufacturer
• Kind of Certification for sustainability
• Accredited ecological parameters testing laboratory
• Retailing (which products)
• Which ecolabel issuing

The selected companies have at least one following production facility:

• Spinning
• Weaving
• Knitting
• Wet processing
• Stitching/Garmenting
• Retailing
• Testing
• Authorization of Certification
• Authorization to issue Ecolabel.
Fig 4.2: Textile Supply Chain
While selecting the companies (sampling techniques), nonprobability self-selection sampling (traditional sampling) technique is used where the entire sample is collected before collection begins.

Regarding sample size, at least one interview from each textile supply chain (fig.4.2) was planned and i.e. basic 9 interviews.

### 4.8 Qualitative Data Analysis Techniques

Qualitative Data analysis is a comprehensive analysis that is directed at tracing out lawful and stable relationships among social phenomena, based on the regularities and sequences that link these phenomena. The main challenge to qualitative data analysis is that there is no clear and accepted set of conventions for analysis corresponding to those observed with quantitative data (Hussey and Hussey, 1997). There are main two methods, Quantifying methods & Non-quantifying methods by which analysis of qualitative data can be done (Table 4.5).

<table>
<thead>
<tr>
<th>Quantifying methods</th>
<th>Non-quantifying methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informal method</td>
<td>General analytical procedure</td>
</tr>
<tr>
<td>Formal methods</td>
<td>Cognitive mapping</td>
</tr>
<tr>
<td>• Content analysis</td>
<td>Data displays</td>
</tr>
<tr>
<td>• Repertory grid</td>
<td>Grounded theory</td>
</tr>
<tr>
<td></td>
<td>Quasi-Judicial methods</td>
</tr>
</tbody>
</table>

**Table 4.5: Main methods of analysing qualitative data**

*Source: Hussey and Hussey, (1999); p. 249.*

According to Malhotra & Birks (1999) the process of analysing qualitative data can be encapsulated in the four stages –

- **Data Assembly:** Data assembly means gathering of data from a variety of sources like notes taken during interview, reflections of observer, theoretical support (e.g. literatures, secondary data), and documents produced from interviewee, photographs, audiotape & transcripts, videotape.
• **Data Reduction**: Data reduction refers to the process of selection, focusing, simplifying, abstracting and transforming the data. Before data are actually collected, anticipatory data reduction is occurring as the researcher decides which conceptual framework, cases, research questions and data collection approaches to choose. The data reduction process continues after fieldwork, until a final report is completed. Data reduction is part of analysis where the based on transcripts, notes, and other supporting material gets scrutinized and gets coded which is called as Coding Data i.e. breaking down the data into discrete chunks (Malhotra et al, 1999). It also can be seen as “data condensation” to make the analysis sharp, focused, organised while discarding unnecessary data (Miles and Huberman, 1994).

• **Data Display**: Generally, data display is an organised and compressed, assembly of information that permits conclusion drawing and action. In other words, data display involves summerising and presenting the structure that is seen in the collected data. It can help the researcher to deepen his/her understanding or to decide on future actions. The most frequent form of display for qualitative data in the past has been an extended text. However an extended text is poorly structured and extremely overload. Thus the better display is valid qualitative analysis, which is designed to assemble organised information into an immediately accessible and compact form. A proper data display is an inventive and systematic process before drawing the data conclusion (Miles and Huberman, 1994). There are many different ways of displaying data such as graphs, charts, networks and diagrams of different types and any way that moves the analysis forward is appropriate. Displays are used at all stages, since data are enabled to organise and summaries (Malhotra et al, 1999).

• **Data Verification**: Data verification involves seeking alternative explanations of the interpretations of qualitative data through other data source and theories. In other means to verify the data can be through seeking ‘similar’ research findings and explanations taken from different context different time frames, and different researchers.

Qualitative data analysis is a continuous and iterative enterprise; data assembly, data reduction, data display and verification are four components that are interwoven and concurrent throughout the data analysis. These four components give an overall view of data analysis and also involve operations, coding, memo and developing propositions, which are processed to help clearly analysing data (Malhotra et al, 1999).
4.9 Adopted Research Method

The aim of the research is to examine the role of different actors across the textile-fashion supply chain to understand the issues regarding growth of eco-labeled STP. The main objectives of this research are to:

1) Conduct literature review to understand the issues and significance of ecolabeled sustainable textile goods on textile consumer’s and textile industry.

2) Conduct 9 in-depth interviews textile manufacturers, dyes & chemicals manufacturers, ecological textile testing laboratory, certification body, ecolabelling body, and retailer to understand ‘how’ and ‘why’ they may use ecolabeled STP.

3) Based on interviews understood the significance, role and importance of each one of while producing eco-labeled STP.

4) Compare and contrast literature review with research results to identify further research and issues for the textile industry to consider.

This study therefore uses in-depth semi-structured, telephonic and computer assisted interview techniques as the collection method, since it enables the generation of ‘thick descriptions’ and depth of information required for the formation of the conceptual framework. In this thesis a literature-based approach is used with the aim of building a strongly substantiated background of ecolabeled sustainable textile and helps to understand the significance of it on textile consumer and industry. In addition, literature review is helped to understand the unsustainability across the textile life cycle. Internal data collected from companies to be used as case document and this assist the research & to gain more information about the project. The data which is not possible to search or collect from the companies, that is collected from external database like company web-site. Apart from this computerized internet database is also one of the source of external database where most of the data available online, or offline; e.g. Fiber2Fashion, where most updated news of textile & fashion industry is published.

Saunders et al. (2003) emphasised that where it is necessary for the researcher to understand the reasons for the decisions that the research participants have taken or to understand the reason for their opinions, suggestions it will be necessary to conduct a qualitative interview.
Therefore, the interview is the most suitable method which will meet the aims and objectives of the research. The semi-structured format was chosen since it will be guided by open-ended questions, giving the interviewees an opportunity to talk about events, behaviours and beliefs regarding ecolabeled STP, hence enabling the research to explore how and why textile manufacturers, dyes and chemical manufacturers, textile testing laboratory, certification bodies, and retailers may use ecolabeled STP. In order to achieve the objectives of the research, it is essential for the researcher to understand the thinking process of whole textile supply chain, including testing, certification bodies and ecolabelling which plays key role for the growth and evaluation of STP and the different information that they gather and process, within their varying positions and market levels. The flexible and responsive interaction between the interviewer and the respondent will allow meanings to be probed, topics covered from a variety of angles and questions made clear to respondents. By listening to what they say, and how they say it, the researcher will be able to meet the research objectives, and compare differences within different companies.

Various organisations were contacted by the researcher for interview and email will be sent out to negotiate access. Interviews with representative from different companies will be arranged, to take place in April for approximation between 30 minutes to 1 hour. They will be tape recorded, and transcribed. Since the non-standardised method was chosen, questions will be added or deleted/alktered during the course of the individual interviews, and the sequence of questions will change to meet the characteristics of the respondents and their answers. In addition to one-to-one interviews looking into time and money constrains, few interviews are arranged on telephone, and by email.

**4.10 Fieldwork**

The process for conducting the personal interview is not an easy task. It’s around one month to search the (textile, dyes & chemicals) manufacturer, retailers, certification body, textile testing, and ecolabelling and for confirmation for interview. The duration for each interview is around 30-60 minutes, however to complete the interview process it takes more than half day to one day since the interviewee are placed at different places like, Mumbai (3 people from different part of Mumbai, India). Mean times because of lack of time and travelling, few interviews are planned on telephone and by email.
The whole process is as follows: First, find the potential companies through own contacts, and then select the appropriate ones. Second, try to contact them through either phone or E-mail. Third, gathered the basic information about company, such as the company’s size, location, specialties, products etc. Third, form and design related questioners for the interview to be based on. Fourth, arrange the time and place for the interviews.

The interviewees for the companies are either with managerial staff, whose work are somewhat affiliated with the company’s product development, marketing sectors or manufacturing department. They ranged from director of development, director of Marketing, Company Owner/ Director etc. Finally, the researchers truly appreciated the companies who are has spend their precious time for this work and this interviewing process provided the important information related to STP’s.

4.11 Interview questions

Interview questions are listed in Appendix I.

4.12 Conclusion

With reference to the research aims and objectives, a review of in-depth interview methodology was conducted to assess the benefits and problems associated with this methodology. Multiple In-depth interviews to be the most appropriate method for conducting the research. A semi-structured interview schedule was designed and an interview protocol was presented. A structure for the in-depth interview report was outlined. Variables were to be identified manually through content analysis of the interviews.
CHAPTER 5: RESULT AND ANALYSIS

5.1. Introduction

This chapter describes the steps used in gathering primary data, and the methods used for analysing the results. It will begin by outlining the time, place and mode of interview for all the interviews conducted, the procedures of the interviews, and their transcription. Background information will be given for all the interviews, the interviewees, and an overview of the companies. Summaries and analysis from the interviews will be highlighted and summarised in a tabular form. This is an essential part of data reduction since it clarifies the thoughts and enables comparisons between the different interviews.

5.2. Data collected

To achieve the research objectives, data collection is very important. In further sub-sections it’s discussed about how, when, where data collected and who are the respondents.

5.2.1 Time and place

The researcher has contacted numerous organisations for the interview purpose though mail and telephone. To understand the importance and issue of ecolabeled sustainable textile goods across the supply chain, it’s important to conduct the interviews of at least one representative from each segment. According to Fig. 4.2, at least one respondent is required. On continuous follow up with different companies, following company representatives (Table 5.1) have confirmed the interviews. Because of lack of time, travelling and money three interviews are carried out on telephone, and three by mail. Out of nine interviewees three are dyes and chemical manufacturers, else for other process, one respondent is available. Here, all three dyes and chemical respondents are considered since this will give cumulative information on STP from dyes and chemical manufacturer end.

The interviews are take place in month of May and June 2010. All the face to face to interviews was scheduled at the head offices of the companies, three interviews on email, and three were telephone interview. All three face to face interviews were carried out in afternoon time only to avoid busy hours.
<table>
<thead>
<tr>
<th>Name and Place of Company</th>
<th>Textile Manufacturing/Testing Facility</th>
<th>Representative Name and Designation</th>
<th>Interview Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots creations, Mumbai, India. <a href="http://www.purecotz.com">http://www.purecotz.com</a></td>
<td>Garment manufacturer</td>
<td>Mr. Amit Narke, Owner</td>
<td>Face to face</td>
</tr>
<tr>
<td>Alok Textile Industries, Mumbai, India. <a href="http://www.alokind.com">http://www.alokind.com</a></td>
<td>Spinning, weaving, knitting, processing, garmenting.</td>
<td>Mr. Mesmer Micheali, Bottoms Marketing Head</td>
<td>Face to Face</td>
</tr>
<tr>
<td>Texanlab Laboratories Pvt Ltd, Thane, India. <a href="http://www.texanlab.com">http://www.texanlab.com</a></td>
<td>Ecological testing laboratory</td>
<td>Mr. Ullhas Nimkar, Director</td>
<td>Face to Face</td>
</tr>
<tr>
<td>DyStar, (HO) Mumbai, India. Singapore. <a href="http://www1.dystar.com">http://www1.dystar.com</a></td>
<td>Dyes, Pigments and chemical manufacturing company</td>
<td>Dr. Siva Pariti (Manager, Laboratory and DyStar Textile Services, India), Dr. Charu Jain (Ecology Solutions Manager - Asia).</td>
<td>Computer assisted (email interview)</td>
</tr>
<tr>
<td>M/s. Inter Continent Chemicals India Ltd., Mumbai, India.</td>
<td>Textile auxiliaries manufacturing</td>
<td>Mr. Vikas Saraf, Director</td>
<td>Computer assisted (email interview)</td>
</tr>
<tr>
<td>Soil Association, Bristol, UK. <a href="http://www.soilassociation.org">http://www.soilassociation.org</a></td>
<td>Certification Body</td>
<td>Mr. Lee Holdstock, Tread Relation Manager</td>
<td>Telephonic Interview</td>
</tr>
<tr>
<td>Hohenstein Institute, Tirupur India.</td>
<td>Testing and ecolabelling body</td>
<td>Mr. Vignesh Amalraj, Technical Compliance Manager</td>
<td>Telephonic Interview</td>
</tr>
<tr>
<td>Frugi <a href="http://www.welovefrugi.com">http://www.welovefrugi.com</a></td>
<td>Retailer of Garments made from Organic cotton</td>
<td>Ms. Anna Bond, Supply Chain Manager</td>
<td>Telephonic Interview</td>
</tr>
</tbody>
</table>

Table 5.1: Interviewee Details
5.2.2. Interviews Procedure

The interview was introduced by a briefing in which the interviewer defines the situation for the subject, briefly introduced the purpose of the interview, permission for recording the interview taken and asks the interviewee if any question had before starting the interview. In case of telephonic interview, researchers confirmed that, there is no disturbance in telephone line and same confirmed with interviewee. A series of questions were asked in a semi-structured manner, to enable the interviewee to discuss the important issues in more depth or be probed when necessary. Depend on the company background and processing facility, questions were asked. The order in which questions were asked depended on the responses. During the interview basic notes were taken, and a lot of attention was focused on:

- Ensuring that the interviewee understood the questions and had time to think about them and respond.
- The interviewees gestures, his tone of voice, frequency and intensity of eye contact.

5.2.3 Interview Transcripts

After completion of each face to face and telephonic interview, the audio was listened few times until the interview was transcribed word-to-word. This is important to make sure that nothing crucial is missed out, and hence the data is sufficient for the analysis. The transcripts can be found in Appendix 02 to 10.

5.3 Interview Summaries

Based on data collected from respondents, researcher had summaries it according to their manufacturing process. The interviews were with members of the supply chain in the organic cotton. The interview summaries are presented according to their place in the supply chain.

5.3.1 Textile Manufacturers:

The textile manufacturers interviewed were Purecots Creations and Alok Textile Industries.
5.3.1.1 Purecots Creations:

Company Background & Product:

Purecots Creations is very unique company who produces only STP from past ten years. The company`s last year turnover was 3.5 million USD. Company mostly producing knitted, woven baby garments, and in small percentage adults wear which are GOTS, OE & Fair-tread certified. Purecots is doing STP business not only because it`s a profitable product, it`s good for environment, and i.e. it’s a “Win-Win” situation for environment as well as business too.

Approach towards STP:

All the naturally grown products are not organic or sustainable, because there is no guarantee that naturally grown product is grown from Non-GMO (Genetically Modified Organisms) based seed or source, in addition, there is no assurance that land doesn’t have any traces of harmful pesticides, fertiliser. In contrast, in case of organic product, it’s grown from non-GMO source and land is free from harmful pesticides & fertilisers.

Thoughts on certification and Ecological Testing:

To call a product organic or sustainable whole supply chain must be certified by certification body. Certification gives the transparency to end consumer with regards to genuinity of the final products. Certifications are for the betterment, improvement and understanding of the ecological, social and given criteria`s. However, certification is not possible for all the manufacturers because of the cost involved in certification & changes required in the production line to comply. Most of the time certificates are asked by the buyers to confirm the genuinity of products and suppliers. Not all the buyers are having complete knowledge of certifications and ecological criteria`s. without understanding they just copy down the others criteria`s and impose on the suppliers.

Regarding ecological testing, to prove the products are free from certain parameters, testing is required. Testing is bottle neck for the processors where they have to use eco-friendly dyes and chemicals which is not only good for them, as well for environment and for human skin too. Today, buyers are not much rely on testing, since manufacturer provides transaction
certificate which is issued by certification body which confirms that product is free from ecologically harmful products.

**Pricing of STP:**

Raw materials for sustainable textiles are somewhat costly compared to conventional ones, for example higher organic cotton prices. Since raw material is costly, eventually across the supply chain because of value addition it becomes further costly, and eventually on consumers it gets imposed in the form of premium. Farmers are asking higher organic cotton price in order to compensate the yield difference between conventional cotton and organic cotton production.

**Response and Activities to become more sustainable:**

Production of STP’s gives feeling of fulfilment and relaxation that company is not one of the parasitic of mother earth. Eco-friendly, certified, approved pigments/dyes/chemicals not only help to reduce the water pollution, also maintains the good working environment and health of the workers. However, from certified dyes and pigments it’s not possible to achieve all the required colours and shades. To overcome this issue, buyers purchase the goods under the standards where there is a relaxation on dyes & chemicals like OE 100 & blended standards. Now a day’s buyers have started using bags made up of corn and potato as a substitute to plastic bags. Celebration of days like Green Day, Earth day within the company try to gives the knowledge, message and information of sustainability at grass route level. In today’s technological era, the days is not far away where we would be producing yarn by the use of solar energy.

**Company beliefs & vision for future:**

According to interviewee, “STP are needed today, it’s not a single man or company or country’s responsibility to overcome from current unsustainability issues, it’s the responsibility of all human kinds. It’s very important to keep in mind that, we belong to earth, not earth belongs to us, and it’s a give and take process”. Looking into current progress and growth in STP products, in next ten years, 50% products in the market would be STP only.
5.3.1.2. Alok Textile Industries:

Company Background & Product:
‘Alok Textile Industries’ is India’s one of the top textile vertical integrated company serving textile industry from past 26 years. Alok has in-house facility from spinning to garmenting of knitted, woven and embroidery fabrics. They have wide product range like, babies, men’s, ladies, kids garments; made-ups, speciality fabrics, bags, and many more. The last year turnover of the company was around 663 million USD. The company has certified for EU Flower, KARV, GOTS, OE, SWAN, Oeko-Tex, ISO 9001, ISO 12000, OHSAS 17001, and SA 7000 certificates. The company is entertaining to the clients like H & M, C & A, M & S, Wal-Mart, Woolworth, Asda and Tesco.

Approach towards STP:
For Alok, Sustainability is a Holistic approach, “sustainability comes first before profitability”. Sustainable textile is good for health of planet earth, for human being, and for business as well. Companies environmental policy is based on three pillars - Reduce, Reuse, and Recycle; for ex: recycling of papers cones and convert them into new ones.

Thoughts on certification and Ecological Testing:
To maintain the sustainability, certification should be mandatory, because it develops the transparency within system and gives assurance to the end customer with regards to authenticity of products. It helps to maintain the traceability within the supply chain, review own system and overcome the lacunias within them, e.g. GOTS certification. Along with certification because of testing only it’s possible to differentiate between harmful and harmless products. Certification and testing go hand in hand. Certification and testing both are buyer’s requirements to prove the product is sustainable; however, it’s costly. Different laboratories charging differently for same test by same method.

Pricing of STP:
STP are costlier than conventional products, however it should not be overpriced.
Response and Activities to become more sustainable:

Across the textile supply chain, dyes & processing aids are the sources of pollution. In case of STP production, because of the use of certified, approved, eco-friendly products, directly it helps to reduce the pollution. Transportation is also the important area while calculating carbon footprint of product. For Alok, since all the plants are situated near to each other and also raw material suppliers are nearer to the production plant, the final product’s carbon footprint is less.

Company believes & vision for future:

The STP business is profitable from farmer to customer if it does in real manner. It will take some time to become more sustainable. However, movement towards to that direction is very important. Polyester from plastic bottles is a smart move towards recycling and sustainability.

5.3.2. Dyes & Chemical Manufacturer

The Dyes & Chemical Manufacturers interviewed were DyStar, Britacel Silicones Ltd and M/s. Inter Continent Chemicals India Ltd.

5.3.2.1 DyStar

Company Background & Product:

DyStar is a company formed in year 1995 combines’ textile dye businesses of the former dye producers Bayer, Hoechst, BASF, ICI/Zeneca, Mitsubishi and Mitsui with the auxiliary activities of Boehme and Rotta. DyStar has about 3700 employees in more than 50 countries and runs 21 production facilities in 13 countries. Worldwide sales amounted to 700 million Euros in 2007. They are in the manufacturing of dyes, pigments, processing aids for textile processing from spinning to garment washing. Apart from manufacturing, DyStar provides Expert, Ecology, Colour, and Testing solutions.

Approach towards STP:

DyStar defines Sustainable textile as, “the product which has manufactured by taking care of all the three elements of sustainability that is: social, economic and environmental
sustainability and product design is fashionable to sell and sustain in the market”. Manufactures need to put extra efforts and focus on cleaning the supply chain and making it more environment friendly by adopting the sustainable processes for the better environment, better health of the textile industry workers and the consumers at the end. DyStar has been the company which places sustainability and ecology as the top most priority and it started self check process since the beginning. If any product is found in the portfolio which is not ecologically safe, it will be immediately recalled in spite of its popularity in the market. Most of the DyStar products are GOTS certified, apart from this few are Blue Sign certified, and to all other follow own RSL norms. All these norms for all the products are tested and assessed by the Ecology cell of DyStar and follow a self monitoring.

**Thoughts on certification and Ecological Testing:**

According to DyStar, certification should not be mandatory; because anything which is made mandatory will attract lot of resistance and then finding the loopholes in the system will take place. It needs lot of acceptance from all the quarters and make it popular (e.g., Oeko Tex) by proper marketing. They go for certification only because of the buyer’s requirement, else they believe in self certification.

Testing is backbone of manufacturers. Because of testing its possible to test the ecological parameters are PPM (Parts Per Million) and PPB (Parts Per Billion) level too. With which it’s possible to identify the level of impact by harmful substance on environment, on human being. Test reports are the proof for what are we clamming.

**Pricing of STP:**

Since DyStar is not manufacturing any unsustainable product, they don’t have any price difference between certified/approved and non-certified/ approved products.

**Company believes & vision for future:**

DyStar has a developed separate wing called Ecology solutions which screens and maintains the standard of the products. They have launched E-confidence system for their buyers/customers, so they can even produce their goods in sustainable manner. This is the part of commitment to environment and CSR for their company. Only STP have place to stay in
the future and others will vanish as the awareness from the customer and consumer is increasing. Production of STP’s are commitment to environment and it’s a CSR (Corporate social responsibility) for the company.

5.3.2.2 M/s. Inter Continent Chemicals India Ltd

Company Background & Product:

M/s. Inter Continent Chemicals India Ltd. is a 33 year old manufacturing company with 3 production facilities having capacity in excess of 22000 MT per annum. Currently, they are manufacturing Specialty Chemicals for Textile, Paper & Pulp, Leather and Plastic, Intermediates for Agriculture, Rubber, Pharmaceuticals, Dyes, Reactive Dyes and Commercial Construction. Form past 17 years; they have technical collaboration with AMITECH, Inc. NJ, USA in the field of textiles for super specialty range of chemicals. The companies most of the products are Oeko-Tex 100 and GOTS certified.

Approach towards STP:

According to Inter Continent Chemicals India, “Sustainable textile” is a mindset; it’s not in hand of one person to change the world. Hence our acts, behaviour and lifestyle should not disturb the harmony of its eco-system. Sustainable products are much needed today to take care of our eco-system, so that this planet can “Sustain” lives and livelihood of its 6 billion inhabitants.

Thoughts on certification and Ecological Testing:

Certification is mandatory where checks and balances are a must for any rule to be enforced and it’s done by the process of certification. Sustainability and sustenance should not become a powerful tool or a weapon or a marketing gimmick in the hands of few corporate with access to the corridors of power to get even with competition.

Without testing, there would not be any development. Testing is a backbone of whole supply chain, specifically for sustainable goods, since from raw material to final product everything gets approved based on test report. Ecological testing is the way to prove that your products are safe for everyone, including environment. Many companies are using test reports are as a
marketing tool, which changes the viewers mind about the company and eventually products manufactured by that company. For certification even, test reports are mandatory, without which it’s possible to get certificate.

**Pricing of STP:**

According to interviewee, “Once you have set your mind, the price or the incremental cost, does not matter”.

**Company believes & vision for future:**

Producing STP gives a sense of pride that company is contributing to undoing what has been done wrong for over a century in our lust of Industrialization, growth and profits; even though it comes minor incremental cost. Majority of today’s polluters like India, China, Brazil, Vietnam, Mexico, the so called emerging market of export of textiles to the developed nations. And being part of that chain, processors in the emerging markets are arm twisted in to supplying goods at throw away prices, all in the name of market capitalism, competition and survival of the fittest.

**5.3.2.3 Britacel Silicones Ltd**

**Company Background & Product:**

Britacel Silicones Ltd is one of the India`s leading silicone and silicone based products manufacturing company established in year 1977. The company has 30% market share for supply of silicones in India. The company has shown phenomenal jump of about 5 times in the turnover during the past 5 years.

**Approach towards STP:**

Britacel has defined the STP in very simples but true words; “Sustainable products are those products providing environmental, social and economic benefits while protecting public health, welfare and environment over their full commercial cycle from the extraction of raw materials to final disposition”. STP’s are needed today to save natural resources and protect environment. Britacel is manufacturing eco friendly softeners of silicones and cationic but they are not fully sustainable in real sense.
Thoughts on certification and Ecological Testing:

Certification is required to maintain the uniformity in offer and standards. There many products are GOTS certified, as well few are Oekopass certified. They are in the process of certification for REACH as well.

To get ecological certificates like GOTS, test report are mandatory. However, for applicant i.e. manufacturer need to pay lots of money, but its one time investment. Without testing, there is no development towards sustainable products.

Pricing of STP:

Sustainable products are comparatively expensive; however customers are ready to pay for it.

Company believes & vision for future:

Producing STP is management conscious decision and most of the clients are demanding them. STP’s added goodwill, environment friendly and safe.

5.3.3 Ecological Testing - Texanlab Laboratories Pvt Ltd:

Company Background and ecological testing:

Texanlab Laboratories Pvt Ltd, this is textile analytical laboratory, established in year 1973. The laboratory undertakes analysis in all aspects of textile and entire textile supply chain. From year 1991, the laboratory has started testing ecological parameters like formaldehyde. Currently, laboratory carry out testing of most of the ecological parameters like, AOX (Adsorbable Organic Halogen), formaldehyde, banned amines, heavy metals, APEO (Alkyl Phenyl Ethoxlates), PCP (Penta Chloro Phenol), LD 50 (Lethal Dose 50, for rats), LC 50 (Lethal Concentration 50 for fish), biodegradability and many more.

Thoughts on need of STP:

Today everybody is talking about need of ‘sustainability’, however, why and how these situation has come are not know to too many people. The earth is 2005 million year old and from last 1.5 million years the human being is in existence. In year 1770, the population was 1
million, where now it got multiplied by 150 times. In year 1756 first synthetic dye was created by Mr. Perkin. Then slowly, 1920s, 50s and 60s organic chemistry evolved polymer chemistry and development of synthetic fibre have started. In year 1956, first reactive dye was invented. As the population was increasing, the production of chemicals, dyes was increasing i.e. the human being was started utilising the natural resources in large numbers. In mid 70’s, people have started realising that, along with chemical positive effects also have an adverse effect. This has primarily started in Germany because out of 6 world’s largest companies are situated on one river, the Ryan. The fishes are not eatable from Ryan river because of the high percentage of arsenic, lead, cadmium, mercury and so on. In 1977, during research it realized that, few azo dyes are having free carcinogenic amines which may be in the free form or they may get leached out of the fabric and cleaved inside the human body because of certain enzymatic reactions. Then in year 1992-93, Germans has come up with legislation for banning certain dyes which would be potentially carcinogenic. It’s easy to test the effect of the product, however still industry is lacking in testing side-effect of product. There are certain products which are not harmful as a final product, however there intermediate degraded product is very destructive. The best example for it would be APEO (alkyl phenol ethoxlates); in environment this product got breakdown into sunlight, when it comes to 1 or 2 or 3 mol, it can’t breakdown further and these products are called as Persistent Products. These products affects the mimic’s of estrogens of female harmon and studies found that, presence of such chemicals in river male fish start producing eggs, so it’s called endocrine-disporting property.

He added, “God has given us metals in the form of salts and human have extracted these metals form it for own interest”. Now, the situation is metals are not in the stage to go back into salts, so they are remaining in form of free metals & these free metals are toxic in nature because they are not bio-eliminable”. So, it’s difficult to define the word sustainable whose definition changes time to time. To understand the sustainability of product, there is a need to calculate carbon footprint, water footprint, energy footprint and toxicity footprint and once evaluation these footprints done it’s easy to find out the traces which product leave behind and eventually will get the sustainability index of product. In brief, for clothing people, now its need to think that resources perennially available, which will be perhaps renewable resource without having adverse effect on bio-diversity which provides adequate performance of end product and which go to the nature without causing harmful impact making it available readily again and this would be ideal definition of sustainable product.
About today’s need of sustainability, natural resources, chemicals resources and water resources are limited, so unless the use of available resources frugally, for coming generations will not have these resources to see. Therefore it’s not a matter of choice; it’s a matter of necessity that everyone will have to move towards sustainability.

Role of testing:

Today restricted substances list, it’s more than few hundred out of few thousand which was started with 2-3 chemicals out of few hundred chemicals. So this is ongoing process, it’s dynamic, never be constant, and never remain static, and it will become more and more important. In future, scrutinizing of chemicals is going to play important role. To find out the presence of RSL testing play an important role. As well to find out potential side effects of chemicals, testing is very much required. Everyday new sustainable criteria are getting evolved. To confirm these criteria’s at each stage these parameters need to evaluate and that will need testing.

Thoughts on retailer’s action:

The leading companies are tying up with chemicals companies, Universities, with lawyers, toxicological laboratories, it’s a team comes up and new list of restricted substance list evolve. There are few big giants who are doing serious work on sustainability and the small companies are just copying them, but important point is not making the criteria, it’s important to do the true implementation of those criteria’s in all stages which is going to be very important while achieving towards sustainability, eventually not on paper, actually on earth. The countries like Europe, USA, have the capability and infrastructure to work towards sustainability and they are doing. However, smaller companies have not all the required facilities to such work, in such case, government have to come up with some solution. At the end, sustainability should be implemented rigidly and this can be done with the joint venture with different consumer group, NGO’s, because finally consumer are king.

Future of STP:

About future of Sustainable textile, its fashionable name that called today, but it will become routine of tomorrow. 200 years ago all was ok, only from last 100 years everything goes wrong. So become sustainable, just everyone have to come at sustainable level without
compromising on modern life style. Not only clothes are important, even now e-waste is not important, which is a challenge.

5.3.4 Certification - Soil Association:

Company background and profile:

Soil Association is UK's leading organic organisation certifying body for the certification of organic products founded in 1926. Currently company has over 200 staff support. The company inspect and award organic certification to farms and businesses that meet our organic standards. They have also developed standards for areas which are not covered by government or EU regulations like conservation, fish farming, textiles and health and beauty care products. With over years' of experience, company have certified over 2,500 farms and businesses all over the world. Currently in the market Soil Association symbol is the most recognised organic mark in the UK. According to soil association, “their consumer recognition is their symbol”.

Thoughts on (STP):

STP’s are those products which are manufactured from fibre cultivated by natural or organic method considering social & environmental impact, understanding soil fertility and animal welfare; subsequent fibre should process in way that doesn’t introduce or try to minimise the contamination or addition of any material or substances which are harmful to human health or proven expected harmful to the environment.

Textile industry is one of the big environmental impact industries among the all. According to DEFRA, textile industry alone in Europe is responsible for 15-20% of overall impact on environment.

Thoughts on certification and Ecological Testing:

Certification is based on faith and trust relationship. Currently certification is not mandatory, its voluntary activity, however Soil Association wants to see certification mandatory under the extension of organic regulation. Certification is important because consumer should able to differentiate between products are claiming to be arrive from organic farming, claimed to be
processed as per organic philosophy and products are genuine. Certification gives assurance to the consumers that they are getting right product from supply chain which is also get benefited through control mass balance, traceability system which may help them to calculate the inefficiencies. For small manufacturers or farmers it’s not possible to get certify themselves; to solve this issue they can form small group and get certify where the certification cost get equally divided which is less than the cost required from individual certification. Therefore group certification is the solution to overcome the cost of certification. Actually there are few certifying bodies who work for profit; however Soil Association doesn’t work for profit.

Regarding organic production, currently battle of GM verses Non-GM products is going on. There is a problem to determine, test and report the accurate level of GM from Non-GM products and indicates the accurate level of contamination which has done intentionally or mistakenly.

From certification point of view, testing is very important. For example, to confirm whether product is organic or not, testing plays major role, there is no other option. Testing decides whether to issue certificate or not.

**Thoughts on pricing of sustainable and ecolabeled products:**

Pricing of sustainable and ecolabeled products is very difficult issue. These prices are not set by any certification bodies nor anywhere else it’s defined about the fare pricing of STP products. Its very much justified asking premium for STP, but should be within limit. Non-STP are not expensive, however the price difference between sustainable and non-sustainable goods need to pay later to clean the environment. So there is nothing wrong to pay premium for STP’s.

**Future of STP:**

Currently in UK there is enormous amount potential growth left in market. In UK, organic food and STP are only 2% of total products, whereas 0.1% is only STP. Now a day’s consumers are very interested in STP’s however knowledge on impact of sustainable textile or implications of buying such goods is very poor in market. So it’s a responsibility of retailers, NGO’s and manufactures to literate the consumes about STP. In future, recycled products
have great demand, but they need to be feeling good, look good and should be at economical price.

5.3.5 Ecolabelling - Hohenstein Institute:

Company Profile and Background:

Hohenstein Institute having their head office in Germany is into testing, inspection and certification from last many years. They are the founder organisations of "International Association for Research and Testing in the Field of Textile Ecology (Oeko-Tex) and they do testing for Oeko Tex 100 and 1000.

Thoughts on (STP):

According to Vignesh Amalraj STP are those “which are manufactured by taking care of social, environmental and technical issues. Such product has low impact on environment. He added “Producing sustainable textile is one of the ways to overcome the Global warming”.

Thoughts on Ecolabeled STP:

According to interviewee eco-labels STP are not mandatory but are developed to overcome the impact of certain non-ecofriendly products. Though all eco-labels are beneficial in supply chain, the level and area of benefit depend upon the standards, objective and parameters of the eco-labels. Eco-labels are not a burden in fact it’s a requirement of buyer to ship the goods and eventually necessacity of the environment.

Pricing of Ecolabeled STP:

Pricing of eco-labeled products depend upon raw material, way of processing and number of process involved as well as on retailers and consumers too. According him the more common the product in market more economical it would be for consumers.

Growth of STP:

Consumers are considered to be the decision makers for the growth of sustainable textile in major extent and in some extent retailers and government too.
Reliability of Ecolabeled STP:

He supports the fact of having Single standardized Eco-label rather than having various eco-labels. Reliability of ecolabelling is not only in the hands of eco-label issuing authorities but it is also in the hands of manufacturer too. To avoid the malfunctioning from manufacturers end continuous testing at various stages of manufacturing is needed to keep product adhere to standards. With increasing interest in sustainable goods our future is in the hands of these products only.

5.3.6 Retailer - Frugi

The retailer interviewed was doing a business of garments made from organic cotton.

Company profile:

Frugi has started in year 2004 with breastfeeding wear product. Slowly they have expanded their product range and now they have whole range of baby products upto age of 8 years. The company only deals with organic products which are certified by GOTS (Global Organic Textile Standards) and few factories are certified by SA 8000 which gives assurance of social accountability. Frugi do have any shops, they stock in boutiques who stocks other brands even. Currently Frugi has 150 stockists across the UK and 230 stockists overseas. In terms of sales this year company has around 3 million pound turn over which is twice the last year.

Thoughts on STP:

STP is about “creating the product which is manufactured by taking care of support and which support and maintain the social responsibility”. The best examples of STP are products made from organic cotton. STP are needed since they do not harm the environment through out there life cycle.

Product sourcing and marketing:

Currently Frugi is souring their products from India, Turkey and Portugal. Further they are looking for new supplier as well from various countries except China and Nepal, since still the consumers have perception that the product manufactured from these countries are not manufactured keeping in mind ethical, social issues. Company is finding small problem while
sourcing GOTS certified product specifically printed garments, since under GOTS wide range of certified pigments are not available.

For marketing of such products Frugi uses sewing tags on garments to inform the consumer about the product speciality. As well they keep on updating their website with relevant information of organic to spread the knowledge of organic products. To reduce the use of plastic bags, Frugi have stated offering shopping bags which are made from Potato starch which is 100% biodegradable.

**Thoughts on Certification, Standards and Ecological Testing:**

For Frugi certification is very important. They ask the Transaction Certificate from there all the supplier for each shipment, which gives assurance that the whole product from raw material to finished garment is complying with GOTS standards. They thought GOTS are the best standards for organic products than any other standards.

Test reports are very important from buyer’s point of view. They ask random test report from manufacturers to confirm the product sustainability. However, since manufacturers are providing transaction certificate for each shipment, they have reduced the frequency for asking test reports.

**Product demand and pricing:**

Currently there is a massive demand of STP’s and its increasing day by day as a fashion. According to Frugi “customers of coming generation are well informed about the fact of the environment so there buying habits, lifestyles are becoming more ecofriendly and green”. Regarding pricing of STP’s, yes, its higher compared to conventional products since premium need to pay down the supply chain. According to researchers “an average UK consumers is prepared to buy green and sustainable products the only if they have not been asked to pay any extra money for that”.

**Thoughts on Ecolabelling:**

The product without ecolabel is just like a conventional product, ecolabels are the only way to recognise the organic or sustainable products. Ecolabelling is an important tool for marketing
of sustainable products. Frugi was not using any ecolabel on their garments although they were buying certified products, however they have decided to take the advantage of ecolabel since they are paying premium for it to the manufacturer.

Thoughts on Future of STP’s:

There is a steady and continuous growth of STP’s. Consumers are looking forward such products and “and now a day’s customers are becoming more informed about environmental issues and their social responsibility, so their lifestyle is also changing accordingly”.

5.4. Analysis

Data analysis is carried according to Malhotra & Birks (1999) four stages discussed under the section 4.8. In further sub-sections, researcher had analysed the collected data and displayed in tabular form.

5.4.1 Textile Manufacturers:

Que: Could you please brief the company profile in terms of products, sales, size of the production?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots Creations</td>
<td>Purecots Creations is very unique company based in Mumbai, India, who produces only STP from past ten years. The company’s last year turnover was 3.5 million USD.</td>
<td>- Purecots creation is one of the few companies, who are producing only sustainable textile from past ten years and doing profitable business.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- They have not used any unsustainable fibre in the factory.</td>
<td></td>
</tr>
<tr>
<td>Alok Industries Ltd.</td>
<td>Alok Textile Industries is India’s one of the top textile vertical integrated company serving in textile industry from past 26 years. Alok has in-house facility from spinning to garmenting of knitted, woven and embroidery fabrics. The last year turnover of the company is around 663 million</td>
<td>- Alok Textile Industries is India’s leading giant in Indian textile industry listed BSE &amp; NSE with present equity 126.18 USD.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- It’s considered to be second largest producer of cotton yarn in world and also second largest employer in India after</td>
<td></td>
</tr>
</tbody>
</table>
agriculture. - The company constitutes 26% of India`s manufacturing sector & 17% of India`s total export earnings. In addition, company also contributes 14% to Industrial production & 6% to GDP.

Que: Which sustainable textile products have you produced & for how many buyers are you producing it?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots Creations</td>
<td>Purecots is mostly producing organic cotton based knitted and woven baby garments, small percentage into adult garments for around 15 buyers across the world.</td>
<td>- Purecots Creations is specialized in producing baby wears. - For 15 buyers across the world they produce the goods.</td>
<td></td>
</tr>
<tr>
<td>Alok Industries Ltd.</td>
<td>Alok is making wide range of product from yarn, knitted and woven fabrics, babies, men’s, ladies, kid’s garments, made-ups, and bags from sustainable raw materials. They are entertaining to the companies like H &amp; M, C &amp; A, M &amp; S, Wal-Mart, Woolworth, Asda, Tesco etc.</td>
<td>- Alok Textile industry can make all kind of STP from yarn to garments. - They are dealing with all big giants &amp; retail chains in fashion industry like H &amp; M, C &amp; A, M &amp; S, Wal-Mart, Woolworth, Asda, Tesco etc.</td>
<td></td>
</tr>
</tbody>
</table>

Que: Do you think certification is mandatory for sustainable textiles products (STP)? If yes, why?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots Creations</td>
<td>To call product organic or sustainable whole supply chain must be certified by certification body. Certification gives the transparency to end consumer with regards to genuinity of the final products. Certifications are for the betterment, improvement and understanding of the</td>
<td>- The certifications i.e. authorised body are the one who decides whether the products are genuine/sustainable/comply with standards. - Certification is for betterment, improvement &amp; understanding of the</td>
<td>Is there any way where government can do financial help to small enterprisers, manufacturers for certification?</td>
</tr>
</tbody>
</table>
ecological, social and given criteria`s. For small manufacturers it difficult to get certify them-self because of the cost and necessary changes involved in certification.

- For small manufacturers it’s difficult to get certify themselves.

| Alok Industries Ltd. | Certification is very much necessary for STP, since it develops transparency within system and gives assurance to the end customer with regards to authenticity of products. It also helps to maintain the traceability within the supply chain. | - Certification develops transparency within system and helps to maintain traceability across supply chain. | - Gives assurance to consumer about authenticity of products. |

Que: Which different type of certifications (regards to sustainability) do you have & from last how many years have you been certified for it?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots Creations</td>
<td>Initially company was certified as per SKAL standards, however later it changed to GOTS (Global organic textile standards). In addition, the unit and products are certified as per OE (organic exchange) 100 &amp; blended standards, Fair-tread etc. From last 4 years we are certified for GOTS &amp; OE, and recreantly certified for Fair-tread. For social accountability, they are in the process to get certifying for SA 8000.</td>
<td>- Initially company was certified as per SKAL.</td>
<td>Why not only one eco-standard is in appliance?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- From last 4 years company is certified for GOTS, OE (100 &amp; blended), and Fairtrade.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Company is the process of SA 8000 certification.</td>
<td></td>
</tr>
</tbody>
</table>
Que: Why management is looking forward to have these certifications?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots Creations</td>
<td>Certifications are one-of and first most requirement to get the orders. As well as for the self satisfaction.</td>
<td>- Certifications are required to fulfil the buyer’s requirement to get the orders.</td>
<td>How the certifications fulfil the buyer’s requirements?</td>
</tr>
<tr>
<td>Alok Industries Ltd.</td>
<td>Management is looking forward to have these certifications because, certifications are useful for review our own system and try to overcome the lacunas within the system. In addition, this is one of the buyer’s requirements.</td>
<td>- Certifications are useful for review own system and try to overcome the lacunas from it.</td>
<td>Who will decide the buyers requirements are serious requirements or it’s just copy past from others standards?</td>
</tr>
</tbody>
</table>

Que: What is the role of testing in developing Sustainable textile products?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots Creations</td>
<td>To prove the products are free from certain harmful substance, testing is required. Testing is bottle-neck for the processors where they have to use eco-friendly dyes and chemicals which is not only good for them, as well for environment and for human skin too. Today, buyers are not much rely on testing, since manufacturer provides transaction certificate which is issued by certification body which confirms that product is free from ecologically harmful products</td>
<td>- Certification and testing go hand-in-hand.</td>
<td></td>
</tr>
<tr>
<td>Alok Industries Ltd.</td>
<td>Certification and testing go hand in hand. Along with certification with help of testing only it’s possible to</td>
<td>- Testing is required to prove products are free from harmful substance.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Test reports are proof of sustainability.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Because of testing, processors can’t do any manipulation during processing. It’s a bottle-neck for them.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Specifically in organic cotton products, since suppliers are proving transaction certificate issued by certification body, buyers are not less rely on</td>
<td></td>
</tr>
</tbody>
</table>
differentiate between harmful and harmless products. Certification and testing both are buyer’s requirements to prove the product is sustainable; however, it’s costly. Different laboratories charging differently for same test by same method.

- Testing is costly. A different lab gives different results for same sample, for same parameter for same test methods.

**Que: Why are you producing Sustainable textile products?**

<table>
<thead>
<tr>
<th><strong>Company Name</strong></th>
<th><strong>Summary</strong></th>
<th><strong>Analysis</strong></th>
<th><strong>Further Question</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots Creations</td>
<td>Organic, sustainable textile products are personally very close to interviewee heart. It’s a win- win situation for all the peoples as well as companies involved into it and eventually, its needed today.</td>
<td>- Production of STP’s is “Win-Win” situation for all who involved into it. - For Alok “profitability comes before sustainability”.</td>
<td>Production of STP or Non-STP same processing steps and machineries are required, then how it will saves the energy?</td>
</tr>
</tbody>
</table>

| Alok Industries Ltd. | Sustainability is a Holistic approach. For Alok “sustainability comes before profitability”. Out of total production products made from organic cotton contributes 20%. Sustainable textile is good for health of planet, human being, and as well as business. | - Alok produces 20% sustainable product out of whole production. - Sustainability is “Holistic” approach. - STP’s are good for planet, human being, as well as business. | |

**Que: What changes have you made within your production line to become more sustainable?**

<table>
<thead>
<tr>
<th><strong>Company Name</strong></th>
<th><strong>Summary</strong></th>
<th><strong>Analysis</strong></th>
<th><strong>Further Question</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots Creations</td>
<td>For small orders, need to depend on small supplier. And sometime need to help them to get our order done in sustainable way. To become more sustainable, because of installed solar plant it’s possible to run 20 computers. To motivate and influence workers, organising celebration of Earth day, Green Day etc gives joy as well as spread the knowledge of sustainability within the</td>
<td>- For small orders need to depend on small supplier however need to help them get it done - Uses solar energy to run 20 computers in plant. - Celebration of Earth day, Green Day etc gives joy as well as spread the knowledge of sustainability.</td>
<td>How solar energy can be used for during production of textiles?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| Alok Industries Ltd.        | Non-certified conventional Dyes and processing aids are responsible for pollution. Recycling of paper cones, water, steam, chemicals saves lots of energy and waste generation. | - Non-certified conventional dyes and processing aids responsible for pollution.  
- Recycling of paper cones saves lots of energy and waste. | What about the cost of recycled paper cone cost?                           |

Que: How do you think your company can improve access to sustainable raw material?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots Creations</td>
<td>Since India is a country who is very rich in raw material, there won’t be any problem while sourcing sustainable raw material.</td>
<td>- India is raw material rich country. So there is no problem of sourcing sustainable raw material.</td>
<td>If Indian reduces the production of raw material then?</td>
</tr>
<tr>
<td>Alok Industries Ltd.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Que: What benefits has your company achieved by doing the production of sustainable textile goods?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots Creations</td>
<td>Production of sustainable textile goods gives feeling of fulfilment and relaxation that company is not one of the parasitic of mother earth.</td>
<td>- Production of STP gives the fulfilment and relaxation that at least someone is doing for betterment of our future.</td>
<td></td>
</tr>
</tbody>
</table>
| Alok Industries Ltd.| Currently in Indian textile industry Alok is market leader in production of product made from organic cottons which one of the biggest achievement. Also, it helps to save lot of energy directly or indirectly. From business point of view, because of sustainable textile tag products are getting premium, so it’s a profitable business too. | - Alok is market leader in the production of sustainable products which is a biggest achievement for them.  
- STP helps to save lots of energy, directly or indirectly.  
- STP tag gives the premium for product. That’s why it’s a profitable business. | How much premium should be asked by manufacturer or retailers? Or  
What percent premium should asked above the profit cost? |

Que: What issues arose while production of sustainable textile products and how did you solve them?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots Creations</td>
<td>Sourcing certified (GOTS approved) pigment is a</td>
<td>- Sourcing certified processing aids specifically pigment is</td>
<td>How we can call the</td>
</tr>
</tbody>
</table>

189
difficult task. Discharge style of printing is not possible on garments made from organic cotton under GOTS, however possible under Organic exchange standards and those goods are accepted by buyer. difficult. - Discharge style of printing not possible under GOTS, but possible under OE. garment sustainable of which base fabric is made up of organic cotton, however wet processing is not as per the sustainable standards?

Alok Industries Ltd. In initial phase, the raw material was not according to ST standards. Dyes & chemicals are sourced from branded companies like DyStar, Huntsman, Clariant etc. - Initially raw material was not as per the sustainable standards. Then sourced the genuine supplier. - All the processing aids sourced from branded companies like DyStar, Huntsman, Clariant etc.

Que: Can you explain your management environmental policy and is your manufacturing practice working towards Carbon Neutral production?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alok Industries Ltd.</td>
<td>In initial phase, the raw material was not according to ST standards.</td>
<td>Initially raw material was not as per the sustainable standards. Then</td>
<td>It’s whose</td>
</tr>
<tr>
<td></td>
<td>Dyes &amp; chemicals are sourced from branded companies like DyStar,</td>
<td>sourced the genuine supplier.</td>
<td>responsibility</td>
</tr>
<tr>
<td></td>
<td>Huntsman, Clariant etc.</td>
<td></td>
<td>to find out the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>genuinity of</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>product after</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>certification?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Who controls</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>this?</td>
</tr>
</tbody>
</table>

Que: Could you please comment on the pricing of “Sustainable textile products”.

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots Creations</td>
<td>Few buyers have changed the</td>
<td>- Few buyers have changed the</td>
<td>Product like Recycling Bags</td>
</tr>
<tr>
<td></td>
<td>packing material from plastic</td>
<td>packing material from plastic</td>
<td>why should sell at subsidiary</td>
</tr>
<tr>
<td></td>
<td>to bags made from potato, corn</td>
<td>to material made from corn</td>
<td>price?</td>
</tr>
<tr>
<td></td>
<td>etc.</td>
<td>and potato.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In factory, reduction in use</td>
<td>- From cutting waste made</td>
<td></td>
</tr>
<tr>
<td></td>
<td>of papers, solar energy,</td>
<td>5000 bags and sold at</td>
<td></td>
</tr>
<tr>
<td></td>
<td>reduces the pollution and</td>
<td>subsidiary price to retailers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>increases the consumption of</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>natural resource. From cutting</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>waste, company have made the</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5000 bags and sold to the</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>local retailers at subsidiary</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>prices.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Alok Industries Ltd. | There are three pillars of environmental policy - Reduce, Reuse, and Recycle. Production plants have RO (reverse osmosis) systems which make the discharge of water ‘Zero’. | - Three pillars of environmental policy - Reduce, Reuse, and Recycle. - Because of RO system, the water discharge is zero. |                                |

Que: Could you please comment on the pricing of “Sustainable textile products”.

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots</td>
<td>STP’s are more costlier than</td>
<td>- STP’s are more expensive</td>
<td>Why organic</td>
</tr>
<tr>
<td>Name</td>
<td>Summary</td>
<td>Analysis</td>
<td>Further Question</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Creations</td>
<td>conventional products &amp; it’s worthwhile to pay extra amount. The price</td>
<td>than the conventional products but it’s worth to pay extra.</td>
<td>cotton prices are higher than conventional cotton?</td>
</tr>
<tr>
<td></td>
<td>difference is because of the higher cost of organic cotton. Farmers are</td>
<td>- Farmers are driving force of organic cotton.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>the driving force and initiator of organic era.</td>
<td>- Organic cotton price is higher than conventional cotton</td>
<td></td>
</tr>
<tr>
<td>Alok Industries Ltd.</td>
<td>STP are having higher prices compared to conventional products.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Que: Could you please comment on growth of sustainable textile products?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purecots Creations</td>
<td>There is a lot of scope and potential for growth of STP. It’s not a single man, or company or country’s responsibility; its each every persons responsibility to look at this issue positively not because of only its advantages, because of its necessity.</td>
<td>- There is a potential for growth of STP’s.</td>
<td></td>
</tr>
<tr>
<td>Alok Industries Ltd.</td>
<td>There is great scope for STP’s. The STP’s business is profitable from farmer to customer if it does in real manner</td>
<td>- STP’s business if profitable from farmers to consumer, if it does in real manner.</td>
<td>Manufacturers are there for production, but until there is no demand, why manufacturer should produce the goods”?</td>
</tr>
</tbody>
</table>

5.4.2 Dyes & processing aids manufacturer:

Que: Could you please brief the company profile in terms of products, sales, size of the production?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>DyStar</td>
<td>DyStar is a company formed in year 1995. They have around 3700 employees in more than 50 countries and run 21 production facilities in 13 countries. Worldwide sales are amounted to 800 million Euros</td>
<td>- DyStar is leader in the manufacturing of textile processing aids operating in each and every country where textile is exists.</td>
<td></td>
</tr>
</tbody>
</table>
M/s. Inter Continent Chemicals India Ltd., in year 2008. M/s. Inter Continent Chemicals India Ltd. is a 33 year old manufacturing company with capacity in excess of 24000 MT per annum. Currently, they are manufacturing Specialty Chemicals for Textile, Paper & Pulp, Leather and Plastic, Intermediates for Agriculture, Rubber, Pharmaceuticals, and Commercial Construction. - M/s. Inter Continent Chemicals is one of the oldest company in India serving to various field like textile, paper, agriculture, construction, plastic, pharmaceuticals etc.

Britacel Silicones Ltd. Britacel Silicones Ltd is India`’s leading silicone and silicone based products largest manufacturing company covering 30% of market share. The company has shown an exceptional jump of about 5 times in the turnover during the past 5 years. Britacel silicones are one of the leaders in this field of silicones. In last 5 years companies has shown exponential growth in this field.

Que: From your point of view how will you define “Sustainable Textile”?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>DyStar</td>
<td>A textile product which has been manufactured by taking care of all the three elements of sustainability that is: social, economic and environmental sustainability.</td>
<td>- STP’s are mindset. - Because of STP’s, social, economical and environmental areas get benefitted throughout the supply chain.</td>
<td></td>
</tr>
<tr>
<td>M/s. Inter Continent Chemicals India Ltd.</td>
<td>“Sustainable textile” is a mindset.</td>
<td>- STP’s are manufactured by taking care of three elements of sustainability: Social, economical and environment.</td>
<td></td>
</tr>
<tr>
<td>Britacel Silicones Ltd.</td>
<td>Sustainable products are those products providing environmental, social and economic benefits while protecting public health, welfare and environment over their full commercial cycle from the extraction of raw materials to final disposition.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Que: Why do you think Sustainable textile is needed today?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| DyStar                              | The end results of sustainable processes, procedures’ gives clean environment and eco-friendly textiles. Sustainable textiles are needed for the betterment of environment as well as the health of the workers in textile industry and the consumers at the end. | - STP’s and its manufacturing process gives clean environment.  
- STP does not affect textile workers health.  
- STP’s are needed to take care of eco-systems, so that planet will “sustain” lives and livelihood. |                                                                                                                             |
| M/s. Inter Continent Chemicals India Ltd. | There is a need to take care of our eco-system so that this planet can “Sustain” lives and livelihood of its 6 billion inhabitants. Our behaviour and lifestyle should not disturb the harmony of its eco-system. | - STP’s are needed today to save natural resources and protect environment.                                                                                                                                       | How STP can save natural resources? |
| Britacel Silicones Ltd.             | STP’s are needed today to save natural resources and to protect environment.                                                                                                                                                                                                                     |                                                                                                                             |                                                                                                                     |

Que: Which different “sustainable textile products (wet processing chemicals, dyes, pigments) are you producing?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>DyStar</td>
<td>DyStar manufacturing Textile Dyestuffs, auxiliaries, Pigments, processing chemicals which comply with different sustainable standards.</td>
<td>- DyStar manufactures Textile Dyestuffs, auxiliaries, Pigments, processing chemicals those complies with different sustainable standards.</td>
<td></td>
</tr>
<tr>
<td>M/s. Inter Continent Chemicals India Ltd.</td>
<td>M/s. Inter Continent Chemicals India Ltd. Involved in the manufacturing of specialty chemicals from fibre, fabric treatment to finishing of garments.</td>
<td>- M/s. Inter Continent Chemicals manufactures speciality chemicals required form fibre to garments.</td>
<td></td>
</tr>
</tbody>
</table>
| Britacel Silicones Ltd.             | Britacel Silicones Ltd manufacturer’s eco friendly silicones and cationic softeners. These products are not sustainable in real sense.                                                                                                                                      | - Britacel silicones Ltd manufactures eco-friendly silicones and silicone based softeners.  
- Silicones are not sustainable in real sense.                                                                                                                                                                                                       | - Why silicones are not fully sustainable? |
Que: Do you think certification is mandatory for sustainable textiles products? If yes, then why?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| DyStar       | Certification should not be mandatory. Anything which is made mandatory will attract lot of resistance and then finding the loopholes in the system will take place. It needs lot of acceptance from all the quarters and proper marketing makes it popular. | - Certification should not be mandatory.  
- Mandatory will attract lot of resistance and then finding the loopholes in the system.  
- STP required proper marketing, so it will get easily accepted. | What factors influences the implementation of certification? |
| M/s. Inter Continent Chemicals India Ltd. | Checks and balances are a must for any rule to be enforced and it’s done by the process of certification. Many shall voluntarily comply with the rules and regulations for betterment of everyone. However, a few in their greed for profit and their personal sustenance may still carry on with their activities that endanger the environment. Eventually, in certification the aim and process should equally transparent, fair, supportive and absolutely economical so that the cost to comply with it is not prohibitive. | - Check and balances are verified by certification.  
- In certification the aim and process should transparent, fair, supportive and absolutely economical. | |
| Britacel Silicones Ltd. | Certifications are mandatory to maintain the uniformity in offers and standards. | - Certifications are mandatory to maintain the uniformity in offers and standards | - Without certification it’s not possible to maintain the uniformity in offers and standards? |

Que: Which different type of certifications (regards to sustainability) do you have & from last how many years have you been certified for it?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>DyStar</td>
<td>DyStar do have GOTS, Blue Sign, and to all other RSL</td>
<td>- All three companies have GOTS certificate from last 2-4</td>
<td>Which standards</td>
</tr>
<tr>
<td>Company Name</td>
<td>Summary</td>
<td>Analysis</td>
<td>Further Question</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>DyStar</td>
<td>EHS and Sustainability is very important to DyStar since the beginning. To fulfil buyer’s requirement or RSL (Restricted Substance List) need to have certificates. Apart from certification, they do believe in their self certification.</td>
<td>- Certificates required because of buyers requirement.</td>
<td>Certificates eliminate the role of testing?</td>
</tr>
<tr>
<td>M/s. Inter Continent Chemicals India Ltd.</td>
<td>Certification gives a sense of pride that even our company contributing to undoing what has been done wrong over a century in our lust of industrialization, growth and profits. Even though, it comes minor incremental cost.</td>
<td>- DyStar believe on own certification.</td>
<td></td>
</tr>
<tr>
<td>Britacel Silicones Ltd.</td>
<td>Conscious decision of management and because of certain customer’s requirement company has taken certification.</td>
<td>- Certification gives a sense of pride.</td>
<td></td>
</tr>
</tbody>
</table>

Que: Why management is looking forward to have these certifications?

Que: What is the role of testing in developing Sustainable textile products?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>DyStar</td>
<td>Testing is backbone of manufacturers. Test reports are the proof for what are they claming. Because of testing it’s possible to test the</td>
<td>- Ecological testing is backbone of manufacturer and whole supply chain.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>M/s. Inter Continent Chemicals India Ltd.</td>
<td>The company do have Oeko-Tex 100 and GOTS certificate for most of their products. - Additionally, DyStar have Blue Sign certificate. - M/s. Inter Continent Chemicals India Ltd have Oeko-Tex 100 certificate. - Britacel Silicones few products are in the process of certification of REACH and Oekopass.</td>
<td></td>
</tr>
<tr>
<td>Britacel Silicones Ltd.</td>
<td>The company do have only GOTS certificate for few of their products who comply with standards. Few of the products are in the process of REACH and Oekopass certification.</td>
<td></td>
</tr>
</tbody>
</table>
ecological parameters in PPM (Parts Per Million) and PPB (Parts Per Billion) level too; with which it’s possible to identify the level of impact by harmful substance on environment, on human being.

- Because if testing is possible to identify the level of impact of product on environment and human being too.
- With testing, there is no development towards sustainability and of sustainable products.
- To get certify products from certification body test report are mandatory.
- Manufacturers can use and using test report as a marketing tool, which changes the approach towards company and eventually products manufactured by them.
- To get it done testing, it’s a costly, however, its one time investment.

M/s. Inter Continent Chemicals India Ltd

Without testing, there would not be any development. Testing is a backbone of whole supply chain, specifically for sustainable goods, since from raw material to final product everything gets approved based on test report. Ecological testing is the way to prove that your products are safe for everyone, including environment. Many companies are using test reports as a marketing tool, which changes the viewers mind about the company and eventually products manufactured by that company. For certification even test reports are mandatory, without which it’s possible to get certificate.

Britacel Silicones Ltd.

To get ecological certificates like GOTS, test report are mandatory. However, for applicant i.e. manufacturer need to pay lots of money, but its one time investment. Without testing, there is no development towards sustainability and sustainable products.

Que: Why are you producing Sustainable textile products (STP)?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>DyStar</td>
<td>This is the part of commitment to environment and CSR (Corporate social responsibility) for company. They Not only follow sustainable production of the</td>
<td>- STP production is commitment to environment.</td>
<td>Are STP’s good for human health? If Yes, How?</td>
</tr>
<tr>
<td>Britacel Silicones Ltd.</td>
<td>To get ecological certificates like GOTS, test report are mandatory. However, for applicant i.e. manufacturer need to pay lots of money, but its one time investment. Without testing, there is no development towards sustainability and sustainable products.</td>
<td>- STP’s are CSR for company. - Company have developed E-</td>
<td></td>
</tr>
</tbody>
</table>

Dyes and chemicals at all manufacturing sites, but also make sure that their customers and users also follow the sustainable production practices. To encourage and literate the customers company has developed E-confidence system which will helps customers to manufacture a product in a sustainable manner and reduce the impact on environment.

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>M/s. Inter Continent Chemicals India Ltd.</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Britacel Silicones Ltd.</td>
<td>To ensure the health and safety of public health, welfare and also economic for the buyer.</td>
<td>- For health and safety of public, welfare and for environment.</td>
<td></td>
</tr>
</tbody>
</table>

Que: Could you please comment on the pricing of “Sustainable textile products”?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>DyStar</td>
<td>Since the company do not produce anything which is not sustainable product, there is no Que of differential pricing.</td>
<td>- Since only producing STP, there is no price difference in same class of products.</td>
<td>Which factors influences the pricing of STP’s?</td>
</tr>
<tr>
<td>M/s. Inter Continent Chemicals India Ltd.</td>
<td>Sustainability is mindset; the incremental cost does not matter.</td>
<td>- Sustainability is mindset; the incremental cost does not matter.</td>
<td></td>
</tr>
<tr>
<td>Britacel Silicones Ltd.</td>
<td>Though sustainable products may cost comparatively expensive, customers are ready to pay for it than the conventional products.</td>
<td>- STP’s are expensive, then also customers are ready to pay.</td>
<td></td>
</tr>
</tbody>
</table>

Que: Could you please comment growth of sustainable textile products?

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>DyStar</td>
<td>Only STP has placed to stay in the future and others will vanish as the awareness from the customer and consumer is increasing.</td>
<td>- Only STP have place in future.</td>
<td>From last many years all are working for betterment of environment,</td>
</tr>
<tr>
<td>M/s. Inter</td>
<td>Sustainable textile is just a part</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continent Chemicals India Ltd.</td>
<td>of the global paradigm shift that we are trying to bring about in our lifestyle within comity of nations.</td>
<td>- STP’s are part of the global paradigm shift that trying to bring about in our lifestyle.</td>
<td>and still the percentage of STP’s are less than 1%. Then is there any plan to increase the percentage in bulk?</td>
</tr>
<tr>
<td>Britacel Silicones Ltd.</td>
<td>The growth of sustainable started from few years back and this will continue until few years.</td>
<td>- STP has vertical growth in future.</td>
<td></td>
</tr>
</tbody>
</table>

**5.4.3 Ecological Textile Testing Laboratory - Texanlab Laboratories Pvt Ltd**

**Que:** Could you please brief us about your company and the activities you carry out with regards to testing?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texanlab Laboratories Pvt Ltd, is 27 year old textile analytical laboratory carry out analysis in all aspects of textile and entire supply chain from fibre, yarn, fabric both knitted &amp; woven, non-woven, different aspects of coloration, wet processing to till the making of finish. From consumer point of view, they do perform characteristics of articles to see whether this article confirm or performs to be desired &amp; adequately the life of the product. which includes physical test, involved right from yarn count, structure of the fabric, tensile &amp; tear strength, GSM, seam slippage, to going on to finishing properties like, anti-crease, wrinkle free, water absorbency, water repellence, or flame retardant or any other special finish imparted and colour fastness testing.</td>
<td>- Texanlab Laboratories Pvt Ltd is 27 year old analytical testing laboratory. - They do carry out testing from yarn to finished garments. - From consumer point of view, they do testing of all the physical and chemical properties of garments which includes fabric strength, seam slippage, creasing, water repellence, colour fastness etc.</td>
<td></td>
</tr>
</tbody>
</table>
Que: From your point of view how will you define “Sustainable Textile”?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| There is sudden strain on natural resources because of industry revolution and increase in population. Industries have made such products which are not possible to dispose off, since they are not biodegradable and as well difficult to recycle. In textile industry, the issue of sustainable textile arose primarily in Germany, where world’s 6 largest manufacturers were situated on one Ryan river and they have polluted it in such a way that, for example, fishes from this river are not good for the health because of the contamination of heavy metals. From many years effects of these chemicals are studied but very few one have try to study the side-effect of actual and their intermediate products which may give the effect like endocrine-disporting property. Now it’s a need to think about the resources which are perennially available and will be perhaps renewable without having adverse effect on bio-diversity which provides adequate performance of end product and which go to the nature without causing harmful impact making it available readily again. | - Because of Industrialisation and increase in population, there is a sudden strain on natural resources.  
- Many products are available on surface on earth which is non-biodegradable.  
- Issue of sustainable textile arose in Germany when fish from Ryan river got contaminated with heavy metal because of world 6 largest dyes & chemicals manufactures.  
- Studies on effect of products are done, however very few one have try to study side-effect of it.  
- Product which is made from renewable raw material without having adverse effect on bio-diversity and which go to the nature without causing harmful impact making it available readily again is called Sustainable products. | |

Que: Why do you think Sustainable textile is needed today?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| In today’s era, natural resources, chemicals resources, and water resources are limited. So it’s needed to use available resources frugally. It’s not a matter of choice; it’s a matter of necessacity that everyone should have to move towards sustainability. | - Natural resources, chemicals resources, and water resources are limited, so need to use them watchfully.  
- “STP are not a matter of choice, it’s a matter of necessacity”. | |
**Que: What is your opinion on “Future of Sustainable Textile”**.

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| Sustainable textile (ST) is today’s fashionable name, but it will become routine of tomorrow. Everyone have to come at sustainable level without compromising on modern life style. Not only clothes are important, even now e-waste is not important, which is a challenge. | - ST is a fashionable name of 21st century and it’s going become fashion tomorrow.  
- Without changing current modern lifestyle, have to be come at sustainable level.  
- Not only textile waste, e-waste is going to be new challenge. | |

**Que: Which eco parameters testing do you carry out?**

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| parameters like, Alkyl Phenyl Ethoxylates (APEO), Adsorbable organic halogens, Formaldehyde, heavy metal which are available in different forms like leachable and free form, Biodegradability, banned amines, Pentachloro Phenol, Tetrachloro phenol etc. From toxicological point of view, they carry out, LD 50 (Lethal Dose 50 for rat) and LC 50 (Lethal Concentration 50 for fish). | - Laboratory carry out formaldehyde, APEO, banned amines, heavy metals, AOX, biodegradability, PCP & TCP.  
- From toxicological point of view LD 50, LC 50. | |

**Que: How long your company a testing ecological parameters, why do you think this is important?**

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| They have started ecological parameter testing from in year 1991 project from Finland with problem of formaldehyde. | - From last 20 years Texanlab doing toxicological testing.  
- Importance is explained in above answers. | |

**Que: What is the role of testing in developing Sustainable textile products?**

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Everyday new sustainable criteria are getting evolved. To confirm these criteria’s at each stage these parameters need to evaluate and that will need testing.</td>
<td>- Testing is required to confirm whether sustainable standards are getting followed or not across supply chain</td>
<td></td>
</tr>
</tbody>
</table>
Que: Could the “retailer’s current ecological testing parameter”, can be more stringent?

<table>
<thead>
<tr>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSL has increased from few hundred too few thousand. Most of the leading companies are tying up with chemicals companies, Universities, with lawyers, toxicological laboratories, to evolve new RSL and most important criteria is that it’s towards human sustainability.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Every year RSL is increasing continuously.</td>
</tr>
<tr>
<td>- Leading companies, retailers, are tying up with experts to evolve new RSL and it supports human sustainability.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why RSL varies from company to company, country to country?</td>
</tr>
</tbody>
</table>

---

5.4.4 Certifications - Soil Association

Que: Could you please briefly describe the company profile?

<table>
<thead>
<tr>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Association is UK's leading certifying body for the certification of organic products which has employed around 200 employees. From last 36 years company has inspected and awarded 4500 farmers and businesses for organic certification around the world. The areas which are not covered by government or EU regulations like conservation, fish farming, textiles and health and beauty care products, this company have developed their own standards. Currently in the market Soil Association symbol is the most recognised organic mark in the UK. According to soil association, “their consumer recognition is their symbol”.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Soil association is 36 year old certification body employing 200 employees and certified 4500 farms and business across the world.</td>
</tr>
<tr>
<td>- The company have developed their own standards in the area like conservation, fish farming, textiles and health and beauty care products.</td>
</tr>
<tr>
<td>- According to soil association, “their consumer recognition is their symbol”.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Further Question</th>
</tr>
</thead>
</table>

Que: From your point of view how do you define “Sustainable Textile products”?

<table>
<thead>
<tr>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>STP’s are those products which are manufactured from fibres cultivated by natural or organic method considering social &amp; environmental impact, understanding soil fertility and animal welfare; subsequent fibre should process in way that doesn’t introduce or try to minimise the contamination or addition of any material or substances which are harmful to human health or proven expected harmful to the environment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>- STP’s are made from fibres produced by natural or organic or sustainable methods.</td>
</tr>
<tr>
<td>- Sustainable fibres maintain soil fertility, social &amp; animal welfare and lower the impact on environment.</td>
</tr>
<tr>
<td>- From fibre to finished product STP’s are</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Further Question</th>
</tr>
</thead>
</table>
manufactured without any contamination of harmful substances.

Que: Why do you think Sustainable textile is needed today?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| Textile industry is one of the strong environmental impact industries. According to DEFRA, textile industry alone in Europe is responsible for 15-20% of overall impact on environment. Since the company is involved in farm certification, at least production of sustainable fibre will diminish the impact on environment as well as on consumer. | - Textile industry has negative impact on environment, e.g. In Europe it’s around 15-20%.  
- Production of certified sustainable fibre will reduce the impact on environment. |                  |

Que: Why do you think certification is mandatory for sustainable textile (ST) products?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| Certification is not mandatory, it’s voluntary. However, it should be voluntary for fibre, textile products. Certification is important from consumer point of view since they can differentiate between sustainable and non-sustainable products. | - Certification is not mandatory, it’s voluntary.  
- Because of certification customer can differentiate the products. | If certification has many benefits then why not its mandatory? |

Que: According to you how does certification benefit each segment of textile, fashion supply chain?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| Because of certification consumer get assured about genuinity of products. It’s beneficial to textile supply chain because certification insist to maintain control mass balance and traceability which is helpful to calculate the inefficiencies within system. | - Certification helps consumer to choose right product.  
- In textile supply chain need to maintain mass balance & traceability which helps to find out the inefficiencies within system. | Are consumers are aware of the all the eco-logs, eco-standards, under which condition are products manufactured? How consumers decides which eco-standards are better? |
Que: Certifying bodies does inspection of factories once a year, how to assure the authenticity of products which manufactured throughout year?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>The relationship between certifying body and manufacturer is of trust &amp; faith. If the certifying body found the discrepancy within integrity of products, then only they do unannounced inspection. If the system is working well, then it’s not necessary to do surveillance inspection.</td>
<td>- Certification is based on trust and faith.</td>
<td>Finished products which are not complying with standards are in store for sell, and certificate is even issued against same product by certification body. Then who is responsible for this wrong product; manufacturer, retailer, or certificate issuing body?</td>
</tr>
<tr>
<td></td>
<td>- If there is any issue related to integrity of products to comply with standards, then it’s obvious to have unannounced inspection.</td>
<td></td>
</tr>
</tbody>
</table>

Que: There are many small manufacturers for whom it’s not possible to get certified because of the cost involved in certification although they have the capability to comply with standards. So can a certifying body help these small scale manufacturers?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Its true that, because of cost involved in certification many farmers, companies don’t get certify themselves. The solution to this issue is, Group certification where the cost will get divided equally within the number of companies or farmers. There are few certifying bodies who work for profit; however Soil Association is not one of them. They don’t work for profit.</td>
<td>- As individual company or farmer are not capable enough financially to get certify, group certification is the only solution.</td>
<td>Why different certification bodies charged differently for certification?</td>
</tr>
<tr>
<td></td>
<td>- Certain certifying bodies work for profit, certain not.</td>
<td></td>
</tr>
</tbody>
</table>
Que: If any product which is not comply with standards and still it’s in selling in market with labelling, then how certifying body will take this issues?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently in case of organic, there is non-compliance with standards is mostly because of traces of GM (Genetically Modified) product in Non-GM product. This contamination is might be accidental. GM products are widely spread in agricultural sector and battle between GM &amp; Non-GM product is going on. It’s very difficult to find out the traces of GM after its processing.</td>
<td>- GM products are not allowed under organic production,</td>
<td>Certification bodies can gives the assurance of genuinity of sustainable products?</td>
</tr>
</tbody>
</table>

Que: Could you please comment on pricing of the sustainable and ecolabeled products?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pricing of STP is very difficult issue. There are no written standards on pricing of STP. It’s justified to pay some premium for STP for the additional cost of system introduced within processing. Many times the extra premium is asked for the label of organic/sustainable/eco which is used as a marketing tool. The price difference between conventional and STP need to pay in later stage to clean the environment.</td>
<td>- Nobody has written any standards on pricing of STP.</td>
<td>Additional cost of producing STP is higher or environment cleaning cost in later stage?</td>
</tr>
<tr>
<td></td>
<td>- Under the Eco/organic/sustainable tag extra premium is asked.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Some times labels are used as marketing tool.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Price difference within sustainable and conventional products need to pay in later stage to clean the environment.</td>
<td></td>
</tr>
</tbody>
</table>

Que: What is the role of testing in developing Sustainable textile products?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>From certification point of view, testing is very important. For example, to confirm whether product is organic or not, testing plays major role, there is no other option. Some time testing decides whether to issue certificate or not.</td>
<td>- Apart from certification, inspection, to confirm whether product is organic or not, testing is the only option.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Some time certification is done on basis of test reports.</td>
<td></td>
</tr>
</tbody>
</table>
Que: What is your opinion on future on sustainable textile products?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| There is enormous amount of potential for the growth of STP. In UK only 0.1% STP’s are in the market. Consumers are very much interested in STP, however they are not aware about the impact of STP and implications of it. To educate the consumers, NGO, retailers and manufacturers need to work together. | - There is great scope for the growth of STP.  
- Consumers are interested to buy STP, however they are not aware about the implications and impact of it.  
- NGO, retailers and manufacturers need to educate the consumer. | What role government can play to educate the consumers about STP? |

5.4.5 Ecolabelling - Hohenstein Institute

Que: Could you please briefly describe the company profile?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| Hohenstein Institute founded in 1946 having their head office at Germany and they are into testing, inspection and certification from last many years. They are the founder organisations of "International Association for Research and Testing in the Field of Textile Ecology (Oeko-Tex) and they do testing and inspection for Oeko Tex 100 and 1000. In addition we do perform the inspection according to buyer’s requirements as well. | - Hohenstein Institute is one of the finest companies in the field of textile testing, certification and inspection of various products.  
- They are one of the founder Organisations of "International Association for Research and Testing in the Field of Textile Ecology i.e. Oeko-Tex 100 and 1000.  
- They do perform the inspection as per buyer’s specification too. |  |

Que: How do you define “Sustainable Textile products”?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>“The products which are manufactured by taking care of social, environmental and technical issues can call STP”. Such product has low impact on environment though out its life cycle.</td>
<td>- “The products which are manufactured by taking care of social, environmental and technical issues can call STP”.</td>
<td></td>
</tr>
</tbody>
</table>
Que: Why do you think Sustainable textile is needed today?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some Natural disaster in any one part of world is daily news. Everyone might be taking steps to overcome, however those are not sufficient. So, by producing sustainable products at least all can try to overcome the non-ecofriendly acts. “Producing sustainable textile is one of the ways to overcome the Global warming”.</td>
<td>- Producing STP is one of the ways to reduce the impact the environment. - “Producing sustainable textile is one of the ways to overcome the Global warming”.</td>
</tr>
</tbody>
</table>

Que: Do you think eco-label is mandatory for sustainable textile products and why?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eco-labels are not mandatory. Those are developed to overcome the impact of certain non-ecofriendly products. And it’s a buyer’s requirements.</td>
<td>- Ecolabels are not mandatory. - It’s a various buyer’s requirements.</td>
</tr>
<tr>
<td></td>
<td>- It’s a guideline to follow from production till shipment of goods.</td>
</tr>
<tr>
<td></td>
<td>Why ecolabels are not mandatory?</td>
</tr>
</tbody>
</table>

Que: According to you how does eco-label benefit each segment of textile, fashion supply chain?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eco-labels are beneficial to all the supply chain. However it varies from standards to standards. E.g. Oeko-Tex 100 only tests for the harmful substances in the product where they are no thinking about social issue. Whereas Oeko-Tex 1000 standards talk about technical, social and environmental aspects.</td>
<td>- Ecolabels are beneficial throughout the supply chain. - Benefits depend on standards and criterias as well.</td>
</tr>
</tbody>
</table>

Que: According to you is eco-label a burden, requirement or necessity and why?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eco-labels are not a burden. However, in industry there are many manufacturers feel that, it’s a burden on them because although</td>
<td>- Eco-labels are not a burden, it’s a necessacy.</td>
</tr>
</tbody>
</table>
they knowing that there products are complying with standards, they have to prove it by testing which is additional cost for them. However for buyers, it’s their requirements. Eventually, it’s for environment.  

- Few manufacturers feel that it’s a burden, since it’s an additional cost for them.  
- Eventually, it’s good for environment.

**Que: How is eco-labeling important for growth of sustainable textile products?**

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| Ecolabel product does not harm environment as well as the person who are using it. All the Ecolabels gives the guideline and if everyone follows it definitely it would be helpful for the growth of STP. The growths of such products are in hand of consumers. Until and unless consumers are showing willingness, there will not be any growth of STP. At certain level it’s in hand of retailers and government as well. | - Ecolabels gives the guideline to follow, if everyone follows, it would good for growth of STP.  
- The growth of STP is in hand of consumer, retailers and government too.                                      | Can government role is vital for the growth of STP?                                           |

**Que: Could you please comment on “pricing of eco-labeled products”?”**

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| Pricing of STP depends on prices of raw material, number of process and way of processing carried out. Pricing of ecolabeled product is in hand of retailers as well as in consumers. Currently such products are selling at premium prices, however if consumers start consuming more and more such products, definitely more and more retailers will start keeping sustainable products in their stores and eventually product would be common in the market and it would be more economical. | - Prices of raw material, number of process, processing steps vary the pricing of STP.  
- Retailers and consumers are even affecting the prices.  
- Common the product, more economical it is, so if more consumers start consuming more, prices of STP can reduce. | Can government role is vital for the growth of STP?                                           |

**Que: Consumers get confused because of different eco-labels in the market. According to you it’s better to have single eco-label standards/ logo or it should be country wise eco-labels and why?**

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>It’s difficult to comment on why single ecolabel standards are not there?</td>
<td>- It’s a debatable issue and it’s difficult to explain why</td>
<td>Why it’s difficult to have one</td>
</tr>
</tbody>
</table>
Que: Is the eco-label reliable? What guarantee or information gives the eco-label?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>The reliability of ecolabelling is not only in hand of ecolabelling issuing company; also it’s in hand of manufacturer as well. Manufacturers to reduce the cost, manipulate during manufacturing and after testing non allowed materials traces found. To control such issues authorised body do random testing ecolabeled products for the confirmation of authenticity.</td>
<td>- First Manufacturers and then ecolabel issuing companies are responsible for the use of ecolabels. - To increase the profit, manufacturers do manipulation during manufacturing - Ecolabelling authorised bodies random test to confirm manufacturers following rules and regulations.</td>
<td>What kind of or at what stage manufacturers do manipulation which they think it’s profitable?</td>
</tr>
</tbody>
</table>

Que: Is the eco-label controlled? If yes, how they controlled?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answered in above Que</td>
<td>Answered in above Que.</td>
<td></td>
</tr>
</tbody>
</table>

Que: What is your opinion on “Future of Sustainable Textile”.

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>According to Mr. Vignesh “Our future is in hand of sustainable products only”. Now a day’s many buyers, retailers are showing interest in such products. If everyone of supply chain does the manufacturing of product in sustainable way, then there will not be any problem.</td>
<td>- “Our future is in hand of sustainable products only”. - Buyers, retailers are showing interest in such products. - If each person from supply chain does production in sustainable way, then there would not be any problem.</td>
<td>With current market growth within how many years we can overcome the unsustainability?</td>
</tr>
</tbody>
</table>
5.4.6 Retailing - Frugi

Que: Could you please brief the company profile in terms of products & sales of sustainable textile products?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frugi has started in June 2004. They are basically into sales of baby wears of age upto 8 years which are exclusively made from organic cotton only. Frugi do have any shops. They do stock in boutiques that stock other brands like them. Currently they have 150 stockists across the UK and 230 stockists across the overseas. The company this sale is 3 million where last year it was 1.3 million. The company is looking forward the introducing new product range in coming season.</td>
<td>- Frugi is a new company into retails of baby garments made from organic cotton. - This year company has shown two-fold sales growth. - In coming season Frugi is going to introduce new range of clothes for baby wear. - Frugi stocks their products in more than 150 boutiques in UK and 250 across the overseas.</td>
<td></td>
</tr>
</tbody>
</table>

Que: From your point of view how do you define “Sustainable Textile products”?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>STP’s are the one which are created by taking care of environment and support and maintain social responsibility.</td>
<td>- Manufacturing of STP takes care, maintains and shows the responsibility towards environment and social factors.</td>
<td></td>
</tr>
</tbody>
</table>

Que: Why do you think Sustainable textile is needed today?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>STP’s do not harm the environment from its discovery and through its life span, that’s why they are needed much. Instead of throwing, it should be reused as many times as possible.</td>
<td>- STP’s are needed since they do not harm the environment throughout its life cycle. - Product should be reused maximum time.</td>
<td></td>
</tr>
</tbody>
</table>
Que: Which sustainable textile products do you market and why those specific products only?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| Company is into retailing of baby products made from organic cotton. They do its marketing by using sewing hangtags, by placing information on company website and all possible different media channels. | - Frugi is into retailing of baby products made from organic products.  
- Marketing is done by placing sewing hangtags, publishing info on company website etc. | What different media channels are useful for the marketing of STP’s? |

Que: From which countries are you sourcing sustainable textile products & why from those Countries only?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| Currently Frugi is sourcing their products from India, Turkey and Portugal. They are looking for other countries even for sourcing except China and Nepal, since many customers has perception that products manufactured from these countries are not complies with ethical or social standards. Companies are looking forward to have suppliers from Europe as well since it keep the product cost low and reduces the carbon footprint as well. | - Frugi is souring from their products from India, Turkey and Portugal.  
- Company looking forward new supplier from different countries specifically from Europe.  
- Because of the consumer awareness they do not want to source the products from countries like China, Nepal where social or ethical standards not followed strictly. | If in China still social issues are overlooked, then why other products are even sourced from them? |

Que: The products that you are sourcing are certified by standards like GOTS, Organic exchange, EU flower, Oeko-Tex; any other?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| Currently Frugi is sourcing product from GOTS certified suppliers only since they are the best among the organic textile standards. In addition, few suppliers are SA 8000 certified as well which gives the assurance of social accountability. | - All the products are GOTS certified since they are best among the organic textile standards.  
- SA 8000 shows that company is taking care of social issues. | |
Que: Are problems are you facing while designing, sourcing sustainable textile products? If yes, which are those?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes it’s difficult under GOTS when garments are having prints on it since GOTS doesn’t allow solvent based printing techniques. In addition, there are limitations on certain trims which can only use upto 5% of garment only.</td>
<td>- Solvent based printing techniques are not allowed under GOTS. - Certain accessories are not allowed to use more than 5%.</td>
<td></td>
</tr>
</tbody>
</table>

Que: Do you think certification is mandatory for sustainable textiles products? If yes, then why?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>For each single process of supply chain Certification is very necessary. Its gives transparency to the buyer as well as customer about from where the product has sourced and under what condition it has manufacturer. Frugi ask the Transaction Certificate from there each supplier for each shipment.</td>
<td>- Certification gives transparency within supply chain. - Frugi collects Transaction Certificate from their each supplier which gives assurance that particular shipped product is complying with standards. - Certification gives assurance to the buyer as well as customer about the compliance of product with standards.</td>
<td>Is transaction certificate issued against the lots/shipment after testing/verification/ cross checking to compliance with standards? Are customers are aware about any such certificates?</td>
</tr>
</tbody>
</table>

Que: What is the role of testing in developing Sustainable textile products?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test reports very important from buyer’s point of view. They ask random test report from manufacturers to confirm the product sustainability. However, since manufacturers provide transaction certificate for each shipment, buyers have reduced the frequency of asking for test reports.</td>
<td>- Test reports are asked by the buyers from manufactures to confirm the product sustainability - not necessary to have test report, transaction certificate is enough for shipments.</td>
<td></td>
</tr>
</tbody>
</table>
Que: Could you please comment on demand and pricing of Sustainable textile products?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| There is massive demand for organic products and its increasing and its becoming a fashion. This is because “customers of coming generation are well informed about the fact of the environment so there buying habits, lifestyles are becoming more ecofriendly and green”. Consumers are ready to pay for the STP, only if they are not over charged. Prices of STP are higher since need to pay the premium down the supply chain. | - The demand for organic products is increasing and it’s becoming a fashion.  
- “customers of coming generation are well informed about the fact of the environment so there buying habits, lifestyles are becoming more ecofriendly and green”  
- Consumers are ready to pay higher.  
- Organic products are having higher prices since need to pay premium down the supply chain. |                  |

Que: Do you think eco-labelling plays important role in marketing sustainable textile products?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
</table>
| Yes, ecolabelling plays an important role in marketing of organic products since it’s the only way to recognise the product is made from organic cotton. Currently Frugi is not using GOTS logo on their labels, however they are planning to use from this season for which are already paying premium. Packaging material is also very important now days. Currently Frugi is using bags made from Potato starch which is 100% biodegradable. | - Ecolabelling is important for marketing of organic products.  
- With ecolabelling is possible to recognise the organic and conventional product.  
- Since Frugi is paying premium that’s why they want to use GOTS logo on the garments.  
- Frugi is packing their products in bags which are made up of potato starch, a 100% biodegradable product. | Ecolabels are – marketing tool/ profitable business/ need? |
Que: Does your marketing strategy when using sustainable textile products differs from conventional one and how?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Since Frugi deals with organic products only, they have only one marketing strategy. To inform consumers they use sewing hangtag on garments, they place information on their websites. Frugi supports two charity firms who deal with organic cotton cultivation.</td>
<td>- Informing customers about the organic cotton and how it’s good for environment is the Frugi marketing strategy. - They do marketing by using sewing hangtag on their products, placing the info on the website. - Frugi supports the charity firms who produce the organic cotton.</td>
<td>What percentage of customers read the labels before buying the products?</td>
</tr>
</tbody>
</table>

Que: What consumer feedback have you received on sustainable textile products”?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumers like the organic products; however they don’t want to extra premium for that.</td>
<td>- Consumers are not ready to pay extra premium for organic products although it’s good for environment.</td>
<td>Consumers buy the luxury fashionable products which are much more costly than the STP’s products, then why not STP’s? Where STP’s are lacking?</td>
</tr>
</tbody>
</table>

Que: How do you access the potential for development and consumption of sustainable textile products?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>For development Frugi takes support of GOTS, Organic Exchange directory. Now Frugi has become bigger, more defined brands people have shown the interest in their products.</td>
<td>- GOTS, Organic Exchange directory helps for the development of organic products. - More brand defined people have shown interest in Frugi products.</td>
<td></td>
</tr>
</tbody>
</table>
Que: What is your opinion on “Future of Sustainable Textile products”?

<table>
<thead>
<tr>
<th>Summary</th>
<th>Analysis</th>
<th>Further Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frugi thinks market for organic textile product is growing. Consumers</td>
<td>- Market for organic clothing is growing.</td>
<td></td>
</tr>
<tr>
<td>are looking forward to have things to last for longer time without</td>
<td>- Consumers getting aware of environmental issues and their social</td>
<td></td>
</tr>
<tr>
<td>harmful impact. Now days consumers are aware about environmental issues</td>
<td>responsibility accordingly they are chaining there lifestyle.</td>
<td></td>
</tr>
<tr>
<td>and their social responsibility, because of which their lifestyle is also</td>
<td></td>
<td></td>
</tr>
<tr>
<td>changing accordingly.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.5 Conclusion

This chapter dealt with the primary research of the study, described how data was collected, places of the interviews, the procedures of the interviews and their transcriptions. Background information was researched about each company being studied, and information collected from the interviewees was used to present each interviewee thoughts on need, pricing, future, growth of ecolabeled ST; role of ecological testing, certification and ecolabeling bodies on STP supply chain. Each transcript was used as the interview study to highlight the role of each segment of textile supply chain to produce STP. The role of each segment is discussed in the next chapter.
CHAPTER 6: DISCUSSION AND CONCLUSION

6.1 Introduction:

This chapter discusses the research findings and its limitations in the context of the research aims and objectives mentioned in section 1.3. It discusses the significance and issues of eco-labelling across the textile supply chain and consumer. The chapter concludes with recommendations for further research for the eco-labeled STP’s.

6.2 Sustainable Textiles: Gravely needed

The global textile industry has taken several steps towards reducing its carbon footprint and meeting the challenges of building a more sustainable future. At the same time there is a growing awareness of environmental issues among consumers who are now increasingly insisting on textile products compliance with environmental standards and thus enabling the manufacturer and retailer to produce more STP. Brudtland’s report in 1987 (cited in Brito et al., 2008), sustainable development (SD) and sustainability defined as aiming to meet “the needs of the present generation without compromising future generations,”

In chapter 2, Part I, researcher have reviewed the literature to understand the need to sustainable textile started with what do you mean sustainable textile? Based on literature in brief STP are –

- Safe for human and physical environment;
- Made from renewable materials;
- Produced while making the most efficient use of resources such as water and energy;
- Manufactured by people employed in decent working environment;
- Capable of being washed at low temperature using environmentally friendly laundering agents; and
- Capable of being returned safely to the environment at the end of their useful life.

The same question had been asked to the all the representatives from supply chain to understand their thoughts and approach towards sustainable textile with perceptive of their field. All the representatives have similar thoughts and understanding about it.
Mr. Nimkar from Texanlab had explain thoroughly ‘why STP are needed today’. According to him everybody is talking about ‘sustainability’, however, why and how these situation has come are not know to too many people. The earth is 2005 million year old and from last 1.5 million years the human being is in existence. In year 1770, the population was 1 million, where now it got multiplied by 150 times. In year 1756 first synthetic dye was created by Mr. Perkin. Then slowly, 1920s, 50s and 60s organic chemistry evolved polymer chemistry and development of synthetic fibre have started. In year 1956, first reactive dye was invented. As the population was increasing, the production of chemicals, dyes was increasing i.e. the human being was started utilising the natural resources in large numbers. In mid 70′s, people have started realising that, along with chemical positive effects also have an adverse effect. This has primarily started in Germany because out of 6 world’s largest companies are situated on one river, the Ryan. The fishes are not eatable from Ryan river because of the high percentage of arsenic, lead, cadmium, mercury and so on. In 1977, during research it realized that, few azo dyes are having free carcinogenic amines which may be in the free form or they may get leached out of the fabric and cleaved inside the human body because of certain enzymatic reactions. Then in year 1992-93, Germans has come up with legislation for banning certain dyes which would be potentially carcinogenic. It’s easy to test the effect of the product, however still industry is lacking in testing side-effect of product. There are certain products which are not harmful as a final product, however there intermediate degraded product is very destructive. The best example for it would be APEO (alkyl phenol ethoxlates); in environment this product got breakdown into sunlight, when it comes to 1 or 2 or 3 mol, it can’t breakdown further and these products are called as Persistent Products. These products affects the mimic’s of estrogens of female harmon and studies found that, presence of such chemicals in river male fish start producing eggs, so it’s called endocrine-disporting property.

He added, “God has given us metals in the form of salts and human have extracted these metals form it for own interest”. Now, the situation is metals are not in the stage to go back into salts, so they are remaining in form of free metals & these free metals are toxic in nature because they are not bio-eliminable”. So, it’s difficult to define the word sustainable whose definition changes time to time. To understand the sustainability of product, there is a need to calculate carbon footprint, water footprint, energy footprint and toxicity footprint and once evaluation these footprints done it’s easy to find out the traces which product leave behind and eventually will get the sustainability index of product. In brief, for clothing people, now its
need to think that resources perennially available, which will be perhaps renewable resource without having adverse effect on bio-diversity which provides adequate performance of end product and which go to the nature without causing harmful impact making it available readily again and this would be ideal definition of sustainable product. About today’s need of sustainability, natural resources, chemicals resources and water resources are limited, so unless the use of available resources frugally, for coming generations will not have these resources to see. Therefore it’s not a matter of choice; it’s a matter of necessacity that everyone will have to move towards sustainability.

According to textile manufactures Alok Textiles and Purecots Creation, STP is a holistic approach and it can be achieved through recycle, reduce and reuse processes. It’s very important to note that all naturally grown products are not organic or sustainable; for example, organic cotton. All naturally grown cotton is not organic; it might be GMO or Bt cotton. Also, there is no assurance that the land doesn’t have any traces of harmful fertiliser, pesticides. For STP producers, production of STP gives the feeling of fulfilment and relaxation that company is not one of the parasitic of mother earth. However, it’s not a one person or company or country responsibility to try to become sustainable, its everyone’s responsibility (Purecots Creation, Amit Narke).

According to dyes and chemicals manufacturers, STP is a mindset (Inter Continent chemicals) and its “the product which has manufactured by taking care of all the three elements of sustainability that is: social, economic and environmental sustainability and product design is fashionable to sell and sustain in the market” (DyStar). STP’s are needed to take care of our eco-system, so that this planet can ‘sustain’ the lives and livelihood 6 billion inhabitants.

From certifiers i.e. soil association point of view, STP’s are those products which are manufactured from fibre cultivated by natural or organic method considering social & environmental impact, understanding soil fertility and animal welfare. Further, Mr. Amalraj has added that “producing sustainable textile is one of the ways to overcome the Global warming” and Ms. Anna had suggested product made from ‘organic cotton’ are the best example of STP.
6.3 ‘Why’ and ‘How’ to become sustainable textile manufacturer

1) Find out products’ biggest impacts

Section 2.11 reviews the carbon footprint by textile-clothing industry throughout the process. With reference to table 2.2, a t-shirt weighing 0.25 kg manufactured in India liberates 14 kg CO₂ throughout its life cycle. However, it’s important to note that manufacturing is contributing only 29% of total footprint whereas sales and its use contribute 71%. In contrast, a polyester jacket manufactured in China weighing 0.5 kg liberates 10.52 Kg of CO2 during its life cycle where manufacturing contributes only 72% and sales and use contributes only 27% of total carbon footprint. Based on above two examples, it’s confirmed that, based on one example it would difficult to predict the carbon footprint of same product but manufactured in different part of world and sold and utilized in other part of would. Therefore its import to ‘find out products biggest impact’. Understanding the life-cycle impacts associated with the manufacture and use of those products is key to reducing their environmental impact and to credible communication about environmental credentials. Without such information, precious management time could be wasted on dealing with relatively insignificant impacts.

Gathering robust impact data is also important to determine a baseline against which any improvements in environmental performance should be measured. The baseline can be compared to regional, national and international standards for environmental outcomes from climate change to toxins to help align product improvements with legislative requirements and society’s expectations. It may be prohibitively expensive to embark on detailed life-cycle analyses of all products. The key to success is to use qualitative analysis and/or common sense to identify potentially high-impact products and services, in order to prioritise those that warrant more detailed, quantitative investigation.

2) Be transparent

Customers and other stakeholders are looking to companies to be ever more transparent about their practices and the impacts they have on the environment and society. There are significant benefits in disclosing this information. It can improve relationships with pressure groups and can deliver competitive advantage. Being open and honest can play a valuable role in securing brand loyalty. Mr. Michele from Alok Industries has similar thoughts and according to him
transparency can be achieved through certification. According to Rundgren (1999) the basic principle of transparency required certification programmes to say who and what is certified. This facilitates more direct contacts between producer and consumers.

Trace and track is one the important part of certification compliance process. It overcomes the lacunas of system; for ex, for certification traceability of product is very important like how much quantity of raw material has entered into factory and how much finished product made and what the loss percentage is. According to OE and GOTS, manufacturer needs to prove the traceability of product from in to out (Table 3.6 and 3.7). This will give mass balance sheet, based on which it’s possible to control the waste and inefficiencies within process.

Ecolabelling is also another way of being transparent with customer, consumers. However, certain eco-labels issued are based on inspection and certification like GOTS where as Oeko-Tex 100 is based on testing only. Therefore in case of Oeko-tex 100, it not possible to understand the social, economical issues associated with product from where it manufactured.

In section 3.11 reviews about the SC and TC. However that is for the buyer’s assurance. What about the consumer assurance? To solve this problem would be based on TC buyer can use the eco-logo on the final product with permission of their supplier and from certification body to inform the consumers. There are other ways too, for example Timberland - more transparency through user-friendly information: Timberland, a footwear and clothing company developed a labelling initiative called the Green Index (evolved in 2007) to give customers information about the environmental impacts of its products. The index covers three performance areas: greenhouse gas emissions, recycled content and use of chemicals. By using LCA data Timberland is making detailed information available to customers about the environmental impacts of its products. According to the company, the information brings internal benefits as well, such as insight for consumer decision-making (BSR, 2008).

3) Bolster the claims with independent verification

Third-party verification of environmental credentials can often bring legitimacy to sustainability. Many of the most successful eco-labels are those that have been backed by issues-led organisations, for example GOTS certification for textile products made from organic cotton. Third-party verification can range in scope from qualitative assurance of
general claims to detailed verification of all stages of a full life-cycle product assessment. When deciding on the scope of verification to adopt, organisations need to evaluate the type of product (is it high or low impact?), the market (consumer or business-to-business) and the level of brand trust and integrity already in place. Given the generally low levels of consumer trust in big business, some degree of external verification is an essential component of any credible environmental claim. According to Mr. Holdstock and Mr. Amalraj, the claims made by the manufacturer or retailers are cross checked by certification of responsible eco-labelling body by testing the goods which can be picked from market store to confirm whether claims are right or wrong.

In case of dyes and chemical, customer believes on proofs from third party and they ask before initiate the business. Therefore many companies use the test reports as a marketing tool which proves the product and company integrity. According to the analysis, researcher has observed that, all the segments of supply chain apply for certification or verification as a buyer requirement.

4) Avoid making claims ‘in a vacuum’

Understanding a product’s life-cycle, being transparent about its impact and throwing in some third-party verification is only part of the way forward. Section 3.10 discussed the example of retailer claim of ‘bamboozling’ where product was made up of rayon. For any claim to be credible it needs to be made within the context of a wider environmental or sustainability programme. Claiming environmental credentials for one ‘hero’ product in a portfolio of ‘villains’ is a high-risk strategy. Once the spotlight moves to the rest of the portfolio, serious questions will tend to be asked about corporate integrity. Similar concerns apply to certifying one ingredient out of many or just the packaging rather than the whole product. A useful defence may be to point to plans to improve all products over time, as well as any efforts being made to tackle direct organisational impacts on the environment. Without this wider context, any Eco-labelled product may seem rather hollow (BSR, 2008).

Consumers are still largely interested in personal benefit. The most successful promotional campaigns for products with reduced environmental impacts emphasise customer value first. STP will have more impact if they are linked to consumer benefits such as health, freshness,
quality, durability, and lower costs in operation, however, currently none of the retailer doing marketing of STP with health benefit claims (Nimon et al., 1999).

5) Educate, Enable, and Encourage to act

Educate, Enable, and an Encourage people to act towards sustainability is very important and key point for the success of any eco-label and STP. ‘Why’ to educate the consumer, because, with reference to fig. 2.2 and 2.3, it’s observed that, consumers the way they use or consume the garments, washing-drying and disposal pattern liberate CO₂ in great extent. Therefore it’s required to educate consumer about product sustainability, eco-labeling, and their consequence on environment. ‘How’ to educate? It’s possible by placing trust worthy eco-label with required info on it, through various media, through regulations it’s possible to do this. Once the consumer gets educated then they will ‘enable’ and get ‘encouraged’ to buy STP and will use the product in sustainable way.

There are possible options companies can consider for addressing this challenge:

- Encourage consumers to buy more sustainable products by linking them with promotions and reward schemes. This needs to be done carefully and consistently. Marketing and incentives need to be consistent with the principles of sustainable consumption.
- Companies shouldn’t just rely on labels to get their messages across. Product information can now be shared via many more ‘touch points’: at point of sale; in retailer magazines, leaflets and websites; through road shows, help lines and education packs. These, combined with a creative approach to interactions with staff and vendors, can provide an excess of opportunities. Companies must look for new and innovative ways of engaging the consumer (BSR, 2008). Ex: Marks & Spencer – engaging consumers: Marks & Spencer’s Look behind the Label advertising campaign, launched in 2006, was designed to introduce customers to a range of ethical issues in five main areas: Fairtrade, sustainability, washability, avoidance of GM ingredients and animal welfare. The campaign intended to raise awareness about important issues (e.g. chemicals in food) while also encouraging behavioural changes (e.g. washing clothes at lower temperatures) (BSR, 2008).
Employees, workers are the key players of any manufacturing facility, therefore it’s very essential to educate them about sustainability and its importance. However, it’s a challenge is to attract, and keep retraining labour. Investing in the skills of employees is part of a sustainable and responsible human resource management. This is not only beneficial in the long run to the company, but it is also one of the numerous facets of the social pillar of sustainability (together with fair labour conditions, discrimination, gender issues and so on) (Brito et al., 2008). To educate the labours and shop-floor people Purecots Creation have adopted innovative way. According to Mr. Narke they celebrate days like Green Day, Earth day in factory to increase the awareness of sustainability. Alok Industries have organised the seminar not only for their employees, also for their suppliers, buyers, contractors etc before going to start the production of organic cotton where they have invited expertise from industry on subjects like eco-friendly dyes and chemicals, GOTS, ethical production practices etc.

6) Understand customers and target different market segments in different ways

Recent data from many parts of the world suggests that consumers increasingly care about environmental issues (Imkamp, 2000; Loureiro et al., 2002; Makatouni, 2002; Moon et al., 2002) and that they do purchase such products (Lathrop and Centner, 1998; Teisl et al., 2002,). However, some of this data also shows that there is quite a significant ‘value to action’ gap - customer concern does not always translate fully into changes in purchasing and other behaviours (Wang, 2007 cited in Gam et al., 2010).

For organisations selling the same product in different geographies, differentiated communications may be advisable. There could be a need for strong eco-labels in those markets where environmental issues are high on the consumer agenda, but relative silence in those markets where there is less customer interest. Even when there is little interest on environmental issues in some markets, eco-labels in other markets can continue to drive improvement in product development and environmental performance. These improvements once turned into a story, can then be communicated to the customer at the point at which they are most likely to engage on the issue and/or market edge can be derived.

For STP sales to enter the mainstream textile and clothing mass market, the casual purchasers, is seen as particularly important for developing sustainable textile market. For these
consumers, factors such as design, colour, quality, and price overrule environmental considerations which may, or may not, share with other consumers (Elzakker, 1999).

7) Reduce, Reuse, and Recycle:

To become sustainable, not only manufacturer should think of ‘Reduce’, ‘Reuse’ and ‘Recycle’ consumer too. According to EPA (2008) report in US during year 2007 around 11.9 million tonnes of textile waste generated which is around 4.7% of total municipal solid waste whereas in UK it was around 1 million tonnes (Defra, 2007). Textile waste in landfill contributes to the formation of leachate as it decomposes, which has the potential to contaminate groundwater. Another product of decomposition in landfill is methane gas, which is a major cause of greenhouse gases, significantly contributing to global warming, although it can be utilised if collected. The decomposition of organic fibres and yarn such as wool produces large amounts of ammonia as well as methane. Ammonia is highly toxic in both terrestrial and aquatic environments, and can be toxic in gaseous form (Waste Management – Productivity Commission Enquiry No. 38 2006, cited on Kerryn Caulfield, 2009).

In section 2.9 have discussed the consumption pattern of fibres where Scheffer (2008; p.131) noted that in every developed country each human being consumes 30 Kgs of textile fibre, where less than half on its apparel which is nothing but each an area of 600 m2 of fibre production somewhere in the world. If each year fibre consumption increases by 1 kg/person, which adds 5 million tonnes fibre production a year which is equal to the entire cotton production of India & Pakistan or cultivates area equal to three times Belgium. If the consumption rate keep on going with this percentage it’s difficult to sustain the yearly growth in the fibre consumption. By 2020 there will be a fibre gap, a difference of 20% between global demand and global supply and to feel this gap there would be need to grow entire surface of India with cotton. According to UK government (cited in Wastebook.org) “If every Briton purchased one item made from recycled wool a year it would save 371 million gallons of water, 480 tonnes of chemical dyes and 4,571 million days of an average family's electricity needs”.

The best example to of ‘How’ to enable the market to start with reuse is “Rreuse”, a European network of associations and companies with activities in re-use and recycling, has called for end-of-use producer responsibility for clothing and textiles. This could be implemented
through a tax paid by producers and importers, which would be invested on sorting technologies for second-hand clothing and textile (Reuse, 2005). Such a tax-scheme is for the first time in place in France as from 2006. Textile processing at the end-of-use is largely taken in charge by some charities. Producers and/or importers of textiles and clothing, shoes and household linen will pay the tax in which funds gathered through this or similar recycling taxes are going to be invested in recycling technologies remains to be seen.

Currently many textile industries are trying to reduce the waste and reusing the material after recycling. Researcher have found few examples it –

**Purecots** –

- by utilizing solar energy company is running around 20 computers within factory,
- from cutting waste, manufactured 5000 bags and sold at local super market subsidiary price,
- Currently working on yarn manufactured from solar energy,
- Reusing treated effluent water for gardening and washing purpose (specifically washing of printing screens).

**Alok Textiles** –

- Have reverse osmosis (RO) plant for purification of processing effluent, after purification of that water it utilised for washing, gardening etc.
- Have started recycling of old paper cones (used in spinning for packing) and making new ones.

**Frugi** –

- Offering shopping bags to their customers made of potato starch i.e. 100% biodegradable.

In case of reduce the energy consumption researcher argues that, whether product manufactured from conventional cotton or organic cotton, the energy consumption for its production would required around same since same process flow is going to use like desizing, scouring, bleaching, dyeing & printing, finishing etc. However, it’s possible to save the energy
like steam required to heat the water if manufacture uses the low temperature enzymes and dyes.

In brief, with reference to fig 2.1 and all above discussion the instead of three pillars of sustainable development, there can be a fourth pillar i.e. “technical” and these pillars can be achieved by (Table 6.1) -

<table>
<thead>
<tr>
<th>SD pillars</th>
<th>Why</th>
<th>How</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic</td>
<td>Competitiveness</td>
<td>Process and product innovation; Process and product substitution.</td>
</tr>
<tr>
<td>Environmental</td>
<td>Clean out puts</td>
<td>Reduce, Reuse and Recycle</td>
</tr>
<tr>
<td>Social</td>
<td>Social fairness</td>
<td>Better human resource management</td>
</tr>
<tr>
<td>Technical</td>
<td>Eco-friendly inputs</td>
<td>Use of certified products</td>
</tr>
</tbody>
</table>

**Table 6.1: Achieving sustainable development pillar**

6.4 Eco-labelled STP, Textile Manufacturers and Retailers:

Survival of the firm depends, to a large extent, on its willingness and ability to achieve a good image in terms of environmental performance (Collins, 1994). In this matter eco-labels and life cycle assessment (LCA) when the entire life cycle of the product is considered are crucial as a means of measuring environmental performance.

6.4.1 Arguments in favour of Eco-labeled STP:

a) Production

- ST`s are in demand and the best example to prove it is the growth of organic cotton cultivation and there consumption. With reference to Fig 2.12 and 2.14 production and retail sales shows the exponential growth from year 2001-2009.
- With reference to Table 2.3, the production cost of organic cotton is far less than GM cotton. Therefore farmer should adopt this system.
- To support STP like organic cotton infrastructure for training and extension is expanding; e.g. integrated pest management (IPM) and integrated crop management (ICM) for production of organic cotton.
• Improved access to information technology is facilitating the exchange of experiences, expertise and ideas for recycling polyester, polyester from PET, organic cultivation methods, as it is for marketing of the STP’s.

• Eco-labels can improve the image and/or sales of the company, according to Lavallee and Plouffe (2004) ecolabelling is attracting more and more interest on the part of large companies who see this type of labelling as an essential factor to consider as part of their industrial and commercial strategies. This interest takes on an even greater impact in the current context of the globalization of markets because product certification and eco-labelling may well become both a very effective means for protecting internal markets and an increasingly essential tool for gaining outside markets.

• Eco-labels can make consumers more aware of environmental issues and problems because of which it helps the protection of the environment.

b) Processing

• Blending organic cotton, recycled products like polyester at some minor percentage at the level of spinning is an effective way to increase fibre demand at low cost.

• Because of the new technology within dyes & chemical manufacturing, eco-standards approved ample dyes and pigments are available for dyeing and printing. This will make the product more colourful, attractive e.g. low temperature dying.

• Use of enzymes saves the water, energy and time.

c) Retail

• The concept of ‘organic cotton’ is successfully being marketed to brands and retailers in the fashion industry as being part of their policies for CSR. E.g. Marks and Spencer, Nike, H & M, C & A and many more have started retailing products made from organic cotton. Not only organic cotton, product from recycled polyester has even gaining the popularity.

• The new involvement of large brands and retailers increases the number of points of sale exponentially, making organic cotton items available to consumers in the usual points of purchase for textiles and clothing. The small scale retailers have started
displaying their products in boutique shops across the world, e.g. Frugi display their products in more than 250 boutique shops across the world.

- The involvement of large fashion brands and retailers in STP generates much attention from other parts of the textile industry, from designers and from the media. This further strengthens consumers’ interest in STP and their willingness to purchase.
- According to Ms. Anna from Frugi consumers are ready to buy STP, only if they have not been asked to pay any extra money.

**d) Infrastructure**

- Demand for STP has become significant in the main consumer markets (United States, EU), even when market share is still small. Global retail sales of organic cotton clothes and textiles reached $4.3 billion in year 2009, an increase of 34% on 2008 (Organic Exchange, 2009).
- Textile and clothing brands and retailers are increasingly aware of, and responding to, the need for comprehensive CSR policies.
- Fair trade cotton creates a unique opportunity for smallholder farmers, including organic cotton producers, to increase their visibility, their income and their development (Fairtrade, 2008).
- Environmental legislation pushing industries to investigate less polluting production methods which includes banned azo dyes, waste water disposal, energy use, emissions etc (BSR, 2008).

**6.4.2 Arguments against expanding Eco-labelled STP**

**a) Production:**

- More than half (61.41%, 2009) of global organic cotton is produced by India only. If because of some unavoidable reasons, natural disasters in India if there is cultivation of organic cotton then what would be the situation?
- Recycling of polyester from PET bottles hardly started by few manufactures like Reliance in India, Tianjin from Japan.
- During the conversion to organic agriculture farmers are usually not rewarded with a price premium for their in-conversion produce. Organic farmers face significant
financial risks in conversion period. The conversion to organic farming tends to be more difficult and more expensive in areas where conventional farming relies upon a high use of synthetic inputs, as the yield drop in organic will generally be higher. Farmers are aware of the environmental improvements that organic production brings, but their main motivation is improved income in the short-term rather than concern about their environment in the longer term (Elzakkar, 1999; p.93).

- The growing importance of GM cotton in the world is the threat for growth of organic cotton cultivation (World Development Report, 2008).
- The premiums paid under fair trade cotton production make it more difficult to motivate conventional farmers to convert to organic. They lean towards the higher fair trade price, as the additional organic premium is comparatively lower (BSR, 2008).
- The percentage premium varies from place to place, country to country. Variability of price can be seen either as a threat, or as a challenge; one that must be met by developing pricing mechanisms that guide value chain and helps to identify the sustainable ‘floor’ price. (Organic Exchange, 2009)
- Compared to conventional cotton production (22403000 MT), organic cotton (175113 MT) is only 0.78%.
- In case of retail sales, product made from organic cotton shows 35% decrease compared to last year, whereas in case of Fairtrade there is 36% decrease in sales compared to last year. m

b) Processing:

- Organic cotton fibre, yarn, fabrics and garments cannot be distinguished from conventional ones, and generally not even from GM cotton, other than eco-labels.
- For smallholder producer organizations difficult get certify them self because of cost involvement, insufficient infrastructure, funding and knowledge of STP.

c) Retail

- Many brands and retailers do not advertise to the general public their involvement in organic cotton, because the organic quality of the product is only an additional feature in consumers’ purchasing decisions (ITC, 2007). In addition, organic food producers,
organic cotton apparel manufacturers and retailers do not typically make health related claims about their products (Nimon et al, 1999).

- Because of higher premium asked by the retailers, consumers purchasing behaviour changes (ITC, 2007).
- According to Key Note ‘Clothing Retailing’ market report 2009, the world market for clothing retailing during year 2008 it has reached 770 billion pounds, whereas in 2008 textiles made from organic cotton sales is 3.2 billion. That means organic cotton textile is only 0.41% of conventional textile. Therefore it shows that, there is a large gap between conventional and organic textile sales and there is huge scope for the growth of products made from organic cotton.

**d) Infrastructure**

- There is no compulsion on testing in place to ensure that organic cotton items sold to consumers actually carry organic cotton fibre only. According to NOP (national organic program) GM seeds are strictly prohibited but NOP standards are ‘process based’ which means testing to detect the GM material in the organic product is not required (Ecotextilenews, 2010)
- The concept of ‘organic cotton’ as understood by the general public is to a large extent built upon information about cotton production systems (health, environment, socio-economic) that form only a minor part of organic cotton production (ITC, 2007).

**6.4.3 Opportunities for eco-labelled STP**

**a) Production**

- Fair trade cotton growers have a higher probability of becoming organic fair trade producers than conventional producers, because of their more frequent linkage with consumer markets. Fair trade cotton deals with social accountability where organic cotton bans the use of most toxic and dangerous cotton chemicals in production.
- Brands and retailers continuously develop and refine their CSR policies. The probability is increasing that they will in future go beyond issues such as energy, environmental performance and labour conditions, to also include specific attention to the fate of producers (ITC, 2007).
b) Processing

- STP demand will continue to grow in the future, thus increasing the number of textile processors involved, and enlarging the range of intermediate and end-products available to the industry and to consumers.
- “It’s not a single man or company or country responsibility to look STP positively, not because its advantages, it’s because it necessacy” Mr. Narke, Purecots Creation.
- “STP’s and their business is profitable form farmer to consumers, if it does in real manner”, Mr. Michele, Alok Ind.
- “ST is a fashionable name of 21st century and its going to become fashion tomorrow”, Mr. Nimkar, Texanlab.
- ‘Our future is in hand of STP only. If each and every person in supply chain does the production in sustainable way, then there would not be any problem’. Mr. Amalraj, Hohenstein Institute.

c) Retail

- The importance end-consumers attach to health and ‘wellness’ is likely to increase in time, to the benefit of organic agriculture and trade.
- Price differences between organic cotton items and conventional items may decrease, because of more efficiency in processing (higher-volume production runs, etc.), and following increased product availability. Organic cotton items may evolve in the marketplace from being a speciality item towards becoming commonly available goods (ITC, 2007).
- Consumer information about the organic nature of organic cotton items (for example through labels inside, hang-tags, consumer brochures or advertisements) is still in its infancy. New strategies and tools may be developed by brands and retailers to cash in on their involvement in organic cotton, improving their image and profile among consumers (ITC, 2007).
**d) Infrastructure**

- High-profile brands and retailers are not likely to take the risk of making unsubstantiated claims about organic cotton usage without adequate documentation, control and certification. This will give growth to eco-labeling and certification.

**6.4.4 Threats to eco-labelled STP**

**a) Production**

- Demand for organic cotton fibre depends on the reliability of the claims made about its ‘organic’ origin and production.
- The organic cotton sector does not seem to be able, now or in the near future, to meet the current explosion of interest in purchasing organic cotton fibre, yarn and fabrics. If demand cannot be met, the image of the organic cotton sector will be affected and many newcomers may lose interest, and prefer to focus on the use of other sustainable cottons (ITC, 2007).

**b) Processing**

- Once organic cotton has become a common good and is taken up also by medium- and low-profile brands and retailers, the opportunity for cheating by spinners and textile mills may increase. Medium- and low-profile brands and retailers run a higher risk of fraud by suppliers (ITC, 2007).

**c) Retail**

- Selling organic cotton items may remain a one- or two-year fashion trend for some brands that are in the marketplace today.
- Blending is an approach that provides new brands and retailers with an easy entry to the organic cotton sector. It is relatively easy to accomplish without too much cost. Blending contributes to achieving NGO approval for CSR policies, and it may also provide free publicity. From the perspective of the organic cotton sector, there is a risk that blending only a small percentage of Organic cotton would be a substitute for a more profound involvement in organic cotton use by brands and retailers (ITC, 2007).


**d) Infrastructure**

- Publicity for the involvement of larger brands and retailers in organic cotton is often premature, happening at the announcement of involvement rather than on sale of the items.
- Until recently, brands and retailers were not used to dealing with actors in the cotton textile chain other than the garment manufacturers. Many of them are now starting to be interested also in the origins of the goods they buy. It is not likely, however, that many will go as far as committing in the short-to medium-term to supporting specific organic cotton production projects.
- Organic agriculture will increasingly be confronted with the risk of contamination by GM organisms, as GM crops are progressing today even in reluctant consumer markets.
- It’s difficult to test GM content once it converted into garment or once it processed with chemicals.

**6.5 Eco-labeled STP and Consumer**

Under the section 3.13 discussed about the factors affecting the consumers behaviour and there approach towards ecolabeled STP. The proliferation of voluntary certification and labelling schemes for environmentally and socially responsible production is often seen as a driven by companies and consumers. Consumers are heavily involved in environmental pollution because of their buying behaviour and consumption of textiles. There exist many consumption patterns with a substantial link to ecological damage. Researchers have tentatively found that specific demographics, human values, personality, and attitudinal variables are useful for characterizing ecologically concerned consumers (Balderjahn, 1988).

Meyer’s (2001) research on relevant literature summarized that higher product cost, little choice, aesthetic disadvantages, complexity of information and uncertainty about actual environmental benefits were consumers’ main barriers to purchasing environmentally friendly product. Continuing to this, in today’s market products made from organic cotton are having attractive designs and colours, however price is the unsolved issue. Consumers awareness about environmental impact of non-ecofriendly business has increased and they more likely to
buy products from environmentally friendly business strategy (Gardyn, 2003 cited in Jin Gam et al., 2010).

According to Wang (2007, cited in Gam et al., 2010), consumers willingness to pay and purchase cloths made from sustainable raw material like organic cotton is a complex issue. Significant associations were found between environmental shopping attitudes and willingness to pay more for organic cotton products, and environmental shopping behaviour and willingness to pay more for organic cotton products. It’s observed that consumers with a greater environmental awareness demand more environmentally friendly merchandise (Montoro et al., 2006).

Several researchers have found that many consumers refuse to purchase products from companies that have been accused of being environmental polluters (Fraj-Andres and Martinez-Salina, 2007). It follows, then, that these consumers willing to pay more for goods whose production is less harmful to the environment, such as organic cotton items, operate from a base of knowledge regarding sound and unsound environmental practices (Casadesus-Masanell et al., 2009). Environmentally friendly products were successful only if customers perceived the product attributes as superior to competitors’ conventional offerings (Meyer, 2001).

To increase consumers’ environmental concerns and encourage consumers’ environmental purchasing behaviour, apparel product retailers and marketers should create marketing campaigns and educational materials to promote ecolabeled STP. To prove it, the best example would Gam et al., (2010) work. He observed that few mothers had never heard of OCC before, indicating that lack of information could be one of the reasons that STP has not become more main-stream into market.

Since higher retail price of STP is still views as the main barrier for its growth. Ton et al, (1999; p.118), have suggested the following possible solutions to the price problem –

- Economies of scale, such as increased fibre production per unit to reduce the cost of production
- Promotional activities to improve the image of STP’s
• Concentration on specific textile and consumer market sectors in which price is of lesser importance
• Government support through, for example less or zero value added tax (VAT) for eco-textiles
• Blending, this could increase the quantities used.

As a consumer, it’s very confusing for them to understand textile Eco-label placed on garments. To recognise which Eco-label is placed on garments, at least consumer should have seen that logo before. Considered consumers have recognised the label, then next question would be, are they aware why that Eco-label is placed on the products? To prove how consumers get confused, the best example would be difference between GOTS and OE standards labelling guide. Both the standards are applicable for products made from organic cotton on which retailers, manufacturers can use respective logo on their tags. Under both the standards it’s mandatory to mention the percentage of organic cotton on the label. According to both the standards if product is made from 100% organically cotton, then under GOTS and OE manufacturer or retailer can use the statement “Organic” and “Made with 100% organically grown cotton” respectively. With reference to Table 3.5, GOTS is based on social, technical and environmental areas, and in contrast Organic Exchange 100 Standard (OE 100) is for tracking and documenting the purchase, handling, and use of 100% certified organically farmed cotton fiber (or organic - in - conversion cotton fiber) in yarns, fabrics and finished goods. The point is, while purchasing the product customer will check only the organic content and they will decides that product is ecofriendly or sustainable which is completely wrong; because an OE standard does not look into social or harmful dyes & chemicals or about the environment related issues. By using OE 100 logo, retailers can make the garments from 100% organically grown cotton and can be dyed with harmful dyes and chemicals, can be printed with non-ecofriendly printing technique like solvent based printing and still tag the product as a Organic. Based on this assumption; researchers have raised the questions - Are consumers aware of the little bit about the standards? If yes, what’s the percentage of awareness/knowledge about the standards?

Another point is regarding statement or wording used for labelling under OE. According to Organic Exchange 100 Standard 2009, Version 1.3, if product is made from 100% organic cotton, then it should be labelled as “Made with 100% organically grown cotton” which
retailers are going to place on the products for consumer’s knowledge. However, from consumer point of view, the statement its confirming that cotton is grown 100% organically i.e. the genuinity of organic cotton, however the statement is not confirming the percentage of organic cotton used in product. Everyone would be agreeing that, cotton can be either organic or conventional; it can’t be for example 90% or 50% organic. So, this proves that, labels along with statement can confuse the consumers. Among the few problems it’s a one of the problems with eco-labels that no common definition or general understanding exists for what constitutes environmentally friendly clothing and eco-labelling.

6.6 Certification and Eco-labelled STP

According to Dunn (2008), ecolabels are backed by solid third party certification that gives confidence to consumers about the genuinity of product. These bodies are the key player for the growth of eco-labeled STP who confirms the product, process and manufactures integrity with respect to sustainability. According to Rotherham (1999) environmental certification is a kind of life-cycle analysis for a company. To call a product sustainable and labelled with eco-logo, the whole supply chain must be certified. Certification schemes are voluntary and assess the overall environmental policy and management of a company; likely Mr. Holdstock from ‘Soil Association’ certification body have same thought. Certification provides a comprehensive system for ensuring that certain standards of sustainable production and processing are met. Rundgren (1999) think that production and process of sustainable textile products are very complex and therefore it require highly efficient and professional certification mechanism. With this regards Mr. Holdstock has said that “certification is beneficial to textile supply chain because certification insist to maintain control mass balance and traceability which is helpful to calculate the inefficiencies within system”. Therefore, it concludes that, certification suppresses the malfunctions and gives the traceability of product throughout the supply chain.

Across the whole supply chain, most of the people have positive thought about requirement of certification. A common thought by all the representatives from across the supply chain is, “certification is required since its one of the buyer’s requirement”.

According to textile manufacturers ‘Alok Textile’ and ‘Purecots creation’
“Certification is for betterment, improvement & understanding of the ecological, social criterias. It develops transparency within system and helps to maintain traceability across supply chain. It also helpful to review own system and try to overcome the loopholes from it”.

According to Dyes & chemical manufacturers M/s. Inter Continent Chemicals India Ltd,

“Checks and balances are a must for any rule to be enforced and it’s done by the process of certification. They gives a sense of pride that even our company contributing to undoing what has been done wrong over a century in our lust of industrialization, growth and profits. Even though, it comes minor incremental cost.”

However, in contrast DyStar think that-

“Certification should not be mandatory. Mandatory will attract lot of resistance and then finding the loopholes in the system”

Certification provides a comprehensive system for ensuring that certain standards of production are processing are met. Certification provides the product with credibility, assures the buyer that the product has been produced as per standards and enables the product to be marketed at premium price. Eventually buyers and consumers must trust the certification procedure. This is particularly relevant for organic fibres where the market has flooded by products described in vague terms such as ‘Green’ and ‘Eco’ (Rundgren, 1999). However, Rowen. J, (2008) think that, certification is still a confusing mass of agencies, guidelines and regulations with sometimes little enforcement. There are many symbols; logos are new and often unknown to both retailers and consumers. "There are so many certification programs, but eventually better programs will bubble up to the top and stick."

Cost of certification can be high in relation to the value of the product and thus can become prohibitive. This is especially true for textiles because of the number of process are involved from production to consumer. Mr. Amalraj has the same thoughts about certification. It may be more expensive for companies in developing countries to obtain labels and certifications, “due to factors such as the lack of existing management structures (EMS), the novelty of EMS, insufficient infrastructure, and high auditing costs if companies have to rely on international consultants and certification companies” (Vossenaar 1999, cited in Rotherham, 1999). According to Mr. Narke from Purecots have the same impression, and think that, in India it’s not possible for small manufacturer to get certifies because of the money involved to get certification although they are capable to get certify. To overcome the cost to certification issue, Mr. Holdstock has suggested that, ‘group certification’ would be the best option to
reduce the certification cost. Here, the cost of certification will get equally divided between number of companies or persons.

To overcome the certification and labelling cost, Grodskay (1993, p.193) have suggested two approaches, one is “Carrot” approach i.e. by rewarding firms that sell environmentally friendly products with an exemplary ecolabels; second “stick” approach i.e. legally binding standards. Ibanez and Grolleau (2007) have used these two approached for their analysis and they have suggested how those approaches can be utilised -

- “carrot” approach - the firm who preserve the environment appreciate them by subsidizing a recognized labelling;
- “Stick” approach - increase of labelling cost for polluting firms by enforcing stricter labelling guidelines and severe punishment in case of deceptive use of environmental claims.

With reference to section 3.11.1, fig. 3.7, researcher has reviewed the process of certification and how individual actors of supply chain get involved into certification. It’s also highlighted that, this is very complex, time consuming and sometime costly process. In fig. 3.7, researcher had drawn the flow considering individual manufacturer has single production facility. In this case, each actor of supply chain has to depend on each other. Therefore to overcome the problems like cost and time of certification researcher has suggested that, if the buyer contacts the vertical integrated manufactures or even to the manufacturers who has at least 2-3 different processing facilities it will solve the purpose (fig. 6.1). In addition, it will save the transaction certificate time and money as well. From production point of view, it will reduce the handling, transportation of product that means less CO₂ elimination. Apart from this, one of the biggest advantages of this is, within short time STP goods can reach retailers’ shelves.
6.7 Conclusions

The research objectives were to:

1) Conduct literature review to understand the issues and significance of ecolabeled sustainable textile goods on textile consumer’s and textile industry.

2) Conduct 9 in-depth interviews textile manufacturers, dyes & chemicals manufacturers, ecological textile testing laboratory, certification body, ecolabelling body, and retailer to understand ‘how’ and ‘why’ they may use ecolabeled sustainable textile products.

3) Based on interviews understood the significance, role and importance of each one of while producing eco-labelled STP.
4) Compare and contrast literature review with research results to identify further research and issues for the textile industry to consider.

Sustainability is a sensitive issue for the textile-fashion supply chain (SC) due to its inherent characteristics (high resource use). Because of such sensitiveness of the SC to sustainability and current sharp competition, the pursuit of sustainable principles, represents at the same time a constraint and an opportunity for the actors of the chain and implies considerable changes at the organisational level both inside each company and along the SC. The question of the compatibility between sustainability and economic growth is still one of the main concerns in the sustainability literature; for example variation in organic cotton prices. Keeping such a question in mind, researcher have first analysed the attitudes and approach of the textile-fashion SC towards sustainability, the importance of certification and eco-labelling, pricing of STP.

However, a common remark concerns the implementation of sustainable strategies within any SC. A deep reorganisation is needed, between the different actors in order to cope with the new sustainable challenges. Subsequently, the performance concept of companies has to be revised according to the reorganisation. The challenge for companies is double: on the one hand the sustainability principle has to be translated into qualitative and/or quantitative indicators; on the other hand, the multiple SC actors have to co-produce the new performance concept. The relationships within the context of the SC become more complex and require the development of new competencies.

Certification plays an important role in STP supply chain. Researchers analysed that certification is a complex, time consuming and costly process however; at the end it creates the transparency within supply chain which gives credible assurance to retailer and consumer. Therefore certification should be mandatory for STP, however it’s not. Certification and eco-labelling (GOTS) goes hand in hand, however, in some case testing and eco-labelling (Oeko-Tex) goes together. Presence of various eco-standards and eco-logos in market is confusing retailer, customers and manufacturers. Therefore harmonisation within the eco-standards is urgently required.

As eco-labelling is a form of product differentiation, products conforming to and bearing an eco-label are likely to receive a premium in their respective markets. This naturally depends
on the environmental awareness of consumers. The credibility of the relevant eco-label, and the market for eco-labelled products, also play important roles in the success of an eco-label. Thus eco-labelling can also work as a –

- Window to verify the claims outside of regulatory processes, which increases transparency within international market (Dowell et al., 2000).
- An indicator of innovation and entrepreneurship since ‘green’ innovation produces higher future values (Christensen et al., 2004 cited in Moore, 2009).
- a market-oriented instrument to achieve environment goals and thereby avoid the inefficiencies associated with mandatory standards, or ban (Nimon et al., 1999)

Changes in consumer behavior alter manufacturer behavior. That is, if a significant portion of the consumer population demands environmentally friendly products, the presence of an ecolabelling program may provide firms an incentive to differentiate and market their products along environmental characteristics. An increase in supply of these environmentally friendly products may increase consumer purchases simply through greater availability without changes in individual awareness.

Finally, researcher have analysed ‘how’ and ‘why’ STP actors can use eco-labelled STP and it’s possible by -

1. Know your product’s life cycle - The most comprehensive carbon footprint denotes the total amount of CO₂ emitted throughout a process or in a product’s lifetime.

2. Choose organic and sustainable fibres - Choosing organic cotton is one big way of reducing the CO₂ impact of products, maintain the soil fertility, creates better environment, and gives good earning to the farmers as well as business based on it.

3. Educate, Encourage consumers on green habits – switching a washing machine’s temperature setting from hot to warm can cut a load’s energy use in half. More than 70% of CO₂ elimination of product occurs during sales and its use.

4. Utilize more recycled fibres- The environmental impact of recycling worn-out polyester into new polyester fiber, for instance, is significantly lower than making that same fiber anew.
5. Go for certification and adopt same practices for conventional practices.

With reference to table 6.1 product innovation can be targeted to specific consumer markets, such as to sustainable minorities, which are actually increasing with the ecologically conscious customer (eco-fashion). The use of new resources such as organic cotton can be an instrument for product innovation, which is attractive for ‘green’ customers. However, innovations should be accompanied by a communication strategy, especially in the business-to-consumer context and ‘Eco-Labels’ can be a means for this.

Eventually sustainability can be used as a springboard to reach environmental and socially conscious customers. For these reasons, sustainability is not likely to fade away and is becoming the flag of excellence in future Brito et al., (2008).

6.8 Research Limitations

The main limitation of the research was time; being a one year period of study, there was only a limited period of time to conduct the research, review the literature, collect primary data and write up the thesis. This affected the sampling used, since it was impossible to visit entire population due to budget restrictions, difference locations, impracticalities as well as the time constraints.

It’s also not possible to include the actors from area like logistic which is another area linked with textile –clothing industry responsible for CO₂ emission; government authorities’ whose views may put some light on government policies and approach towards eco-labelled STP; the manufacturers who are not certified by any of the standards to understand why they are not willing to get certify.

The research was not able to test the accuracy of the information, and with the limited time to conduct interviews because the researcher was unable to ask more questions; which arises later and this weakens the validity of the results. Bias is another issue which arises especially with interviews. Some participants tend to express views that are consistent with organic cotton, GOTS, OE standards only and try not to present themselves negatively. In addition, the interviewees may have also been unable to disclose some information due to the privacy issues with various companies. Information collected may be prone to some inaccuracy as a
result of less than accurate recall, lack of information, or discomfort with self-disclosure. The researcher’s educational background and personal quest to fulfil the study’s objectives may have also lead to bias. When considering the secondary data gathered, the information was mostly from books and journals; however, the information available had no boundaries, making it difficult to decide when to stop searching. Hence, the researcher was constantly concerned with, and questioning the sufficiency of information and conclusiveness of results.

Finally, the quality of the data collection and the results are highly dependent on the skills of the researcher and on the rigor of the analysis. Since all of these methods are dependent on interpersonal exchanges with respondents, any number of variables, including the dress and language used by the interviewer may influence the quantity and quality of information given by respondents (Saunders et al., 2003). The skill and experience of the analyst also influences how well the data are summarized into themes and insights. This study’s limitations need to be taken into account when considering its contributions to theory and findings; however, some of these limitations draw attention to some areas of future research, which are discussed next.

6.9 Recommendations for Further Research and Industry

There are numerous possibilities for future research in eco-labelled STP. For this research manufactures were from India, results may vary from country to country. However, based on general understanding, the study results indicate the following areas of further research:

1) Most of the research is carried out to identify the consumers’ willingness to pay for sustainable, organic or fair tread products. However, research has been not carried out about

   i how much consumer knows about eco-labels, and eco-textile standards and
   ii the shopping behaviour and attitudes of STP consumers have not yet been analysed through actual purchase data.

2) Investigate the health claims dictated by the lack of direct categorical data available on environmental benefits claims versus health benefits claims on labels (Nimon et al., 1999).
iii Is there any serious health benefits of STP especially Organic Cotton to human being?

3) Compared to conventional cotton, if organic cotton saves 171% of cost and increases 200% farmers income then why there is a need to pay premium to the farmer?

4) Why eco-standards are not mandatory throughout the textiles industry?
Appendix I: Interview Questions

A) Textile Manufacturers

**Company profile/Background:**
- Could you please brief the company profile in terms of products, sales, size of the production?

**Products:**
- Which sustainable textile products have you produced & for how many buyers are you producing it?

**Certifications and Eco-logical testing**
- Do you think certification is mandatory for sustainable textiles products? If yes, why?
- Which different type of certifications (regards to sustainability) do you have & from last how many years have you been certified for it?
- Why management is looking forward to have these certifications?
- What is the role of testing in developing Sustainable textile products?

**Manufacturing and sales**
- Why are you producing Sustainable textile products?
- What changes have you made within your production line to become more sustainable issue?
- How do you think your company can improves access to sustainable raw material?
- What benefits has your company achieved by doing the production of sustainable textile goods?
- What issues arose while production of sustainable textile products and how did you solve them?
- Can you explain your management environmental policy and is your manufacturing practice working towards Carbon Neutral production?
- Could you please comment on the pricing of “Sustainable textile products”?
- Could you please comment growth of sustainable textile products?

B) Textile Dyes, Pigment and Chemicals Manufacturer

**Company profile/Background:**
- Could you please brief the company profile in terms of products, sales, size of the production?

**Sustainable approach**
- From your point of view how will you define “Sustainable Textile”?
- Why do you think Sustainable textile is needed today?

**Products**
- Which different “sustainable textile products (wet processing chemicals, dyes, pigments) are you producing?
Certifications & Eco-logical testing
- Do you think certification is mandatory for sustainable textiles products? If yes, why?
- Which different type of certifications (regards to sustainability) do you have & from last how many years have you been certified for it?
- Why management is looking forward to have these certifications?
- What is the role of testing in developing Sustainable textile products?

Manufacturing and sales
- Why are you producing Sustainable textile products?
- Could you please comment on the pricing of “Sustainable textile products”?
- Which eco parameters are you controlling while producing STP products?
- Could you please comment growth of sustainable textile products?

C) Ecological Textile Testing Laboratory

Company Profile:
- Could you please brief us about your company and the activities you carry out with regards to testing?

Sustainability Approach
- From your point of view how will you define “Sustainable Textile”?
- Why do you think Sustainable textile is needed today?

Future of Sustainability
- What is your opinion on “Future of Sustainable Textile”.

Testing
- Which eco parameters testing do you carry out?
- How long your company a testing ecological parameters, why do you think this is important?
- What is the role of testing in developing Sustainable textile products?
- Could the “retailer’s current ecological testing parameter”, can be more stringent?

D) Certification

Company profile
- Could you please briefly describe the company profile?

Sustainability Approach
- How do you define “Sustainable Textile products”?
- Why do you think Sustainable textile is needed today?

Certification & Ecological Testing
- Why do you think certification is mandatory for sustainable textile products?
- According to you how does certification benefit each segment of textile, fashion supply chain?
- Which common lacunas you have seen while certifying manufacturing units as per required standards?
• According to you certification is burden, requirement or necessacity and why?
• How is certification important for growth of sustainable textile products?
• What is the role of testing in developing Sustainable textile products?

Future of Sustainability
• What is your opinion on “Future of Sustainable Textile”.

E) Eco-labelling

Company profile
• Could you please briefly describe the company profile?

Sustainability Approach
• How do you define “Sustainable Textile products”?
• Why do you think Sustainable textile is needed today?

Eco-label
• Do you think eco-label is mandatory for sustainable textile products and why?
• According to you how does eco-label benefit each segment of textile, fashion supply chain?
• According to you eco-label is burden, requirement or necessacity and why?
• How is eco-labeling important for growth of sustainable textile products?
• What is the role of testing in developing Sustainable textile products?
• Could you please comment on “pricing of eco-labeled products”?
• Consumers get confused because of different eco-labels in the market. According to you it’s better to have single eco-label standards/logo or it should be country wise eco-labels and why?
• Is the eco-label reliable? What guarantee or information gives the eco-label?
• Is the eco-label controlled? If yes, how they controlled?
• According to you will Eco-labels really help to improve the environment?

Future of Sustainability
• What is your opinion on “Future of Sustainable Textile”.

F) Retailer

Company profile
• Could you please brief the company profile in terms of products & sales of sustainable textile products?

Sustainability Approach
• From your point of view how do you define “Sustainable Textile products”?
• Why do you think Sustainable textile is needed today?

Products and Product sourcing
• Which sustainable textile products do you market and why those specific products only?
From which countries are you sourcing sustainable textile products & why from those countries only?

The products that you are sourcing are certified by standards like GOTS, Organic exchange, EU flower, Oeko-Tex; any other?

Are problems are you facing while designing, sourcing sustainable textile products? If yes, which are those?

Certifications & Eco-logical Testing

Do you think certification is mandatory for sustainable textiles products? If yes, then why?

What is the role of testing in developing Sustainable textile products?

Marketing

Could you please comment on demand and pricing of Sustainable textile products?

Do you think eco-labelling plays important role in marketing sustainable textile products?

Does your marketing strategy when using sustainable textile products differs from conventional one and how?

What consumer feedback have you received on sustainable textile products”?

How do you access the potential for development and consumption of sustainable textile products?

Future of Sustainability

What is your opinion on “Future of Sustainable Textile products”? 
Appendix 2: Purecots Creation Transcripts

Company: Purecots Creations.
Interviewee: Mr. Amit Narke.
Position: Owner.
Location: Mumbai, Maharashtra, India.
Date: 01\textsuperscript{st} April, 2010.
Type of Interview: Face to Face.

Company Profile:

RS: Could you please brief the company profile in terms of products, sales, size of the production?
AN: As far as product are consent we exclusively into baby garments, with regards to quality of garments we only manufacture garment from organic cotton only, we don’t touch conventional cotton or man-made fibres. 90% of total production, are baby product only which divides into 2-3 segments; 2-3% for adults for client in France. In this spread, 70% is knits & 30% is knitted fabrics. Regarding sales of the product, last year it was 3.5 million USD. Currently we have 350 sewing machines with stitching capacity of 3000 pcs/day. Currently we have 550 workers in the factory. We are selling our products to the country like France, Italy, Germany, Denmark, UK, Australia, New Zealand, S. Korea and North America, Canada.

RS: What about company establishment?
AN: Sorry, I forget to mention…this is 10 years old company, started in year 2000.

RS: So you are happy with your company progress?
AN: Yes, I am pretty happy with this organic business, since its Win-Win situation for environment as well for business too. For our business organic is main philosophy.

RS: Ok, then what about your product range means, which sustainable textile products have you produced & for how many buyers are you producing it?
AN: As i have mentioned earlier, for making garments we are only using a fabric made from organic cotton. In product range, we do babies, toddler’s garments, Undergarments for all the categories like, men’s, ladies, children’s etc. Regarding the buyers, we do have 15 buyers out of which 9 are major and 6 are smaller one.

Certifications:

RS: Do you think certification is mandatory for sustainable textiles products? If yes, why?
AN: hmmm....according to me, yes, certification should be mandatory for STP. When i was started this organic garment business, i was considering organic as a certified product only. However, I was wrong; there is difference in natural and organic products. When i was earlier i was trying to source the organic cotton, many suppliers used to call natural cotton, but when i approached certifying agency i come to know that, might be natural cotton grown without help of synthetic fertilisers, pesticides; in addition might be its grown from GMO (Genetically Modified Organisms) based seed or source; on the other hand organic cotton is grown without help of such things and to confirm that, certification is there. Then i started sourcing only certified organic cotton. In brief, certification is guarantee for organic cotton. Certification gives transparency to the consumer with regards to genuinity of organic cotton. There are lots
of possibilities of malfunctioning during processing of organic products, so this is certification agency responsibility to control that. So, certification certifies whole process to give authenticity to the product. So, its right way and right approach towards organic product to be called organic/ecofriendly/ sustainable product.

RS: Which different type of certifications (regards to sustainability) do you have & from last how many years have you been certified for it?

AN: Regarding certifications, currently we are certified as per GOTS i.e Global Organic Textile Standards & OE i.e. organic exchange by Control Union Certification. Earlier we were certified as per Agriko standards which is German based standards, and then we shifted to SKAL, which is Netherlands based company. In brief, we have been certified as per some standards because of the requirements and recently we have certified as per SA 8000 & Fare Tread standards which are for social standards.

RS: What about Oeko-Tex certificate?

AN: Hummm... our most of the suppliers are have Oeko-Tex certificate, and since it’s mostly related to dyes and chemicals we don’t require. So, if buyer asks for such certificate, then we provide our supplier’s certificate to buyer and they are happy with that. In addition, GOTS certificate covers most of the Oeko-Tex standards points, based which we inform our buyer about this & they got agree. Apart from the all the certification inspection, recently inspection as per Nike standards has been done, where we are partly through & partly we need to improve. So we are working on that.

RS: Why management is looking forward to have these certifications?

AN: Actually...to give you an example, SA 8000 was none of our buyer’s requirement, this we have done for our own understanding & improvement in social benefits. Then we took GOTS & OE because of the buyer’s requirement only. Actually, my buyers are having faith and understanding with us, so we have taken certification as a subjective. We are very transparent with our buyers, where they can visit our factory at any time & test our product from any production for confirmation. My buyers have never asked for transaction certificate, the interesting part is, many of my buyer are not aware of it. Then even we are collecting transaction certificate from our suppliers are even we are taking such certificates from certifying agencies. Eventually if i have certification, i can do manipulation, but we don’t, because of my relation with buyers, and for long business relationship, manipulation doesn’t work.

Manufacturing and sales:

RS: Why are you producing Sustainable textile products?

AN: Actually, organic products are personally very close to my heart and i said earlier, its win- win situation for all the peoples, companies involved into it and eventually, its needed today.

RS: What changes have you made within your production line to become more sustainable?

AN: Yes, we have made lots of changes in production and production supply chain. For ex, when i visited my raw material supplier like knitting, dyeing factories, i observed that they are not following the standards since they are not knowing those points, so personally i visited them and explained each and every point to get certify themselves. In initial phase this we were doing with specifically small manufacturers, because for example if i have an order of
100 Kgs, a big manufacturer not going to entertain me, so i have to depend on them. Then slowly, the suppliers got certified themselves and touchwood we got big orders and we started working with big manufacturers.

Now, about our manufacturing plant, we have planted small solar plant, on which we run around 20 computers. Apart from that, we have reduced our consumption of plastic as much as possible; similarly we are concentrating on low paper consumption. To motivate and influence our workers, we celebrate Earth day, Green Day etc which gives joy as well as knowledge to the people and to spread the knowledge on sustainability mouth publicity helps.

**RS:** How do you think your company can improve access to sustainable raw material?
**AN:** So far we have not had an issue related to sources of raw material. From last 4-5 years we are working with only one supplier and we are happy with him. Actually, i had thought of importing cotton, but when i figure it out, its not feasible. So, i am happy with Indian cotton. Although, cotton is available, there is shortage of yarn because of yarn prices, which shoot up by 20-30%. However, because of long relationship with supplier, we are getting yarn at good price.

**RS:** What benefits has your company achieved by doing the production of sustainable textile goods?
**AN:** In brief, it gives feeling of fulfilment that at least we are doing something good for the environment. At least i feel that, we people are not parasitic of earth.

**RS:** What about your production line... since you have printing unit...
**AN:** Yaaa... we are not using any hazardous chemicals because of which workers health got affected, like asthma, skin problem. Also, since we have small ETP (effluent treatment plant), we discharge properly treated water, which complies with government rules.

**RS:** What issues arose while production of sustainable textile products and how did you solve them?
**AN:** Actually, we had problem with copper based pigment inks required for printing. There are certain colours which are copper based, however, they are not passing criteria so could not able to give exact colour which buyer is required, eventually, we explained to our buyers and few have them accepted the fact, however few of them are very particular, so they asked only fabric transaction certificate which is a guarantee that fabric is complying with GOTS standards not the garments. This is somewhat confused, because, different buyer, different standards are varying in their limits. So as a manufacture we get confused and we need to take separate inventory for different products. Thennnn... we have issue with discharge printing, which is not possible under GOTS, however we ask the buyer to purchase them under OE standards where there is no restriction on dyes, pigment, chemicals. There are few shine prints like foil, puff and rubber prints are also not possible. So we play with these standards. Eventually, our quality of product is not get affected by these issues.

**RS:** Can you explain your management environmental policy and is your manufacturing practice working towards Carbon Neutral production?
**AN:** Hummm..from last 6-12 months, we are consciously looking into environmental issues and i have mentioned earlier about what steps we have taken to overcome like paper consumption, solar system, packing material etc. I would like to mention that, we have made a bags for clients which are made from biodegradable corn, potato starch, which really a good solution over plastic bags which we use for shopping. Our 4 major buyers are packing their
goods into such bags.... We are reusing recycled the water which comes from our ETP for gardening purpose.......i would like to tell one thing that, after finishing last season, there was no work for few days, so we have run a program like, we have made a 5000 bags from waste material like cutting waste, and we have offered to a retail chains in Mumbai at very subsidiary price like Rs. 5/ bag... so they can reduce the consumption of plastic in Mumbai because of which the drainages get choked up......hope you remember 26\textsuperscript{th} June 2006 disaster in Mumbai...so i think its good to avoid the use of plastic bags....What was last part of question?

**RS: About carbon neutral production....**

**AN:** Haaaa...few days before one person from Vardha have approached us who makes the yarn by using solar technique. Actually he has made a device which we have to fit somewhere in spinning production line and with the help of solar power the yarn will manufactured. So we are thinking of purchase the yarn from them, bring to our factory by train, and make the garments by using hand flat knitting machines like sweaters, where no electricity required and if wherever required any electricity we will create from our solar plant. We are very keen on this project & technicians are working on the quality aspect of the product. I have not seen the product, but communication is going on. In our next meeting definitely i will show you that product....

**RS: Could you please comment on the pricing of sustainable textile products?**

**AN:** About pricingggg.... it’s a very important issue. Yes, it’s very much true that, pricing of sustainable products are higher than the conventional products. But we all should have to understand that, by paying less to conventional product we are not gaining anything, we are utilising double the amount of price difference between STP and conventional products to overcome the problems, pollution happened during production of non- STP. So, its worth to pay some margin for STP, there is nothing wrong. I am not telling because i am doing business of such products, i am explaining because its needed today’s. We have to think about our future generation, eventually, they are going to suffer from it. In India Farmers in ruler area very poor, and they cultivate the cotton, however if they are using pesticides, fertilisers they will get better yield at a cost of health problem. So, when farmers are cultivating organic cotton, they are getting somewhat less yield. So, we have to respect them, and we should pay some premium to them. Farmers are the driving force, initiator of the organic era. Looking into current growth into organic & fair tread products, i think in next 10 years 50% of the product would be those only.

**RS: Could you please comment on growth of sustainable textile products?**

**AN:** Yes... as i mentioned just before, there is a lot of scope, potential for growth of STP...however it’s not a single man, or company or country’s responsibility, its each every persons responsibility to look at this issue positively not because of only its advantages, because its today’s need. Its worth to mention now that, we are belongs to earth, not earth is belong to us, so if we are going to take care of earth, she will take care of us, it’s just a give and take process. And i have a hope that in future, everything will be sustainable.....
Company: Alok Industries Ltd.
Interviewee: Mr. Mesmer Micheali
Position: Bottoms Marketing Head
Location: Mumbai, Maharashtra, India
Date: 01\textsuperscript{st} April, 2010.
Type of Interview: Face to Face

Company profile/Background:

RS: Could you please brief the company profile in terms of products, sales, size of the production?
MM: Alok was established in 1986 as a private limited company, with first polyester texturising plant being set up in 1989. They became a public limited company in 1993. Over the years, we have expanded into weaving, knitting, processing, home textiles and garments. And to ensure quality and cost efficiencies Alok have integrated backward into cotton spinning and manufacturing partially oriented yarn through the continuous polymerisation route. We also provide embroidered products through Grabal Alok Impex Ltd., our associate company.
Currently Alok have evolved into a diversified manufacturer of world-class home textiles, garments, apparel fabrics and polyester yarns, selling directly to manufacturers, exporters, importers, retailers and to some of the world’s top brands.
Alok is an end-to-end textile solutions provider. Its products encompass the entire value chain from cotton and blended yarn to fabrics to garments and home textiles. A significant portion of these products are cotton based - manufactured from both organic cotton and 'regular' cotton; blended and polyester yarn offerings also form part of the Alok portfolio of products.

<table>
<thead>
<tr>
<th>Product</th>
<th>Machinery capacity</th>
<th>Production Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ring spun yarn</td>
<td>3,00,006 Spindles</td>
<td>44,980 tons per annum</td>
</tr>
<tr>
<td>Open ended yarn</td>
<td>3792 rotors</td>
<td>13,528 tons per annum</td>
</tr>
<tr>
<td>Woven fabric (112 to 160 cm)</td>
<td>1018 looms</td>
<td>105 million meters/annum</td>
</tr>
<tr>
<td>Knitted fabric</td>
<td>214 machines</td>
<td>67,200 tons per annum</td>
</tr>
<tr>
<td>Embroidery fabric</td>
<td></td>
<td>34 billion stitches per annum</td>
</tr>
<tr>
<td>Woven garments and Knitted garments</td>
<td>3100 machines</td>
<td>22 million pieces</td>
</tr>
<tr>
<td>Home textiles</td>
<td>Bed Linen - 855 looms, 1500 stitching machines</td>
<td>82.5 million meters per annum of sheeting fabric, 13.75 million sheet sets</td>
</tr>
<tr>
<td></td>
<td>Terry towels - 48 Airjet Looms</td>
<td>6,700 tons per annum</td>
</tr>
<tr>
<td>Polyesters</td>
<td>Texturised yarns – 92 machines</td>
<td>114,000 tons per annum</td>
</tr>
<tr>
<td></td>
<td>Partially Oriented yarns – 22 lines</td>
<td>1,82,500 tons per annum</td>
</tr>
<tr>
<td>Accessories</td>
<td>Shopping Bags</td>
<td>12 million pieces per annum</td>
</tr>
<tr>
<td></td>
<td>Handkerchiefs</td>
<td>60,000 pieces per day</td>
</tr>
</tbody>
</table>
With regards to sales of the products, in 2008-09 it was around 2977 crores.

Products:

RS: Which sustainable textile products (STP) have you produced & for how many buyers are you producing it?
MM: Alok is producing all kind of STP from yarns to specialty fabrics. The products which we are making from conventional cotton, that we can and we are offering made from Organic cotton. In case of polyester, we have started manufacturing of products by using recycled polyester from PET. I am very happy to inform you that, out of our total production, organic products are around 20%. Currently we are working with buyers to like H & M, C & A, M & S, Tesco, Asda from UK, Wal-Mart from US, and Woolworth from South Africa to whom we are supply STP products.

Certifications:

RS: Do you think certification is mandatory for sustainable textiles products? If yes, why?
MM: Yes, certification is very much necessary for STP, since it develops transpareny within system and gives assurance to the end customer with regards to authenticity of products. It also helps to maintain the traceability within the supply chain which is very important. I will define certification or certification bodies are CBI officers of the STP….who will find out the non-ethical, not accepted issues which are relates to sustainable production. Without such companies, its just like, anybody can do malfunctioning and earn good money….i think you know better than me, since you was one of them, you did great job…..and all Alok units you only have inspected…superb….

RS: Which different type of certifications (regards to sustainability) do you have & from last how many years have you been certified for it?
MM: Hummm…proudly I want to say that, Alok is the first Indian Textile company to have been awarded all three certifications for its eco-friendly products as under:
- EU Flower – the eco-certificate from European Union
- KRAV- certification for organic products
- SWAN certification – a Nordic eco-labelling certification
Apart from this we have certifications like Fair-trade, GOTS (Global Organic Textile Standards), OE (Organic exchange). In addition we are now accredited with Integrated Management System (IMS) and there are 4 certificates under this system:
- ISO 14001:2004 – Environmental Management System
- OHSAS 18001: 2007 – Occupational Health & Safety Assessment System
I think we are one of the few companies who has most of the certificates relates to sustainability, social accountability, environment and many more…

RS: Why management is looking forward to have these certifications?
MM: Humm…management is looking forward to have these certifications because certifications are useful for review our own system and try to overcome the lacunas within the system. Certification always gives transparency within system, for example GOTS gives balance sheet between inputs & out where we can find out the loss, waste & after doing study
we can try to reduce that which is indirect advantage. GOTS also assures the use of only organic cotton with allowed percentage of synthetic & other natural fibers within the product. Apart from this, certification is one of the also buyer’s requirement, without which we are not getting orders. Apart from that, workers safety is also important, that’s why management thought of go ahead with SA 8000 certifications and OHSAS 180001:2007. From environment point of view, we are through with ISO 14000 certificates. Certification shows where your company is standing, how much improvement needed to become a good, profitable company.

Manufacturing and sales:

RS: Why are you producing Sustainable textile products?
MM: For Alok industry, Sustainability is a Holistic approach. For us “sustainability comes first before profitability”. Now days environmental issues are individual persons responsibility to overcome and as a public company we are very much concern with environmental problem. For example, before going to start the production of organic cotton, we had organised a conference for all the Alok peoples, i.e. head of each department, our raw material suppliers, etc to understand the issues and Do’s and Don’ts for organic cotton. In brief, sustainable textile is good for health of planet earth, for human being, and for business as well. That’s why we are producing STP.

RS: What changes have you made within your production line to become more sustainable?
MM: In terms of changes…..In textile processing, dyes & chemicals are one of the biggest sources of pollution. So we have changed our conventional dyes and chemical to eco-friendly certified dyes & chemicals. Since we are having continuous production ranges which saves the water & energy in large percentage, so there is less pollution. Few more changes which we have done are – recycling of water, waste, and chemicals.

RS: How do you think your company can improves access to sustainable raw material?
MM: Currently they have enough availability and accessibility of raw material. This is because of the location of plants, which are located very nearby of raw material source.

RS: What benefits has your company achieved by doing the production of sustainable textile goods?
MM: Currently Alok is Market leader for organic products in India which is one of the biggest achievements for us. Also, we are saving lots of energy directly or indirectly by doing STP production. From business point of view, because of sustainable textile tag these products are getting premium, so it’s a profitable business.

RS: What issues arose while production of sustainable textile products and how did you solve them?
MM: Initially Alok have started working with a farm for organic cotton, where they found the source of organic cotton is not genuine, then we broke the contract, and then started sourcing organic cotton independently from approved genuine source, sourcing all our chemicals, dyes, processing aids from right companies like Dyestar, Ciba, which very well know companies in dyes, chemical industry.
RS: Can you explain your management environmental policy and is your manufacturing practice working towards Carbon Neutral production?

MM: Companies environmental policy is based on three pillars- Reduce, Reuse, and Recycle. The best example is, in spinning plant, they found a huge waste of paper cones which they were selling on weight basis, but now they have started small own paper cone manufacturing plant where they are recycling the old cones and make them new.
Yes, we are working towards Carbon neutral production; “Since our all the plants are situated nearby, the energy saving through less transportation is huge. In addition, because of the continuous production machinery lots of energy getting saved else in batch wise processes, lost of energy gets consumed. Because of recycling of water, steam, we are saving lots of energy too. We have RO (reverse osmosis) system, because of which we have Zero discharge, we are utilizing that water for cleaning, toilets, gardening purpose…

RS: Could you please comment on the pricing of “Sustainable textile products”?

MM: All are aware that, STP are having higher prices compared to conventional products; however, most of the people are not thinking why those are higher. So, STP shouldn’t be over priced, it will after value for the product, pricing should not be much higher. Earlier as I mentioned, Alok is working more towards sustainability rather than profitability. We have to pay higher, we are paying that higher amount to overcome from what wrong we have done.

RS: Could you please comment on growth of sustainable textile products?

MM: “Growth of STP is based on designers, buyers, retailers and most important consumers”. “We are here for the production, until and unless there is no demand, why we should produce the goods”. The STP business is profitable form farmer to customer if it does in real manner. Yes, it will take years to be fully organic; however, imitation from that direction is very important. Now a day’s Recycle polyester from polyester waste, plastic bottles is smart move towards recycling.
Appendix 4: DyStar Transcripts

Company: DyStar.
Interviewee: Dr. Siva Pariti (Manager, Laboratory and DyStar Textile Services, India), Dr. Charu Jain (Ecology Solutions Manager - Asia).
Location: Mumbai, Maharashtra, India.
Date: 11th May, 2010.
Type of Interview: Computer-Assisted.

Company profile/Background:

Que: Could you please brief the company profile in terms of products, sales, size of the production?
Ans: “DyStar is a leading provider of products and services for the textile and leather industry. [The company combines the textile dye businesses of the former dye producers Bayer, Hoechst, BASF, ICI/Zeneca, Mitsubishi and Mitsui with the auxiliary activities of Boehme and Rotta.] Trained specialists and modern service laboratories in all major markets ensure fast and competent customer service. Thanks to its high-quality and innovative solutions, DyStar help its customers to lower their costs, to reliably meet quality and environmental standards and to shorten delivery times. DyStar has about 3700 employees in more than 50 countries and runs 21 production facilities in 13 countries. Worldwide sales amounted to 800 million Euros in 2008.”

Sustainable approach:

Que: From your point of view how will you define “Sustainable Textile”?
Ans: A textile product which has been manufactured by taking care of all the three elements of sustainability very well at every stage of its production. That is: social, economic and environmental sustainability have been taken into consideration while producing textiles. For example sustainable raw materials, energy efficient textile processing etc has been used to produce textiles. At the end it is also very important for the design to be fashionable to sell and sustain in the market.

Que: Why do you think Sustainable textile is needed today?
Ans: Textile industry is one of the most polluting industries in the world. Manufactures need to put special focus and efforts on cleaning the supply chain and making it more environment friendly by considering the sustainable processes to process their textiles. The end results of these sustainable processes procedures’ environment and health friendly textiles which are also appreciated by the consumer. So more and more, sustainable textiles are needed for the better environment, better health of the textile industry workers and the consumers at the end.

Products:

Que: Which different “sustainable textile products (wet processing chemicals, dyes, pigments) are you producing?
Ans: All our products meet strict environmental compliance and regulations and hence all our products are environmentally sustainable. Range covers: Textile Dyestuffs, auxiliaries, Pigments, processing chemicals.

Certifications:
**Que:** Do you think certification is mandatory for sustainable textiles products? If yes, why?

**Ans:** No. Anything which is made mandatory will attract lot of resistance and then finding the loopholes in the system will take place. It needs lot of acceptance from all the quarters and make it popular (e.g., Okeo Tex) by proper marketing.

**Que:** Which different type of certifications (regards to sustainability) do you have & from last how many years have you been certified for it?

**Ans:** DyStar has been the company which places sustainability and ecology as the top most priority and it started self check process since the beginning. If any product is found in the portfolio which is not ecologically safe, it will be immediately recalled in spite of its popularity in the market. DyStar has all GOTS certification, Blue Sign, and to all other RSL Norms, we do testing of our products and assessed by the Ecology cell of DyStar and follow a self monitoring.

**Que:** Why management is looking forward to have these certifications?

**Ans:** EHS and Sustainability is very important to DyStar since the beginning. We normally look at the requirements of all the certification agencies / individual RSL of the buyers and make sure that all our products in the range meet all the norms. We do not per say go for certification as we believe in self certification.

**Manufacturing and sales:**

**Que:** Why are you producing Sustainable textile products?

**Ans:** As told before, EHS and sustainability is very important for DyStar and we have a separate wing called Ecology solutions which screens and maintains the standard of the products. We not only follow sustainable production of the Dyes and chemicals at all our manufacturing sites, but also make sure that our customers and users also follow the sustainable production practices. This is why we have launched E-confidence system which will help our customers to manufacture in a sustainable manner and reduce the impact to environment. This is the part of commitment to environment and CSR for our company.

**Que:** Could you please comment on the pricing of “Sustainable textile products”?

**Ans:** Since we do not produce anything which is not sustainable product, there is no question of differential pricing. Every batch of our products are tested for ecological norms and released from production site only if it is meeting the standards.

**Que:** Which eco parameters are you controlling while producing STP products?

**Ans:** Apart from the colour values and application standardization, we carry out thorough testing and monitoring of all ecological parameters required for that particular class of colours auxiliaries. Every batch is tested and then released. They are not tested not just for a set of parameters but for all possible parameters (wherever necessary). The production will be tuned to reduce / eliminate all possible toxins by practicing strict controls, monitoring and following best manufacturing practices.

**Que:** Could you please comment growth of sustainable textile products?

**Ans:** Only sustainable textile products have place to stay in the future and others will vanish as the awareness from the customer and consumer is increasing.
Appendix 5: M/s. Inter Continent Chemicals India Ltd Transcripts

Company: M/s. Inter Continent Chemicals India Ltd.
Interviewee: Mr. Vikas Saraf,
Position: Director.
Location: Mumbai, Maharashtra, India
Date: 04th May, 2010.
Type of Interview: Computer-Assisted.

Company profile/Background:

Que: Could you please brief the company profile in terms of products, sales, size of the production?
Ans: M/s. Inter Continent Chemicals India Ltd., Mumbai is a 33 year old manufacturing company with 3 production facilities having capacity in excess of 24000 MT per annum. Currently, our activities include Specialty Chemicals for Textile, Paper & Pulp, Leather and Plastic, Intermediates for Agriculture, Rubber, Pharmaceuticals, Dyes, Reactive Dyes and Commercial Construction. We manufacture most of our specialty polymers in our highly modernized plants in India to provide cost advantage to our valuable customers along with strong Technical Backing.
For past 17 years, we have technical collaboration with AMITECH, Inc. NJ, USA in the field of textiles for super specialty range of chemicals. Furthermore, we jointly exhibited at ITMA – SINGAPORE 2005, where we introduced various novel concepts – including, Flame Retardants, Wicking Finish, Anti – Microbial, etc.

Sustainable approach:

Que: From your point of view how will you define “Sustainable Textile”?
Ans: “Sustainable textile” is a mindset. Just as one would go to any length to have house spick – and-span leaving no-stone-unturned; same should be the case with our planet, which is our house that we all co-inhabit. Hence our acts, behaviour and lifestyle should not disturb the harmony of its eco-system.

Que: Why do you think Sustainable textile is needed today?
Ans: As mentioned above, we need to take care of our eco-system so that this planet can “Sustain” lives and livelihood of its 6 billion inhabitants.

Products:

Que: Which different “sustainable textile products (wet processing chemicals, dyes, pigments) are you producing?
Ans: We are in the manufacturing of specialty chemicals from grey fiber, fabric treatment to finishing of garments. All our products are 100% eco-friendly which are conforming to Oeko-Tex 100 standards as well as GOTS Version 2.0. We are a 100% zero-discharge company.
Certifications:

Que: Do you think certification is mandatory for sustainable textiles products? If yes, why?
Ans: Checks and balances are a must for any rule to be enforced and its done by the process of certification. Many shall voluntarily comply with the rules and regulations for betterment of everyone. However, a few in their greed for profit and their personal sustenance may still carry on with their activities that endanger the environment. It is to bring such errands to comply and shoulder responsibility that certification should be mandatory.
Another very important aspect is that sustainability and sustenance should not become a powerful tool or a weapon or a marketing gimmick in the hands of few corporate with access to the corridors of power to get even with competition.
Hence just as certification should be mandatory, the aim and the process should equally transparent, fair, supportive and absolutely economical so that the cost to comply with is not prohibitive.

Que: Which different type of certifications (regards to sustainability) do you have & from last how many years have you been certified for it?
Ans: We were the first company in India to supply Non-GMO based enzymes for the processing of textiles. Way back in 1993, in collaboration with our USA partners-Amitech, Inc., we introduced the concept of Non-GMO high efficiency de-sizing enzymes. And M/S. The Bombay Dyeing & manufacturing company was the first mill in India to use Non-GMO enzymes on commercial scale.
Currently, we have Oeko-Tex 100 and GOTS certificate, and we are also in the process of ISO 9001-2008 and ISO 14000-2009 certification as well.

Que: Why management is looking forward to have these certifications?
Ans: Not only It means a better world for all of us; but, it also gives a sense of pride that even we are contributing to undoing what has been done wrong for over a century in our lust of Industrialization, growth and profits. Even though, it comes minor incremental cost.

Manufacturing and sales:

Que: Why are you producing Sustainable textile products?
Ans: As mentioned above.

Que: Could you please comment on the pricing of “Sustainable textile products”?
Ans: As I mentioned earlier, it is a mind set. Once you have set your mind, the price or the incremental cost, does not matter. Off course, this gets coupled with transparent, fair, supportive and economical certification process to welcome companies who want to shift sustainable way of living.

Que: Which eco parameters are you controlling while producing STP products?
Ans: All pollution related norms as specified used different standards as well under pollution control act. We are zero-discharge Company.

Que: Could you please comment growth of sustainable textile products?
Ans: It is important to note and understand that sustainable textile is just a part of the global paradigm shift that we are trying to bring about in our lifestyle within comity of nations. And the growth thereof is linked to successes that we collectively achieve in adhering to Kyoto
protocol; agreements arrived at Doha rounds and now Copenhagen. Rewriting rules to suit a few powerful group or lobby would give away the gains achieved thus far. Especially, the awareness that has been generated among common man world over that ultimately pushed countries like India and China agreeing to huge emission cut without a backlash from their domestic constituents at Copenhagen.

However, just addressing a part of the whole world economy cannot bring about sustainable growth in achieving goals of sustainable textiles. Majority of today’s polluters like India, China, Brazil, Vietnam, Mexico, the so called emerging markets export textiles to the developed nations. And being part of that chain, we know how processors in the emerging markets are arm twisted into supplying goods at throw away prices. All in the name of market capitalism, competition and survival of the fittest. While trillions are lost in sophisticated white collar frauds a LA Goldman Sachs, Bernie Mad doff, etc.
Appendix 6: Britacel Silicones Ltd Transcripts

Company: Britacel Silicones Ltd.
Interviewee: Roopali Panchal,
Position: Commercial Manager.
Location: Mumbai, Maharashtra, India
Date: 04th May, 2010.
Type of Interview: Computer-assisted.

Company profile/Background:

Que: Could you please brief the company profile in terms of products, sales, size of the production?
Ans: The Company was started in 1988 with the daring vision of Mr. Hiren Vashi founder director. Intention of the promoter to sell (CEL) to Britain coined company as Britacel, and sold their first product to Britain. Our dedicated team with continuous R & D coupled with our reliability made us a market leader with a continuous growth rate of 30% year after year.

Britacel has established its credentials as manufacturers of speciality silicones with excellent quality control. Being the largest supplier of speciality Silicones in India today with over 30% market share, Britacel has shown a phenomenal jump of about 5 times in the turnover during the past 5 years.

The Britacel family includes:- Lab Chemists, Technocrats, Marketing Experts, Production teams, Polymer Chemists, Material and Logistics Department & Finance professionals. The R & D Center is supported by a range of sophisticated instruments to render a sharp edge to its scientific endeavour. The company is proud to be a pioneer in introducing so many new concepts in Indian market like Micro Emulsions, Silicone Elastomers, Super hydrophillics, etc.

Sustainable approach:

Que: From your point of view how will you define “Sustainable Textile”?
Ans: Sustainable products are those products providing environmental, social and economic benefits while protecting public health, welfare and environment over their full commercial cycle from the extraction of raw materials to final disposition.

Que: Why do you think Sustainable textile is needed today?
Ans: To save natural resources and protect environment sustainable textile is needed.

Products:

Que: Which different “sustainable textile products (wet processing chemicals, dyes, pigments) are you producing?”
Ans: We do have eco friendly softeners of silicones and cationic but we are not fully sustainable in real sense. Because Silicones are said to be sustainable but are not fully biodegradable. Generally the full destruction of polymer takes about 20-25 years as per some of the studies. We do not offer dyes of pigments. We offer Midori organic softeners produced from fruits grown in marginal land and using emulsifiers based on potato starch and other
natural substances. In Midori we are offering hydrophilic but also in a position to offer hydrophobic.

Certifications:

**Que:** Do you think certification is mandatory for sustainable textiles products? If yes, why?
**Ans:** Yes, to maintain the uniformity in offer and standards.

**Que:** Which different type of certifications (regards to sustainability) do you have & from last how many years have you been certified for it?
**Ans:** We used to have “Skal” which is GOTS now. We do not have any other certification in sustainability. No doubt we are in process of REACH certification and for few products Oekopass certified.

**Que:** Why management is looking forward to have these certifications?
**Ans:** Conscious decision of management to offer the sustainable product and some of our customers also ask for the same.

Manufacturing and sales:

**Que:** Why are you producing Sustainable textile products?
**Ans:** To ensure the health and safety of public health, welfare and environment and also economic for the buyer.

**Que:** Could you please comment on the pricing of “Sustainable textile products”?
**Ans:** Though sustainable products may cost comparatively expensive, customers are ready to pay for it than the conventional products the reason being it has cheaper raw material, less liability, fewer regulatory constraints, added goodwill, and environment friendly and safe.

**Que:** Which eco parameters are you controlling while producing STP products?
**Ans:** We try to use naturally grown substances.

**Que:** Could you please comment growth of sustainable textile products?
**Ans:** The growth of sustainable started from the year 2001 and started going slowly upward from 2004 and year 2007 onwards showed tremendous growth which is continuing and will continue till the year 2015.
Appendix 7: Texanlab Laboratories Pvt Ltd Transcripts

Company: Texanlab Laboratories Pvt Ltd
Interviewee: Mr. Ullhas Nimkar,
Position: Director
Location: Thane, Maharashtra, India
Date: 02nd April, 2010.
Type of Interview: Face to Face

Company Profile:

RS: Could you please brief us about your company and the activities you carry out with regards to testing?

UN: The name of our company is Texanlab Laboratories Pvt Ltd, this is textile analytical laboratory and we undertake analysis in all aspects of textile and entire supply chain. This company is now about 27 years old and in this filed analysing right from fiber, yarn, fabric both knitted & woven, non-woven, different aspects of coloration, wet processing to till the making of finish article in different filed like technical textile, specialty fabrics including accessories. In addition we do packaging material testing even. From consumer point of view, we do performance characteristics of articles to see whether this article confirm or performs to be desired & adequately the life of the product. The quality of end product is not much important than the service of the product during his life cycle. So these test includes physical test, which involved right from yarn count, structure of the fabric, tensile & tear strength, GSM, seam slippage, to going on to finishing properties like, anti-crease, wrinkle free, water absorbency, water repellence, or flame retardant or any other special finish imparted. The colour fastness properties are adequate, when we talk about colour fastness it includes, colour fastness to washing, rubbing, water, sun light, bleaching.

Sustainability Approach:

RS: From your point of view how will you define “Sustainable Textile”?

UN: In order to define sustainable textile product let’s see what has happen in past. To give you a broad spectrum of earth, it’s 2005 million years old, whereas man has lived here only 1.5 million years and even during this journey he has lived in sustainable manner just few hundred years ago. If we see the revolution of chemistry, the first synthetic dye is created in year 1856 by Mr. Perkin and it was beginning of organic chemistry. From organic chemistry evolved polymer chemistry and during 40s, 50s and 60s we invented all these fibres like nylon, polyester and then going onto acrylics, propylene. So when we think about sustainability, we should think about availability of raw material and the way they will be available in future for mankind. Now along with this industrial growth, we should keep eye on population. If you look at the figures, in 1880s it was only 1 million, and till today it got multiplied by 150 times. So along with advent in industry revolution and increase in population, there is a sudden strain on natural resources. Unprecedented resources did not exist in the past… and today we have made such products which are not possible to dispose off, since they are not biodegradable and as well difficult to recycle. Now if we look at textile & textile studies, it has started from mid seventies. Then it started realizing along with chemical positive effects also have an adverse effect and this has started primarily in Germany because out of 6 world’s largest companies are situated on one river, the Ryan. You have Sandoz and Ciba which are at the opposite sides of river at Bazal, as the river flows further, then in Ludvicks you have BASF, then in Collan we have Buyer…..so apart from ICI Uk, five
big giants are situated on one river. So if think...historically why they where situated on one river? Because its an easiest way leave your effluent in river and it will get carried away to North Sea at free of cost....so there is no other reason why they are on one river....especially during the 2nd world war, when industry revolution starts in textile, colorants was manufactured in large quantity for uniforms....specially vat colours at that time. There were no reactive dyes at that time.... reactive dyes are invented in 1956 exactly one hundred years after the Perkin has invented first synthetic dye and this gives further increase in production of dyes. Keeping in mind population the production keep on increasing....however later it starts realizing, because of these colorants the companies who are situated on banks of river are polluting it in big manner...for ex- you cannot eat fish from river Ryan because of high content of Arsenic, cadmium, lead, mercury and so on. Later after realizing such problems, the companies moved out of the Germany and located in different part of world. At the same time, Indian dyes & chemical industry was booming and at during that period hundreds of companies started in western belt of India. In 1978, during research it realizes that, few reactive dyes, azo dyes are having free carcinogenic amines which may be in the free form or they may get leached out of the fabric and cleaved inside the human body because of certain enzymatic reactions...so in 1992-93, Germans has come up with legislation for banning certain dyes which would be potentially carcinogenic. During the same time, they found formaldehyde which used for manufacturing of for example dye fixing agent, for printing fixation, for resins, which will have free formaldehyde on surface of fabric which is harmful for the skin...and these studies started and new law comes for this... from that time onwards like 1992-93, the focus was on studying all dyes & chemicals used for textiles.

If we talk about the fiber production, for example cotton, we use pesticides, fertilisers, defoliants, which are eventually end with nature only and the effect of these are visible on each passing day. Then during textile processing from spinning, then sizing, weaving, processing, garment wash, we are using so many chemicals. Each these dyes & chemicals have certain short comings, certain advantages, disadvantages...

If we look at the today’s restricted substances list, its more than few hundred....so from 2-3 chemicals few hundred chemicals out of few thousand chemicals... recently i got an opportunity to discuss the issue on global level where they were talking about scrutinizing thousand chemicals.... so now more research is going on toxicity of products ...i am very much sure that still few chemicals will come up during some investigation and got banned...

...depends on uses of the product...or phase out such product till got the safer alternative....

One think which i want to shear with you, from many years we are studying effects of these chemicals but very few one have try to study the side-effect of products....another major aspect, is when these products release into the environment, till breakdown into C, O and H, intermediates got release and these intermediates are even harmful...So, sometime, the final product or degradable product not harmful, however, the intermediate one are... for example, Alkyl Phenol Ethoxylates, Nonyl Phenol Ethoxlates when they supplied to the industry they are safe.. there is no problem.... but when the chain in this products got breakdown in sunlight...it comes to 1 mol or 2 mol where they cannot breakdown further, these products are called persistent products...these products affects the mimic’s of estrogens of female harmon....and studies found that, presence of such chemicals in river male fish produce eggs...so its called endocrine-disporting property....intention to tell you is, such intermediates also need to study...that’s bring the new legislation REACH.... where they realised that man have manufactured 130,000 chemicals and many of which are not studied adequately. ...

So, after this discussion if we look at your question, only a given fiber would not only sustainable, if all are wants use only cotton.... then for 6.4 billion people from where to bring only cotton and in next few years the population would be 9 billions...then to fulfil the
requirement of such number, we need to grow only cotton there would not be any land for food to grow...so we will have to look at the combinations, we have to look at the total impact of these fibres.... and then we will have to come up a solution....
So according to me the definition of word sustainable changes time to time...for example, each recycled product is not sustainable, then how to call recycled product sustainable. For that we need to calculate total impact of the product for that we need to study four footprints......carbon footprint, water footprint, energy footprint and toxicity footprint.... and once we evaluate these footprints where we leave behind the traces we will come know the sustainability of product. ....One more point is, heavy metals, god has given us metals in form of salts, we took the salts & we purified them ...now metals are not in a stage to get react and go back to salt stage ...so they are remain in form of free metals & these free metals are toxic in nature. These metals are toxic because they are not bio-eliminable.
To sum up this – for clothing people, we need to think about the resources perennially available which will be perhaps renewable resource without having adverse effect on bio-diversity which provides adequate performance of end product and which go to the nature without causing harmful impact making it available readily again. This would be ideal definition of sustainable product.

RS: Why do you think Sustainable textile is needed today?
UM: Its very simple, limited natural resources, limited chemicals resources, water resources are limited, so unless we use the available resources frugally the coming generations will not have these resources to see. So its not a matter of choice, its a matter of necessacity that we will have to move towards sustainability.

Future of Sustainability:

RS: What is your opinion on “Future of Sustainable Textile”.
UM: Sustainable textile is fashionable name we called today, but it will become routine of tomorrow. 200 years ago all was ok, only from last 100 years everything goes wrong. So just we have to come at sustainable level without compromising on modern life style. Not only clothes are important, even now e-waste is not important, which is a challenge.

Testing:

RS: Which eco parameters testing do you carry out?
UM: As i mentioned earlier about banned amines, formaldehyde, APEO, heavy metal. PCP, TCP... Heavy metals are tested in different forms like, how much of heavy metal extracted from human body precipitation, from baby saliva, what will be get extracted from hydrochloric acid to check when it goes to baby stomach how it will react/ affect, then test for toys EN 71, then you come to different flame retardants, pesticides residue, Optical brighteners. For all such banned or parameters with certain limits, there are two approaches... one is from government and another is from privet sector. Each government has come with their own label like in India you have POT, in Europe you have EU flower likewise you have national labels for most of the European and western countries. Then you at approach from privet sector which one in which the articles which comes in contact with human skin which is from consumers point of view....here we are looking at labels Oeko-Tex 100, which is popular label today, however it does look sustainability during production, when you look at over all parameters there are standards for fibres, separate for organic cotton, in wet processing you
have GOTS label, however we have to look other fibres even, and i think EU flower is most versatile criteria, who look at all the aspects of process and sustainability. So all these test we carry out. If you choose any top restricted substance list, most of them we carry out testing in our lab. There are few unique test for organic cotton..hmmm...they look at the AOX values for certain chemicals i.e. contribution of organo halogens to waste water. This is a unique criteria. Apart from that biodegradability, LD 50 (rat toxicity), LC 50 (fish toxicity) we do.

**RS: How long your company a testing ecological parameters, why do you think this is important?**

**UN:** Actually it started in year 1991 with a country which now not in limelight for ecological parameter is Sweden, and actually even before it started from Finland with problem of formaldehyde. Also these restrictions come from Japan. .....and why testing is important i have explained you in your early questions.

**RS: What is the role of testing in developing Sustainable textile products?**

**UN:** As we have defined sustainability, which going to change....as this sustainable criteria evolved to confirm these criteria’s at each stage these parameters need to evaluate and that will need testing.

**RS: Could the “retailer’s current ecological testing parameter”, can be more stringent?**

**UN:** In fact if you look at last 20 years, every year the restricted list has grown from two to two hundred. So, your question is already answered with this fact. It’s not a static situation, it’s a dynamic situation and the leading companies are tying up with chemicals companies, Universities, with lawyers, toxicological laboratories, its a team comes up and new list of restricted substance list evolve and most important criteria is that its towards human sustainability. So this is ongoing process, it’s dynamic, never be constant, and never remain static, and it will become more and more important. Here important is, very often ...its my personal opinion that, there are few big giants who are doing serious work on sustainability...and the small companies are just copying them...but important point is not making the criteria...its important to do the true implementation of criteria in all stages which is going to be very important while achieving towards sustainability..... Eventually not on paper, actually on earth.

**RS: More specifically could you please name of few companies with whom you have experience?**

**UN:** I think this will not be fare to pinpoint any company name.....all the leading companies from Europe, USA, have the capability and infrastructure to work towards sustainability and they are doing. However, smaller companies have not these facilities to such work.... here, government have to come up with some solution and India government have done lot of work with in this area. They have organised more than hundreds of seminars on sustainability, including Do’s and Dont’s of ecological parameters for the industry...this is what we required a complete guideline, clear-cut information on do’s and dont’s, and strict implementation of standards. These are important points, points should not be on paper, and those should be implemented. This is not only for India, this is for all the countries, and i think sustainability should be implemented rigidly and this can be done with the joint venture with different consumer group, NGO’s, because finally consumer are king.
Appendix 8: Soil Association Transcripts

Company: Soil Association.
Interviewee: Mr. Lee Holdstock,
Position: Tread Relation Manager.
Location: Bristol, UK.
Date: 18th May, 2010.
Type of Interview: Telephonic.

Company profile:

RS: Could you please briefly describe the company profile?
LH: Well…The Soil Association was founded in 1946 by a group of farmers, scientists and nutritionists who observed a direct connection between farming practice and plant, animal, human and environmental health...Today the Soil Association is the UK's leading organic organisation, with over 200 staff based in Bristol and Edinburgh and working as certification inspectors across the country.
We inspect and award organic certification to farms and businesses that meet our organic standards. Our standards not only meet the UK government's minimum requirements but exceed them, especially in areas concerning the environment and animal welfare. Organic standards cover all aspects of food production and packaging, animal welfare, wildlife conservation, and ban unnecessary and harmful food additives in organic processed foods. We have also developed standards for areas which are not covered by government or EU regulations. These include conservation, fish farming, textiles and health and beauty care products. With over 36 years' experience, we have worked with more businesses than any other certification body certifying over 4,500 farms and businesses all over the world. Our experience, knowledge and expertise in all aspects of the organic sector, means the Soil Association symbol is the most recognised organic mark in the UK today, our consumer recognation is our symbol.

RS: From your point of view how do you define “Sustainable Textile products”?
LH: We define the STP exactly same as Global Organic Textile Standards has defined…we think that ST shows that farm produces the fiber natural way, organic way considering social impacts, environmental impact, understanding soil fertility, animal welfare, all of these issues not influences under sustainability…and then of course we feel that, subsequent fiber should process in way they doesn’t introduce or try to minimise the contamination or addition of any material or substances which are harmful to human health or proven expected harmful to the environment.

RS: Why do you think Sustainable textile is needed today?
LH: Well…we feel that textile industry is one of the big environmental impact industry…& I think DEFRA suggested that textile industry alone in Europe responsible for 15-20% of overall impact on environmental in terms of European consumers and behaviour, that similar impact caused by the transportation. So, since we are involved in farm certification,…so production of fiber will mitigate the impact on environment as well as consumer.
Certification:

RS: Why do you think certification is mandatory for sustainable textile (ST) products?  
LH: Well at the moment, ST, certainly for organic cotton products are not mandatory, it’s wholly voluntary…. We would like to see if it gets mandatory…. we would like to see an extension of organic regulations includes for products like fibers, textiles….we thought it’s important because consumer should able to differentiate between products are claiming to be arrive from organic farming, claimed to be processed as per organic philosophy….and products are genuine….so customers can believe on those products and we can cross verify those claims…..we think certification is important.

RS: According to you how does certification benefit each segment of textile, fashion supply chain?  
LH: okk….actually it’s about more from our perspective…however its beneficial consumers point of view …because of throughout supply chain certification we can assure that consumers does not get wrong product…and I am sure that for throughout supply chain they are getting benefit whether its insisting on control mass balance, traceability system which may help them to calculate the inefficiencies …then material control doesn’t need…as well farmers are also get benefited specifically small farmers to whom need not pay for pesticides……so at different level, at different stages its get benefited across the supply chain.

RS: Certifying bodies does inspection of factories once in year, then how you assure the genuinity of products which manufactured throughout year?  
LH: We certainly….we engage in unannounced inspection if we felt trust, faith relationship broken down by factories …if we are finding the factories are complying we do yearly inspection…..we do only unannounced inspection only if we found there is s discrepancy with organic integrity then only we do….certification is trust - intelligence combination…if the systems are working well, and we feel that there is no need to such inspection then we do don’t unnecessarily surveillance inspections.

RS: There are many small manufacturers to whom it’s not possible to get certify themselves because of the cost involved in certification although they have the capability to comply with standards. So a certifying body can help to these small scale manufacturers?  
LH: Ya…ya…we all struggled in Uk with this issue where there are farmers who are willing to get certify themselves however they can’t afford the certification fees….to overcome this, what these farmers can do…the only way to go forward in farming small farmers can form a group and collaborate to get certify where they can share the cost of certification….internal control system which is reliable and functional in order to auditing bodies can actually assess and reduce their further burden of inspection work …I think unless we can do that …still we are in position to do that ….certifiers have to audit each and every operators and repeat of documentation and administration, for individual licensee and I think it’s a minimum cost for this. Actually, there are few certifying agencies who work with marginal profit, whereas we don’t work for profit…so group certification is the way to overcome the cost of certification.

RS: If any product which is not comply with standards and still it’s in selling in market with labelling, then how certifying body will take this issues?  
LH: Well… in case of organic, there are always issues of GM content, however it’s not possible to find out GM traces in final product particularly which is thoroughly
processed…even its difficult to find out the traces of it…so it’s difficult to deal with such issues…might be there are chances of accidental mixing or very low level of traces perhaps we are losing the battle against to keep GM out of the contaminations from organic….GM has spread wildly in agricultural..There is a big argument on GM verses organic agriculture…so important to remove the GM based agricultural practices from Non-GM farming which are responsible for contamination of product where there is no particular desire for contamination or farming GM itself. So the problem is to determine, testing and reporting the accurate level of GM from Non-GM products and indicates the accurate level of contamination which has done intentionally or mistakenly….

RS: Could you please comment on pricing of the sustainable and ecolabeled products?
LH: Ya….i think it’s very difficult issue…i think organic certification bodies don’t set any standards for the pricing of products not even in global standards about what is the fair price of organic products….yes, we know that premium are asked some time which are very justified because of additional cost of system introduced in organic processing…some time higher premiums are added which are not justified, they are purely added to the price…so it’s a products are labeled organic/sustainable/eco and seen a marketing tool…so I think its fare to say that we are moving towards the point where certifying organic supply chain include from where the starting of supply chain where they get rewarded or at least should pay cost of production not below cost of production. On the other hand, if conventional cotton produces very cheaply there may be environmental cost, social cost are less where they are paying in different ways…so i think it’s nothing wrong to pay some extra money to the environment instead of paying later to clean the environment.

RS: What is your opinion on future on sustainable textile products?
LH: well …there is enormous amount potential for growth left in market…. In Uk 2% of total market is organic food and textile out of which very tiny percentage like 0.1% is of organic textile. So there is large room for the growth of such products. I think consumers are very interested in sustainable products however knowledge of impact of sustainable textile or implications of buying such goods is very poor in market. So overcome this issue, retailers, NGOs, manufacturers are need to work collaborative to create an awareness… in UK most of the cotton consumers have not thought fact that the cotton come from farm not spontaneously from factory. So it’s important to educate the people to make them aware about the fact and this will help to increase the buying of organic products. Now a day’s recycling is an import issue, so we need to make them aware about and it need to be feel good, look good at right price.
Appendix 9: Hohenstein Institute Transcripts

Company: Hohenstein Institute  
Interviewee: Mr. Vignesh Amalraj  
Position: Technical Compliance Manager.  
Location: India, Tirupur.  
Date: 09th June, 2010.  
Type of Interview: Telephonic.  

Company profile:

RS: Could you please briefly describe the company profile?  
VM: About the company profile, we are Hohenstein Institute having head office at Germany….and I think its founded in 1946…..we have long history….We are into the testing, inspection and into certifications of textile from many years. For environment and sustainability point of view, we do testing for Oeko-tex 100 and1000. We are founder organisations of the "International Association for Research and Testing in the Field of Textile Ecology (Oeko-Tex)". Together with partner organisations, Hohenstein has also developed the Oeko-Tex® Standard 1000. We also issue The Eco-Passport which can be used for textile dyes and auxiliaries. It serves as a neutral proof of these products’ suitability for the production of textiles that are harmless to human health such as Oeko-Tex® certified articles.

Sustainability Approach:

RS: How do you define “Sustainable Textile products”?  
VM: Well, according to me, STP are those products which are manufactured by taking care of social, environmental and technical issues. Such product has low impact on environment.

RS: Why do you think Sustainable textile is needed today?  
VM: For this question, I need not explain you more… from past few years we all are facing problem called “Global Warming”. Every day we heard about some natural disaster in one part of world. We are taking steps to overcome, however those are not sufficient. So, by producing sustainable products we can try to overcome the non-ecofriendly acts.

Eco-label:

RS: Do you think eco-label is mandatory for sustainable textile products and why?  
VM: By the way let me clear that, eco-labels are not mandatory. Those are developed to overcome the impact of certain non-ecofriendly products. Actually it’s a various buyers requirements….they inform the manufacturers that they want the products as per XYZ standards and as per that manufacturer ship the goods…confirming they are complying with standards.

RS: According to you how does eco-label benefit each segment of textile, fashion supply chain?  
VA: yes, eco-labels are beneficial throughout the supply chain, however not all…ummm…for example, Oeko-Tex 100 only tests for the harmful substances in the product where they are no thinking about social issue. Now they are developed Oeko-Tex 1000 standards where they are
talking about technical, social and environmental issues. So, it depends on the standards, their objectives, there parameters.

RS: According to you eco-label is burden, requirement or necessacit and why?
VA: According to me eco-labels are not a burden. However, in industry there are many manufacturers feel that, it’s a burden on them since they are confident about their process and products which are used for the manufacturing of sustainable products, still then they have get tested their products to just show they are complying and this is additional cost for them. From buyer’s point of view, it’s a requirement to ship the goods….eventually necessacity for environment.

RS: How is eco-labeling important for growth of sustainable textile products?
VA: Ecolabel product means they are not going to harm to the environment as well as the person who are using it…. All the Ecolabels gives the guideline and if everyone follows it definitely it would be helpful for the growth of STP. Although it’s true, the growths of such products are in hand of consumers. Until and unless consumers are not purchasing, not showing interest in such products there will not be growth of sustainable textile growth…also at some part it’s in hand of retailers and government as well.

RS: Could you please comment on “pricing of eco-labeled products”?
VA: Hmm…the pricing of such products depends on pricing of raw material, number of process and way of processing….. Pricing of ecolabeled product is in hand of retailers and consumers…..currently such products are selling at premium prices…..however if consumers start consuming more and more such products, definitely more and more retailers will start keeping sustainable products goods in their stores…..so finally, if the product get common in the market it going to be more economical.

RS: Consumers get confused because of different eco-labels in the market. According to you its better to have single eco-label standards/ logo or it should be country wise eco-labels and why?
VM: Yes, it’s very true that, consumer get confused because of number of ecolabels in the market. However it’s difficult to comment on why single ecolabel standards are not there?

RS: Is the eco-label reliable? What guarantee or information gives the eco-label?
VA: The reliability of ecolabelling is not only in hand of ecolabelling issuing company, its in hand of manufacturer as well…. Many of times we found that, manufacturers to save the cost, manipulate during manufacturing and after shipping of goods at the buyers end on testing we found the traces of non allowed materials….so, we do random testing of products which are ecolabeled…we buy this products from market and test it to find out the confirmatory with standards.

RS: Is the eco-label controlled? If yes, how they controlled?
VA: I have answered in above question.
Future of Sustainability:

RS: What is your opinion on “Future of Sustainable Textile”.
VA: According to me, our future is in hand of sustainable products only. Now a day’s many buyers, retailers are showing interest in such products….if everyone of supply chain do the manufacturing of product in sustainable way, then there will not be any problem.
Appendix 10: Frugi Transcripts

Company: Frugi
Interviewee: Anna Bond
Position: Supply Chain Manager.
Location: Cornwall, England.
Date: 16th June, 2010.
Type of Interview: Telephonic.

Company Profile:

RS: Could you please brief the company profile in terms of products & sales of sustainable textile products?
AB: The Company has started as Cut4Cloth on June 2004 and now its name has changed to Frugi. Our entire product means every single product is 100% organic cotton and they are created by keep in mind highest ethical standards. And every single product is covered under GOTS that’s Global textile organic standards as well as we ask our manufacturers to provide transaction certificate which not only confirms garments are certified as per GOTS but also the whole supply chain of product is certified. The transaction certificate certifies that whole product has been produced ethically and organically. In terms of our products we are into children's clothes upto 6 years …actually our first range of product was breastfeeding wear. Now we have clothes upto age of 8 years... we stock in boutiques that stock other brands like us. We have 150 stockists across the UK and 230 stockists overseas. In terms of sales we are meeting and exceeding our targets….this year our turnover is 1.3 million pounds and we are expecting it to be 3 million pounds next year …which means its doubling next year…. We are growing step by step and it’s a great situation today.

Sustainability Approach:

RS: From your point of view how do you define “Sustainable Textile products”?
AB: ummm…You mean how do I define the term ‘sustainable textile product’??….i think it’s about creating a product which is manufactured by taking care of environment, support and maintain social responsibility. Therefore our products are Organic and our packaging material even sustainable which recycled and 100% degradable.

RS: Why do you think Sustainable textile is needed today?
AB: I think its needed….right from discovery through its life span it should not harm the environment and this is possible with any sustainable product……and for creating a working environment safe we need reuse the things many times, we should not lose them.

Products and Product sourcing:

RS: Which sustainable textile products do you market and why those specific products only?
AB: All over products are manufactured and marketed as sustainable and I have said already before about our products….and about our marketing of products we do marketing of our products by using sewing tags on our products, placing info on our websites and all the possible different media channels.
**RS:** From which countries are you sourcing sustainable textile products & why from those countries only?

**AB:** at the moment we source from 3 different countries ....from India as u know Purecotzs is our main manufacturer ...we also source from Turkey and Portugal as well. We are in the search of other few countries, other areas but right now at the moment only these three countries....ummmm We might concentrate to stay away from china and Nepal at the moment because we don’t feel that customers have well informed about working in China which not ethical. Actually to say it’s not about product but people have some perception for Chinese and Nepalese working styles. Well actually we encourage production in Europe because it keeps the cost less in terms of cost of importing and carbon footprint well would be less.

**RS:** The products that you are sourcing are certified by standards like GOTS, Organic exchange, EU flower, Oeko-Tex; any other?

**AB:** Yes....certified by GOTS only....and the Certifying body for GOTS is Control union with whom we deal nicely. I have been to companies certified as per GOTS and the GOTS is really the highest standard than organic exchange, Oeko-tex. We also have SA8000 which covers fair working conditions that’s more social standards.

**RS:** Are problems are you facing while designing, sourcing sustainable textile products? If yes, which are those?

**AB:** Yes.. it was more difficult having competition within fashion industry 3-4 years previously but recently its more challenges when you are designing or sourcing organic.. Some of the printings or solvents are not allowed under GOTS. Some trims are not allowed…ya well that all… I think it’s a such arousing market and I just think its not as advanced as it could be so every day we get into different competition so ya it is difficult…and as GOTS has its own limitation not allowing over 5%.....

**Certifications:**

**RS:** Do you think certification is mandatory for sustainable textiles products? If yes, then why?

**AB:** Definitely Yes....i think you need certification for every single process within your supply chain which makes whole supply chain more transparent and you know from where you are getting everything from, which is really important. It is also important to communicate to your customers as well about your supply chain and they should know from where you are getting everything exactly from and that information should be available to your customers.

**Marketing:**

**RS:** Could you please comment on demand and pricing of Sustainable textile products?

**AB:** There is a massive demand…its increasing and its becoming a fashion to be sustainable and eco-friendly. And I think customers of coming generation are well informed about the fact of the environment so there buying habits, lifestyles are becoming more ecofriendly and green. Actually our customers does have high sustainable income and we never seen necessacity to reduce our price. Obviously it is higher because of the premium which you are paying back to supply chain. We are very transparent about everything...but I went for a seminar on sustainable textile in London, they basically said “we had a research group across the country and basically average UK consumers is prepared to buy green and sustainable products” the only if they not been asked to pay any extra money for that.
RS: Do you think eco-labelling plays important role in marketing sustainable textile products?
AB: Ummmm Yes....actually since we are not dealing with only organic products we don’t have any separate marketing strategy. Ecolabelling play an important role for marketing of organic products...since, ecolabels are the only way to recognise the organic or sustainable products...the non-ecolabeled product is just like a conventional product.... From next season we will be having GOTS label on all our garments.....because we thought we are paying premium then why we should not use them... and we are going to use that on our website even for more detailed info about what we do, how we do...currently our more attention is being focused on our sustainable packaging as well our recycle packaging and potato starch bag, which are 100% biodegradable.

RS: Does your marketing strategy when using sustainable textile products differs from conventional one and how?
AB: Well...yes always we emphasis on informing customers about what we are doing separately for environment and how it helps to farmers ...as well as about the charity firm to whom we support....currently we supporting two charities ...one is Cotton Farming in Africa and other is Murrin-standing network...

RS: What consumer feedback have you received on sustainable textile products”?
AB: Hummm… basically we support environment and people like the organic approach. A research reveals that “the average consumers will definitely support this area and they don’t want to pay massive premium for buying a green product and same we have experienced”..

RS: How do you access the potential for development and consumption of sustainable textile products?
AB: Development wise we are much relay on GOTS, Organic Exchange directory....and Frugi is become bigger and more defined brands people have shown the interest in our products.

Future of Sustainability:

RS: What is your opinion on “Future of Sustainable Textile products”?
AB: I think the market is growing....we have faced the recession however our sales grown during that period even.....People want things for longer term ....they want things to last for longer time without its adverse effect....... And now a day’s customers are becoming more informed about environmental issues and their social responsibility so their lifestyle is also changing accordingly..
References


Differences between Qualitative and Quantitative Research Methods (n.d). Anon.


European commission (2003), Integrated pollution prevention & control (IPPC), reference document on the best available technique for the textile industry.


http://organicexchange.org/oecms/

http://www.global-standard.org/


280


Pan, J; Chu, C; Zhao, X; Cui, Y; Voituriez; T (2008) "Global Cotton and Textile Product Chains" International Institute for Sustainable Development, October, Canada.

Parfitt, Dr J. (2002). Analysis of household waste and factors driving waste increases, December, WRAP.


Ross Tucker, Ellen Groves (Nov 2008), Cotton examines environmental footprint, WWD, New York, 196 (95), 9.


USDA (2009), Cotton: World markets & trend, November, Foreign agricultural service Circular series FOP. 11-09


