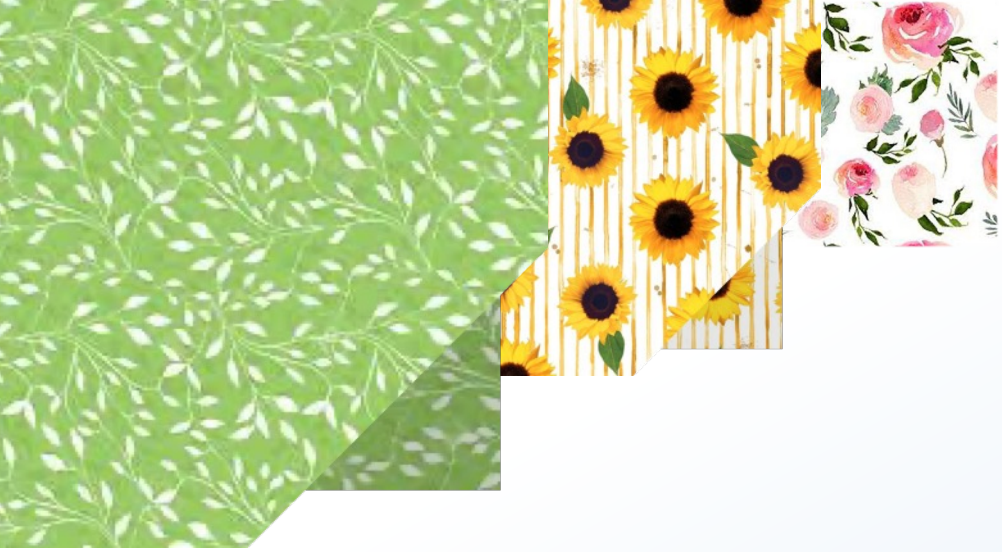

Fabric From Plastic Bottles

Textiles Current Events

Why Discuss Recycled Textiles?

- Environmental protection and sustainability are hot topics in social and political debates
- Widespread plastic use in the last two centuries has raised concerns about the impact of plastic waste on the environment
- Man-made fibers have an environmental impact because of their longevity and their methods of production

Production of Textiles from Plastic Bottles

Methods of Recycling Bottles into Fibers

Main Ingredient of Fabric Recycling = PET Plastic

<u>Three Methods:</u>

1. Mechanical Method
   - PET from bottles is melted and spun directly into fiber
2. Chemical Method
   - Complex polymers in PET are broken down into simpler plastic structures (monomers or oligomers) using chemicals
   - Monomers and/or oligomers are rebuilt into new polymers
3. Biological Method
   - Similar to chemical method
   - Polymers are broken down using enzymes instead of chemicals

Uses and Distribution of Recycled Fibers from Bottles

Environmental Concerns Addressed by Recycled Fabrics:

1. Plastic Bottle Waste
2. Production of New Man-Made Fabrics
    - Use of natural resources and energy
    - Fabric waste

Uses and Distribution of Recycled Fibers from Bottles

Distributors and Users of Recycled Fabrics

Large Apparel Companies:

- Patagonia
- Adidas
- Nike
- The North Face

Nonwovens and Recycled Fabric:

- Disposable Wipes (EcoSure)
- Construction Substrates
- Landscaping Materials
- Wallpaper
- Filters
- Car-related Fabrics

Smaller Companies:

- Girlfriend Collective (Apparel)
- Allbirds (Shoes)
- Everlane (Apparel)
- Buffy (Comforters)

Concerns with Recycled Bottle Textiles

Mechanical Method

- Lower fabric functionality
- Typically used in low-quality applications

Chemical Method

- Fabrics are more functional than mechanical method
- Greater environmental impact

Biological Method

- Possibility to have both high fabric functionality and low environmental impact
- Insufficient research due to being a new process

Alternative Recycling Processes

Circular Recycling

<u>Definition:</u>

- Recycling bottles into textiles, then back into bottles, for an indefinite period

Has it Been Done Before?

- Carbios Biological Process:
  - Can be customized for “bottle-to-bottle, bottle-to-fiber, fiber-to-bottle and fiber-to-fiber” recycling

Circular Recycling

Basis for Circular Recycling:

- All recycling methods (mechanical, chemical, biological) break down PET plastic into a customizable component:
  - Mechanical = Liquid plastic
  - Chemical and Biological = Simple plastic structures (monomers and oligomers)

- The customizable component can be made into any end product (bottles, fabrics, etc.)

Textiles Made from Textile Waste

Mechanical Method

- Same as plastic bottle recycling:
  - Extracting PET plastic from man-made fabric and melting it to form another fabric

Chemical Method

- Differs from plastic bottle recycling:
  - Other elements may need to be removed from the old fabric before it can be used to make a new fabric
  - Ex: 50/50 Cotton/Polyester Blend → Cotton must be removed first

Textiles Made from Textile Waste

Concerns

Research studying one biological process for textile recycling shows that:

1. It is more expensive than producing new fabric
2. It requires extra PET plastic to make new fabric
   - Higher cost
   - Greater environmental impact

Conclusion: The textile recycling process needs to be improved to solve these problems

Consumer Response to Recycled Textiles

Perception and Purchase Intention of Recycled Textiles

<u>Negative Connotations:</u>

Previously used → Perception of contamination → Feelings of disgust

Feelings of disgust:

1. Remain despite physical transformation and cleaning processes
2. Negatively affect purchase intention

Perception and Purchase Intention of Recycled Textiles

Positive Connotations:

1. Feelings of disgust only apply to items worn close to the skin (clothing)
   - Do not affect purchase intention for items like carrying bags
2. Customers prefer recycled fabric in carrying bags over non-recycled fabric
3. Use of recycled materials → Positive view of the company
4. Feelings of disgust may be counteracted by the association of the product with an attractive spokesperson

Response to Recycled Textiles in Emerging Markets

Most Important Factors for Buying Eco-Friendly in Western Countries:

- Quality
- Consumer Image
- Sustainability
- Product Safety

Most Important Factors for Buying Eco-Friendly in Vietnam (an Emerging Market):

- Quality
- Sustainability
- Product Safety

Response to Recycled Textiles in Emerging Markets

Conclusions:

- Consumers in emerging markets won’t be as concerned with their image when they buy recycled textiles
- Priorities may be different between buyers in emerging markets and buyers in Western countries
- Selling methods for recycled textiles should be adapted to the region

Conclusions

Plastic Bottle Recycling:

1. Mechanical method = more sustainable
2. Chemical method = more functional
3. Biological method may be both functional and sustainable, but there is insufficient research

Consumer Response:

1. Main issue = Feelings of disgust associated with recycled materials
   - May be combatted by a few means:
     - Using attractive spokespeople
     - Seeking alternative fabric applications
2. Promotional strategies in emerging markets should be tailored to their specific needs