77th Plenary Meeting of the International Cotton Advisory Committee
Abidjan, Côte d’Ivoire

Third breakout session

Producing Fiber Quality that Spinners Desire: a look from the final consumer side

Jean-Paul Gourlot and Bruno Bachelier
December 2-7, 2018
What does a spinner want?

• Satisfy his customers…

• … For satisfying his customer’s customers

• … For satisfying final customer’s needs

⇒ What is the market?

Content: Observation from the final users upstream to the fibers, operation per operation
Worldwide textile and footwear market

FIGURE 2: Structure of the global value chain for apparel

Activities in red indicate highest value added activities + control/power over the chain

Source: Stitches to Riches?

Worldwide textile and footwear market

- +4% in 2017
- 1700 billions USD in 2017 (1200 billions USD textiles only)
- 50 billions USD in 2017 for cotton fibers alone

Euromonitor and [https://www.modeintextile.fr/marche-mondial-de-lhabillement-de-chaussure-progresse-de-4-a-17-milliard-de-dollars/](https://www.modeintextile.fr/marche-mondial-de-lhabillement-de-chaussure-progresse-de-4-a-17-milliard-de-dollars/) 02/2018
Worldwide textile and footwear market

- Kids, men, sport, women

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Worldwide textile and footwear market

• Kids, men, sport, women

• Production scheme
  – More concentration in 2011 than in 2005 (and more now)
  – 58% made by 10 countries in 2011

• Consumption
  – 78% consumed by top 3 consumers EU, USA, Japan
  (“requirements are more elaborate, detailed, and difficult to comply with in developed countries” (Fukunishi, 2013))

=> What are the criterion to feed the market?
What about ‘quality’ expectations?

- Kids, men, sport, women
- EU, USA, Japan ("requirements are more elaborate, detailed, and difficult to comply with in developed countries" (Fukunishi, 2013))
What about ‘quality’ expectations?

Garments

- Kids, men, sport, women
- EU, USA, Japan ("requirements are more elaborate, detailed, and difficult to comply with in developed countries" (Fukunishi, 2013))

Expected ‘quality’ criterion
- Difficult to find (free) information
- Nice fit (85% of internet purchase returns!), style and comfort
- Strength, dimensional stability of fabrics, abrasion and pilling resistance, colorfastness (light and washing)
- Consistent ‘quality’

=> How does this transfer to expected ‘fabric quality’ parameters?

From https://lifestylemonitor.cottoninc.com/
What about ‘quality’ expectations?

Product properties and customer perception: => results of an interaction

• Price, care …
• Marketing conditions
• Product characteristics or properties
• Customer culture, education, …, living conditions
• Apparel production
• Fabric finishing
• Fabric production
• Yarn production
• Fiber properties
What about ‘quality’ expectations?

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=> results of an interaction

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  • Yarn production
  • Fiber properties
What about ‘quality’ expectations?

Fabrics

Worldwide share of fabric’s values by fabric type (%)

Based on data extracted from https://comtrade.un.org/ in October 2018
What about ‘quality’ expectations?
Fabrics

Worldwide share of fabric’s values by fabric type (%)

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What about ‘quality’ expectations? Fabrics

Worldwide share of fabric’s values by fabric type (%)

=> What are fabric quality properties?

Based on data extracted from https://comtrade.un.org/ in October 2018
What about ‘quality’ expectations?

**Fabrics**

- Material shares
- Density and structure
- Cover factor, dynamometric properties, drapé, dimensional stability, pilling and abrasion properties, softness, stiffness, moisture and water sorption, desorption and permeability, crease resistance, color stability … (mean and variability)
- Productivity, price and availability

=> How does this transfer to expected ‘yarn quality’ parameters?
What about ‘quality’ expectations?  
Yarns

<table>
<thead>
<tr>
<th>World</th>
<th>OE</th>
<th>RS short staple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nb spinning positions</td>
<td>8 065 601</td>
<td>243 491 864</td>
</tr>
<tr>
<td>Resp. %</td>
<td>3%</td>
<td>97%</td>
</tr>
<tr>
<td>Production / spinning positions</td>
<td>300</td>
<td>25</td>
</tr>
<tr>
<td>(m/mn)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean tex (g/1000m)</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>(Ne 15)</td>
<td>(Ne 30)</td>
</tr>
<tr>
<td>Production (1000km/mn)</td>
<td>2 420</td>
<td>6 087</td>
</tr>
<tr>
<td>Resp. %</td>
<td>28%</td>
<td>72%</td>
</tr>
<tr>
<td>Production (kg/spinning position/year)</td>
<td>6307</td>
<td>263</td>
</tr>
<tr>
<td>Production (t/mn)</td>
<td>97</td>
<td>122</td>
</tr>
<tr>
<td>Resp. %</td>
<td>44</td>
<td>56</td>
</tr>
</tbody>
</table>

What about ‘quality’ expectations?

Yarns

• Making: RS, OE, Compact, combed yarns?

• Abrasion, Count, CSP, Defects, Elongation, Eveness, Friction, Hairiness, Imperfection content, Lea strength, Moisture regain, Strength, Twist… (mean and variability)

• Productivity, price and availability

=> How does this transfer to expected ‘fiber quality’ parameters?
What about ‘quality’ expectations?

Fibers

Industrial spinning: yarn strength depends on:

<table>
<thead>
<tr>
<th>Rank</th>
<th>Open end</th>
<th>RS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Strength</td>
<td>Length</td>
</tr>
<tr>
<td>2</td>
<td>Fineness</td>
<td>Strength</td>
</tr>
<tr>
<td>3</td>
<td>Length</td>
<td>Fineness</td>
</tr>
<tr>
<td>4</td>
<td>Trash</td>
<td>Trash</td>
</tr>
</tbody>
</table>

Deussen, 1992

Research: RS 20 tex (191 cottons) yarn strength

\[
YS = 0.44 \text{ Strength} - 0.0016 \text{ Fineness} + 2.58 \text{ Maturity} + 0.33 \text{ Length Uniformity} - 27.03
\]

\[R^2 = 0.76 \text{ ***}\]

Frydrych R. & Gourlot J.-P., 2000
What about ‘quality’ expectations? Fibers

• Kids, men, sport, women

• EU, USA, Japan ("requirements are more elaborate, detailed, and difficult to comply with in developed countries" (Fukunishi, 2013))

• Expected ‘quality’ criterion
  – Difficult to find (free) information
  – Nice fit (85% of internet purchase returns!), style and comfort
  – Strength, dimensional stability of fabrics, abrasion and pilling resistance, colorfastness (light and washing)
  – Consistent ‘quality’
  – Made from knitted, woven and non-woven fabrics
  – Commercial fiber characteristics

From https://lifestylemonitor.cottoninc.com/
What about ‘quality’ expectations?

Conclusions

Products

Fabrics

Yarns

Fibers

10 000s

1 000s

100s

100s
# What about ‘quality’ expectations?

## Fabrication parameters

### Making: weaving, knitting, finishing, ...

**Parameters:** pattern, density, yarns, materials, speed, technique, chemicals...

**Incence:** costs, productivity, ...

### Making: RS, OE, Compact...

**Parameters:** combing, blends, origins, know-how, twist, materials, speed, technique, ...

**Incence:** costs, productivity, ...

### Fabrics

**Aesthetics**
- Cover factor
- Crease resistance
- Dimensional stability
- Drape
- Stain resistance
- Stiffness

**Comfort**
- Air and water permeability
- Breathability
- Fabric touch and hand
- Stretch and recovery
- Thermal insulation
- Thermal regulation
- Water proof
- Water repellent

**Durability**
- Surface friction
- Tearing strength
- Tensile strength

**Maintenance**
- Color: light resistance
- Color: perspiration resistance
- Color: rubbing resistance
- Color: washing resistance
- Storage: resistance to moths
- Storage: resistance to stain

### Yarns

**Abrasion**
- Count
- CSP
- Defects
- Elongation
- Evenness
- Friction
- Hairiness
- Imperfection content
- Lea strength
- Moisture regain
- Strength
- Twist

### Fibers

**Color**
- Fineness
- Foreign materials
- Friction
- Length
- Length distribution
- Length uniformity
- Maturity
- Micronaire
- Rigidity
- Short fiber content
- Stickiness
- Strength
- Trash content

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What about ‘quality’ expectations?

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... and so on ...

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