GOING AGAINST THE GRAIN: THE DEMATURITY OF THE EUROPEAN TEXTILE INDUSTRY

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MULTI FIBRE AGREEMENTS (MFAs)

- The European textile industry has been the object of industrial transformation since the 1970’s under MFA
  - Protection
  - Restructuring and modernisation

- **Result:**
  - Improvement of productivity
  - Continuous decline of employment
  - Declining market
Productivity

Employment

Textiles

Clothing

[Graph showing employment trends in textiles and clothing for Italy, France, Germany, and UK from 1995 to 2002]
POST MFAs

• Abolishment of MFA (1 January 2005)

  – Radical technological innovation
  – Improve long-term competitiveness of the sector
  – to reinforce the position of Europe as a leading global player
Technology Platform

Commodity to Specialty Products
- New specialty fibres & fibre composites
- Functionalisation of textiles
- Biomaterials & biotechnologies

New Textile Applications
- New textile products for human performance
- New textile products for technical applications
- Smart textiles & clothing

Mass Production to Customisation
- Clothing/fashion mass customisation
- New product design concepts & technologies
- Lifecycle & total quality management concepts

Industrial Innovations - Societal Solutions

R & D Priorities
Industrial Reconfiguration

- Textile equipments
- Chemicals (synthetic fibres, finishing substances, etc)
- Agriculture (cotton, wool, silk)
- Intelligent system of production
- Advanced materials, including micro-nano materials and technologies
- Micro, flexible electronics
- Textile Industry
  - Design
  - Spinning
  - Weaving
  - Knitting
  - Finishing
- Users/Consumers

Applications:
- Automotive, aerospace, aviation industries
- Army and armour industries
- Sports and medicals
- Geosynthetics
- etc

Existing supply chain
Emerging supply chain
Production processes subject to discontinuities
Potential Problems

• An old industry with deeply-embedded routines

• Unfavourable structure
  – 95% are SMEs with limited research capacity

• Supplier-led innovation sector (Pavitt, 1984)

• Require paradigm change
  – technologies, production processes, understanding market demand, distribution systems, organisations and management

• Growing competition from LDCs even for advanced products

• Rising complexity of process and product innovations
RESEARCH QUESTION

Mature Phase

- Standardized products, production systems, technologies, organisational routines
- Mass markets
- Declining market due to intense competition
- Cost-based competition
- Largely involve process innovations
- Centralised organisation

Ferment Phase

- Customised products
- Under-developed production systems and organisational routines
- Employing emerging technologies
- Niche and emerging markets
- Performance/functional-based competition
- Largely involve production innovations
- Decentralised organisation

HOW

Technology
Market
Organisation

FACTORS

Internal
External
THEORETICAL FRAMEWORK
• Maturity is inevitable in the process of industrial evolution

• Key aspects of the ‘maturity trap’ are:
  – cost reduction
  – economies of scale
  – Static or declining market share
  – standardization
Maturity can be arrested and, for some circumstances, reversed (dematurity).

Dematurity has to be pioneered by "innovations that change an industry’s basis of competition at the same time that it disrupts established production competence, marketing and distribution systems, capital equipment, organisational structures and the skills of both managers and workers" (Abernathy et al, 1983, p. 109).

The search for new concepts typically works its way back up through the same design hierarchy established by the evolution towards maturity which preceded it.
Evolution of Technology Transilience

Impact on market linkages

- Niche creation phase
- De-maturity
- Architectural phase
- Maturity
- Regular phase
- Revolutionary phase

Abernathy et al (1983)
Dynamic Capabilities Framework
by Teece et al. (1994, 1997); Teece (1986, 2007)

• An attempt to unveil the foundations of long-run enterprise success in rapid environmental change

• The firm’s ability to build, integrate and reconfigure internal and external assets to address rapidly changing environments

• DC origins:
  – Routinized behaviour (e.g. NPD, TQC)
  – Creative and differentiated entrepreneurial acts
    Sensing and seizing opportunities through asset and capacity reconfiguration
Dynamic capability defines the course of evolution of a firm as a consequence of chosen long-term competence development trajectory.

Firm’s asset positions determine its competitive advantage at any point in time and its evolutionary path constrains the types of industrial activities in which a firm can be competitive.

Organizational processes transform the capabilities of the firm over time.
• **Abernathy *et al.* (1978, 1983)**
  - Built on the evolution of technology and market at industry level

• **Teece (1986, 2007) and Teece *et al.* (1994, 1997)**
  - A firm level study built on evolutionary and behavioural economics combined with creative and differentiated entrepreneurial acts

• **Hypotheses**
  - De-maturity at firm level is a result of well-executed, well-organised dynamic capabilities
  - Maturity-trap is a consequence of under-developed dynamic capabilities
METHODOLOGY
Approach

• **In-depth, longitudinal study** to investigate the phenomena of maturity, de-maturity and maturity-trap in the textile industry in Europe

• **Multiple cases study**

• To address “how” question:
  – Firm level study
  – Long-lived firms (over 125 years)

• To address “factor” question:
  – Firm-specific and country-specific

• **Comparative analysis**
Case Study

• Italy – Marzotto, S.p.A
• The Netherlands – Ten Cate, NV
• Germany – Freudenberg Group
• UK – Hainsworth, Ltd.
Process technology

Weaving and spinning technology - OECD (2004)

Hand loom
Fly shuttle
Mech loom
Multiloom weaving
Northrop pirn changer
Automatic loom
Automatic, standardized machinery
Require less skilled labour

Working hours per kg yarn
Working hours per 100m cloth

Weaving and spinning technology - OECD (2004)

E.I Ring frame
Ring frame
Auto ring frame
OE-rotor spinning

Development towards maturity
1750 1800 1850 1900 1950 2000

Working hours
per kg yarn

1000
100
10
1
0,1
0,01
0,001

Working hours
per 100m cloth

1000
100
10
1
0,1
0,01
0,001

Spinn.wheel
Hargreaves
Spinning jenny
Mule
Self actor
E.I Ring frame
Projectile

Hand loom
Fly shuttle
Mech loom
Multiloom weaving
Northrop pirn changer
Automatic loom
Automatic, standardized machinery
Require less skilled labour

Spinning
Weaving

Year

Weaving and spinning technology - OECD (2004)
Process technology

Working hours per kg yarn

Weaving
- Automatic loom
- Projectile
- Jet

Spinning
- Ring frame
- Auto ring frame
- OE-rotor spinning

Working hours per 100 m cloth

Weaving and spinning technology-future trend (OECD, 2004)
Product Technology

- **Consumer Textiles**
- **Technical Textiles**
- **Functional Textiles**
- **Multifunctional Textiles**
- **Smart/Intelligent Textiles**

- **1940’s**: Production technology
- **1960’s**: Fibre technology
- **1980’s**: Processing technology
- **2000’s**: Finishing technology

**Advances in technology**
- **Advanced materials and hybrid technology**
- **Smart production**
• Each country appears to follow unique pattern of industrial evolution

• Therefore, the evolution is examined on country basis
CASE STUDY 1:
ITALY and MARZOTTO, S.p.A
Statistics

Textile & Clothing Sector

Sistema Moda Italia
Statistics: Technical Textiles

- Agrotech & Geotech
- Meditech
- Hometech
- Buildtech
- Indurtech
- Mobiltech
- Clotech
- Sportech
- Others

Comparison:
- Italy vs Europe
- Italy vs World

Yearly Distribution:
- 2000: 12.50%
- 2005: 12.34%
- 2010: 12.34%
Innovative Characters

- Traditionally weak in R&D, high-tech industries including the chemical industry.
- R&D is not the main source of innovation in the textile industry but the *purchase of machinery, design, and customer needs*.
- Local/national equipment suppliers as the source of innovation.
- Competitiveness lies on its disintegrated structure, cooperate in networked clusters, *mainly locally situated*, to form flexible specialised firms.
## Evolution towards maturity

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<tr>
<td><strong>Trend in the Italian textile industry</strong></td>
<td>Adopt ring frame faster than other European countries</td>
<td>• The height of synthetic fibre production</td>
<td>• Inflation due to a sharp increase of oil price and labour costs</td>
<td>• A further increase in wages</td>
<td>• Crisis hits due to MFA &amp; competition from the emerging countries</td>
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<tr>
<td><strong>Market Change</strong></td>
<td>Growing market as a result of unification of Italy (1860)</td>
<td>• Local couturiers began to gain market as French and English couture were unavailable during the war</td>
<td>• Export textiles to the US</td>
<td>• The rise of Italian luxury fashion</td>
<td>• A wave of merger and acquisition in the luxury fashion industry</td>
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<tr>
<td><strong>Competitive Change</strong></td>
<td></td>
<td>• The beginning of competitive crises due to raising labour costs, obsolete plants and competition from the Far East</td>
<td>• Market expansion for ready to wear to the US</td>
<td>• Relocation to North African and Eastern Europe</td>
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<tr>
<td><strong>Structural Change</strong></td>
<td>Increasing number of vertically integrated firms</td>
<td>A few large firms emerge as a result of mergers and acquisition</td>
<td>• Disintegration of structure</td>
<td>• Forward integration to clothing manufacturing</td>
<td>• A decline in number of firms and employment</td>
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<td></td>
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<td>• Declining employment</td>
<td>• Declining employment</td>
<td>• A shift in power towards buyers</td>
</tr>
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<td></td>
<td></td>
<td>• An increase in concentration</td>
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Maturity-trap

- Transient economic misfortune
  - Problems can be solved by re-enforcing the existing basis of competition i.e. speed of production and flexibility

- Did not see the decline as a consequence of permanent changes in demand, technology and competition

- The label “Made in Italy” will remain the industry’s unique competitiveness despite growing production relocation and OPT
Maturity-trap

- Local search & local preferences
  - Business diversification to clothing and fashion brands
  - Favour local textile equipment makers as the main source of innovation → Deter participation in global innovation networks

- Favour process innovation than product innovation

- Less developed technical textile markets among other textile industry in Europe
MARZOTTO, S.p.A

- The largest textile manufacturer in Italy

- Founded in 1836 in Valdagno, Veneto region as a wool yarn and fabric manufacturer

- Expanded the business to flax and linen and yarns fabrics through acquisition in the 1980’s

- Integrated forward to clothing and luxury brands in the 1980’s and 1990’s

- Demerged clothing business in 2005, and subsequently concentrate on yarn and textile manufacturing
Performance

The graph illustrates the performance of a company over time. It shows the changes in employment (green line) and net profit (blue line) from 1866 to 2007.

Key points:
- Employment and net profit trends show significant fluctuations over the years.
- Both employment and net profit saw a decline in the early 2000s, with employment falling to a low point in 2007.
- Net profit levels remained relatively stable from 2005 onwards, with a slight increase in 2007.
Innovativeness

- Amongst the first companies to adopt mass production technique in the 1950’s in Italy
- The first textile firm in Italy that adopted “made in Italy” computer, ELFA 9003
- Amongst the first textile firms that integrated forward to clothing sector
- Early adopter of the latest spinning and weaving technology
- Relatively inactive in the EU research programmes
CASE STUDY 2:
THE NETHERLANDS / TEN CATE, NV
Statistics

Employment 2004

 NL 1.3%

Others EU 98.70%

Turnover 2004

 NL 2.1%

Others EU 97.9%
Statistics

Pie chart showing:
- Textile, 60%
- Clothing, 30%
- Leather, 10%

Line graph showing:
- Productivity-Netherlands
- Productivity-Italy

Graphs cover the years 2001 to 2004.
Innovative Characters

• Open for international collaboration

• Opposition (together with Germany and Denmark) to the EU industrial protection policy

• Concentrated R&D expenditure (DSM, Akzo-Nobel, Philips, Shell, Unilever)

• The textile industry contributes 0.34 percent of total industry R&D expenditure

• Chemical and equipment industries are the major source of information concerning innovation trends

• Textile contributes 60% of the industry population with technical textile producers being the most innovative ones.
Evolution towards maturity

Graphs showing the evolution of turnover and employment in the textile industry and total manufacturing from 1956 to 1991.
## Evolution towards maturity

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<td><strong>Trend in the Italian textile industry</strong></td>
<td>Preferential market agreement with the East Indies (Indonesia) was terminated in 1870.</td>
<td>Increased labour costs • Early rapid decline</td>
<td>Rapid decline continues • Extensive restructuring following MFAs</td>
<td>Economic slow down 2001-2003 • MFA is abolished in 2005</td>
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<tr>
<td><strong>Market Change</strong></td>
<td>Losing market protectionism in the Dutch colony of East Indies</td>
<td>Severe decline in Indonesian market share • Growing domestic and international markets</td>
<td>Losing colonial markets • A number of companies begin to shift to interior textiles and consumer technical textiles</td>
<td>Growing market in technical textiles</td>
<td>Exploitation of high added value technical textiles</td>
</tr>
<tr>
<td><strong>Competitive Change</strong></td>
<td>Begin to compete with Japan over markets in Indonesia</td>
<td>Intensified competition with Japan and Britain over Indonesian markets</td>
<td>Begin a rapid decline due to uncompetitive labour costs • Production relocation to Belgium for low-mid segments • A wave of merger and acquisition</td>
<td>Relocation to North America and Eastern Europe • Production relocation for high segment markets • Merger and acquisition continues</td>
<td>Clothing production largely disappears</td>
</tr>
<tr>
<td><strong>Structural Change</strong></td>
<td>• Increased concentration, the most concentrated in Europe up to 1980 • Decreased employment and increased labour costs</td>
<td>Company closures</td>
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**Year**: 1900’s-1920’s, 1930’s-1940’s, 1950’s – 1960’s, 1970’s – 1980’s, 1990’s – 2000’s
• One of the largest textile manufacturers in the country

• H. Ten Cate Hzn & Co was established as a linen merchant in 1704 in Almelo, Twente region

• Export to the Dutch colonies was the primary markets

• It has undergone two major transitions which transform the company from a linen to a high tech textile manufacturer for technical uses

• The third transition is underway which may disrupt the existing production competence and markets
Innovativeness

• Performing distant search

• Setting industrial trend to shift to higher added value textiles

• Performing path breaking change & continuous strategic alignment involving:
  – emerging technologies and markets,
  – a combination of internal and external assets to exploit opportunities

• Active in the EU R&D programmes

• Engage with university research centres

• Fundamentally entrepreneurial by which it shapes business ecosystems
Path breaking change and continuous alignment

- Opportunity identification in emerging markets
- Rapid learning process
  - Technology, market, distribution system, consumers
  - Recombination of assets/factors of production
- Development
  - Internal development
  - Actively engage with national, regional and EU research programmes
  - Acquisition to complement or reinforce internal technical capability/capacity
- Establishment
  - Market expansion and product/technology refinement
- Divestment
  - Declining businesses
DISCUSSION
Industrial maturity

- In terms of process technology, maturity began in the late 19th century
- Industrial maturity occurs in different periods in two countries
- Process towards maturity in two different countries appears to follow different evolutionary paths:
  - Different primary markets
  - Different industry structures
  - Different competitive environment
  - Different opportunities
  - Different trade policies (liberal and protectionism)
  - Different historical background
Maturity-trap

- Active inertia
- Local search & local preferences
- Process innovation by adopting the latest equipment
- Existing markets
- Acquisitions to expand capacity and customer base
- A rather static competence
Marzotto-competence statics

Yarns and textile production and technology

Cloth making production

Luxury brands

High quality yarns and textile production and technology

1836

1980

1985

2005

1993: Relocation and rationalisation

2005: Demerger

Will continue to remain in the same markets, Expansion to emerging Economies i.e. China, Russia, India

Maturity trap
Emerging processing technology

De-maturity

New materials
- Synthetic fibres
- High performance fibres
- Composites
- Advanced, nano materials
- Advanced chemicals

Emerging processing technology
- Non woven
- Functional digital printing

New Distributors

Emerging markets
- Protective clothing
- Geotextiles
- Technical components
- Armour
- Artificial grass

Entrepreneurial, dynamic capabilities

New Competitors

Creating new industrial boundaries
Ten Cate-competence dynamics

Textile production and technology

Technical textile technology and chemical processes

Polymers

Composite materials

Functional materials

Developments on core concept, engaging emerging technologies, potentially disrupt existing production system and market-technology linkages
Evolution of Technology Transilience

Impact on market linkages

Niche creation phase

High

Low

Marzotto

Ten Cate

Maturity

De-maturity

Architectural phase

Impact on production system

Marzotto

Ten Cate

Regular phase

Revolutionary phase
CONCLUSION

• The EU efforts to **de-mature the textile industry** through **technological innovation** by supporting revolutionary R&D programmes should be accompanied by social innovation.

• Combination of the two types of innovation are fundamental to break away from maturity-trap.

• Advances in the textile industry have to be **complemented** by advances in supplier industries and market industries.

• Firms have to develop dynamic capabilities that are fundamentally entrepreneurial in the process de-maturity.
  – Distant search; international networks
  – Path breaking changes & continuous strategic alignment
  – Recombination of assets & cospecialisation
  – Constant change, innovation as a moving target.