

Mainstreaming of Sustainable Cotton in the German Clothing Industry

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Abstract This chapter analyses the sustainability-oriented transformation of clothing industries. Although sustainability pioneers introduce new products in niche markets, incumbents advance them into the mass market. Together this can lead to the transformation of industries, markets, and consumer habits. We examine the German clothing retail industry with a focus on organic cotton and related sustainable fibres. The analysis covers some of the largest German textile retailers. Data collection is based on publicly available sources. We find that in the late 1970s, Hess Natur pioneered organic cotton practices and supported the development of sustainability standards in the clothing industry. Although in the beginning this was largely a phenomenon in niche markets, some of the organic practices have now diffused amongst mainstream retailers. This is counterintuitive because previous theory suggests that incumbents only adopt practices with significantly lower sustainability standards than do niche companies. The findings can support managers to better understand their organization's role in the transformation of industries and markets toward sustainability, and—vice versa—understand how the transformation may affect them. Leading the transformation challenge by adopting organic and other sustainable supply chain practices can be an important measure for market success.

Keywords Sustainability-oriented innovation • Corporate sustainability • CSR • Organic cotton • Integrated production • Certification • Environmental quality standards • Eco labels • Transformation • Textile industry • Clothing industry • Supply chain

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1 Introduction

The key idea of a sustainable economy is the lasting, world-wide guarantee of individual opportunities to secure basic needs as well as attain a greater quality of life while at the same time preserving nature and promoting humane social relationships (cf. for example WCED 1987). Changed and changing markets and legal, political, and social conditions challenge companies to take greater account of sustainability. The degree of sustainability-oriented industry transformation varies from one country to the next; however, it is always influenced or even shaped by changes made within and by corporations. In this context, corporate sustainability does not mean a (superficial) “repair” or “correction” of corporate activities but rather making deep changes, i.e., making sustainability principles an integral element of corporate value creation by knowing that engagement is most credible when it is comprehensive and lasting and contributes not only to social and ecological development but also to corporate success.

Industry transformation toward sustainability in the textile and clothing industries has been studied in the literature from diverse perspectives (e.g. Illge and Preuss 2012; Villiger et al. 2000). Here we focus on an illustrative examination with a focus on the diffusion of organic cotton through incumbent clothing retailers. The change from conventional cotton to organic and other more sustainable forms of cotton indeed represents a strategic innovation to incumbent retailers because they must (a) develop the sustainability consciousness and purchasing patterns of consumers or enter new consumer segments; (b) build up new competencies in managing the upstream supply chain (i.e., cotton cultivation); and (c) create or engage in co-operations to increase the cultivation of more sustainable cotton.

The chapter is structured as follows. Section 2 gives an overview of sustainability issues and the important aspects of sustainability management in the clothing industry. Section 3 presents the case study method. Section 4 presents the findings of the illustrative case study in the clothing industry. Finally, Sect. 5 discusses the findings.

2 Sustainability Challenges and Developments in the German Clothing Industry

2.1 Overview of Industry

Clothing is a basic human need and the textile and clothing industry (in the following text simply “clothing industry”) delivers goods in response to this demand. At the same time, the clothing industry is subject to severe ecological and social problems in most of the phases of the supply chain spanning from fibre production, spinning, fabric production and dyeing/finishing to clothing production (cf. Goldbach et al. 2003). During the last few decades, the clothing industry has faced

price pressure exacerbating its efforts to become more sustainable. The pursuit of a comparative cost advantage has led to the outsourcing of much of European and US clothing production to emerging and developing countries in Asia. This covers most of the value chain. The value creation remaining in Western countries is mostly limited to value-added services such as design and overall brand management (exceptions are some new entrepreneurial firms experimenting with new business models based on local production; e.g., Plieth et al. 2012). This relocation of value-chain activities to low-wage countries has increased the sustainability challenges because it becomes ever more difficult to manage or even oversee labour and ecological practices at supplier sites in these supply chains (Harms et al. 2013).

More generally, taking a product innovation perspective, sustainability improvements can occur across all life-cycle phases (Hansen et al. 2009). In the clothing industry this has led to a plethora of standards, certification systems, and labels covering different parts of the value chain (see Fig. 1). These approaches aim, for example, at better inputs (particularly fibres), the control of production regarding various chemicals and other risky substances (threatening the natural environment and the health of workers and other stakeholders), the extension of product lifespans, or closing the loops at the product's end-of-life (either by reusing/repairing/recycling or, in case of biodegradable products, by reintroducing them into the biological metabolism). In this chapter, we focus on the sustainability at the beginning of the value chain, i.e., the provision and use of fibres. While the improvements of fibre production is predominantly perceived as an environmental measure, it is in fact also linked to

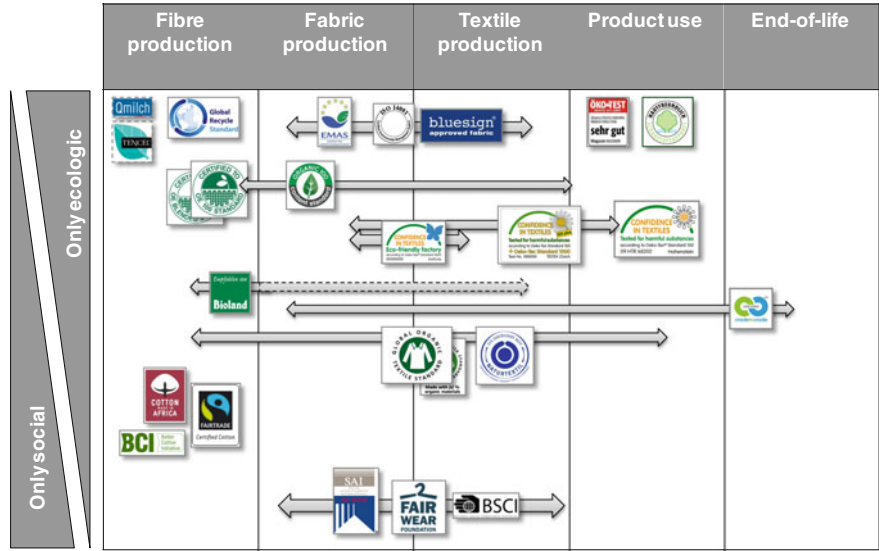


Fig. 1 Ecological and social quality standards, certification systems, and labels covering different life-cycle phases in the textile industry (Hansen and Schaltegger 2013, p. 586)

both direct social effects (i.e. health of farmers and of nearby communities) and indirect social effects (i.e. consumers' health).

The textile and clothing industry uses various natural and man-made fibres—such as cotton, wool, polyester, and nylon—which all have advantages and disadvantages regarding environmental impact (Chouinard and Brown 1997; see also the detailed classification of fibres in Sanches et al. 2015, p. 694). Still, cotton is the main natural fibre used in the clothing industry globally accounting for 38 % of the world's textile consumption (DU 2009b; Sanches et al. 2015).

2.2 Sustainability Challenges Associated with Cotton

Cotton fibre production is a sustainability “hot spot” in textile production (Gminder 2006, p. 126; Villiger et al. 2000, p.159) both concerning the general characteristics of the fibre (e.g., land use, water footprint) as well as the specific cultivation practices used in today's widely spread intensive agro-industrial farming (e.g., pesticide use). Overall cotton production is linked to many challenges to sustainability (e.g., DU 2009b; Gminder 2006; Goldbach et al. 2003; Illge and Preuss 2012) covering “degraded land as a result of salinisation and erosion; water depletion by excessive use of soil and surface water; natural habitat conversion due to cutting of forests and dam constructions; eutrophication of surface water; wildlife contamination by pesticides (insects, fish, mammals, birds); and human health due to direct pesticide intake primarily by farm worker (Kooistra and Termorshuizen 2006, p. 33).” Excessive land use is also linked to displacement of the local or indigenous population.

The major issues of cotton cultivation are usually considered to be land and water use on the one hand and synthetic pesticide use and related toxic effects on humans, other species, and the natural environment on the other. Conventional cotton production uses very large quantities of synthetic pesticides and chemical fertilizer, which not only contaminate soil and water and decrease biodiversity but also have significant health impacts on farmers and local inhabitants, particularly in developing countries where usually the most toxic pesticides are applied without proper protection of workers. Due to residues, this can even affect consumers (e.g., those with allergic reactions). Approximately 10–16 % of worldwide pesticides and 25 % of insecticides are used on conventional cotton production while this covers only 2–4 % of the global agricultural land (Gminder 2006; Sanches et al. 2015). With the aim of solving some of these problems, genetically modified plants have been on the rise; however, this is with severe negative side effects such as loss of farmer rights to collect their own seeds (due to patents), heavy dependence on (sometimes monopolistic) seed firms, increased cost of seeds, and negative impact on alternative crops and wild plant populations (e.g., cross-pollination) (DU 2009b; Gminder 2006). The price pressure on raw materials and particularly fibres has further intensified agricultural production systems and their negative environmental impacts (Goldbach et al. 2003).

2.3 General Approaches for Improved Sustainability of Fibres

Two groups of alternatives to conventional cotton can be distinguished: alternative farming systems for cotton can be pursued or alternative fibres can be sought.

2.3.1 Improving Sustainability of Cotton

A first set of options for sustainability-oriented improvement is to look at alternative farming systems such as integrated or organic production:

- *Integrated production of natural fibres.* Integrated production or integrated pest management (IPM) aims at the provision of a more sustainable production system for natural fibres. The integrated production system (IOBC/WPRS 2004) is an *efficiency* approach and deals with the reduction of environmental impacts by using less pesticides and fungicides, chemical fertilizers, and water, and this was already called for in the Brundtland Report (WCED 1987, p. 67). We will use the term “improved cotton (IC)” in the remainder of the chapter to refer to this type of ecological (and partly social) improved cotton. Integrated production, including improved cotton, is often criticised for unclear standards and missing certification systems, which leave too much room for uncertainty. However, certification standards such as Cotton Made in Africa (AbTF 2012) or initiatives such as the Better Cotton Initiative (BCI 2009) are exemplary certification systems promoting the idea of improved cotton. Some researchers and practitioners also see genetically modified fibres as a solution to excess pesticide use and thus as a contribution to sustainability. However, against the background of lack of knowledge of long-term effectiveness as well as the many ecological, social, and ethical risks associated with the new technology, we emphasize the precautionary principle and question the instrumentality of genetic engineered plants for sustainability until the doubts are reasonably resolved (Makoni and Mohamed-Katerere 2006).¹ This debate is also reflected

¹The most prominent GMO fibre is Monsanto’s “Bt Cotton” plant which incorporates genes of the bacterium “*Bacillus thuringiensis*” for the production of a biological insecticide and thus makes the plant resistant to some insects at least in the short term. The introduction of GMO cotton in major production countries, such as the US, China, and India, has often resulted in yield increase and decreased pesticide use (e.g., Krishna and Qaim 2012) and is thus promoted by biotech proponents as a solution to sustainable development. The effectiveness, however, has been questioned as being far from fact because the technology depends on local circumstances (Qaim et al. 2006) and seems to erode over the long-term due to secondary pests (Wang et al. 2008; Zhao et al. 2011) or pesticide resistance (Tabashnik et al. 2012). However, others criticise the technology not for their (in)effectiveness but for their non-technical risks, both ethical and social (Hahn 2012). Overall, the potential benefits of GMO plants are controversially discussed and are linked to overstated benefits, missing evidence on long-term effects, narrow assessment of risks based on simplified cost-benefit analysis excluding many ethical, social and other aspects, and last but not

in the assessment criteria of the various cotton initiatives: the Better Cotton Initiative is “technically neutral” and allows GMO cotton (BCI 2009), whereas Cotton Made in Africa bans it (AbTF 2012).

- *Organic fibres.* In contrast to the integrated production system, the organic production system is a *consistency* approach (Huber 2000; Schaltegger and Burritt 2005) because it aims at producing cotton with material flow systems in harmony with the natural environment. This is achieved by crop rotation and the use of natural fertilizer (usually from animal husbandry) and natural pesticides, thus it represents a circular economy in the agricultural sector. Chemical (also called synthetic) pesticides and fertilizers are banned. Based on comparative life-cycle analysis between organic and conventional crops (including cotton), organic produce is sometimes considered less environmentally friendly because the environmental benefits related to the organic practices are said to be overcompensated by lower yields leading to the assumption that “organic production is not necessarily any more or any less environmentally friendly than current conventional cotton production” (Wakelyn and Chaudhry 2009). However, this type of LCA study—due to the necessary system boundaries—usually does not consider all of the direct and indirect effects, e.g., the human–toxicological/biodiversity effects of pesticide use and other indirect effects of conventional industrial agriculture. In addition, the water footprint is often not fully considered in LCA studies (Kooistra and Termorshuizen 2006, p. 34). Moreover, while it is commonly accepted that the heavy use of fertilizers and pesticides in conventional agricultural practices usually leads to higher productivity (i.e. yield increases), it is often neglected that organic agricultural practices can also do so, at least in specific contexts (e.g., Gminder 2006, p. 127; Hess Natur 2009). Particularly in developing nations, the potential for yield increases with organic (Badgley et al. 2007). Although the organic system does not incorporate any regulation regarding water use, organic cotton farms are predominantly (60 %) rainfed and therefore much less prone to water depletion (Kooistra and Termorshuizen 2006, p. 34). Although organic cotton production is more cost-intensive due to a higher demand for manual labour (which leads to higher employment levels in developing nations and therefore represents a desirable social effect), this is usually financially offset or even overcompensated with price premiums for (certified) organic cotton. In the last decade, organic cotton has become an important trend in the clothing industry, particularly in Europe and the US (Willer and Kilcher 2011; Memon 2012). Organic cotton production has experienced strong growth in the past, and although it experienced a steep decrease in 2011/12 (a major problem, beside others, is the provision of organic seeds due to pollution by genetically modified cotton),

(Footnote 1 continued)

least, unethical marketing practices of biotech companies (e.g., Makoni and Mohamed-Katerere 2006). Considering the lack of scientific knowledge on the long-term impacts and risks of GMO, the *precautionary principle* should apply (Makoni & Mohamed-Katerere 2006; Zhao et al. 2011).

future growth is forecasted (TextileExchange 2012). Still, organic cotton accounts for only approximately 1 % of worldwide cotton production (Pay 2009). Two main certification systems for organic cotton exist internationally: the Organic Exchange standard (OE 100; OE Blended) only controls for the organic content, whereas the “IVN certified BEST” and Global Organic Textile Standard (GOTS) additionally define ecological and social criteria for the entire textile supply chain (IVN-certified BEST is considered the most ecological stringent standard in the industry; although it is derived from the latter, the related GOTS standard relaxes some of the criteria). Moreover, a huge number of company-specific labelling approaches exist, which may be used in addition to or in replacement of independent certification (DU 2009a).

In summary, the three cotton-farming systems can be compared regarding their environmental impacts (Table 1). In general, the challenges of heavy land and water use do not differ much between the various farming systems, however, in practice organic farms mostly provide for a better water footprint because the majority of farms are rainfed. The major differentiator in the farming systems is the use of pesticide and chemical fertilizer, which is banned in the organic farm system, therefore eliminating toxic effects on humans, other species, and the natural environment. At the same time, organic cotton is often linked to a decrease in productivity per hectare (yield) depending on locality. However, over the long term, organic agriculture can maintain productivity over infinite time periods, whereas conventional intensive agriculture is subject to soil degradation and a decrease in productivity in the long term.

Table 1 Characteristics of organic, integrated, and conventional cotton-farming systems (based on Kooistra and Termorshuizen 2006, p. 32)

	Organic	Integrated production	Conventional
Synthetic/organic fertiliser use	Organic	Synthetic/organic	Synthetic/organic
Synthetic/natural pesticide use	Natural	Synthetic/natural	Synthetic/natural
Irrigation water use	Yes (but often rainfed)	Yes	Yes
Average yields	Rel. low (depending on locality)	Rel. high	Variable
Soil degradation	Low	Medium	High
Monocultivation/mixed-cropping systems	Mono/mixed	Mono/mixed	Mono/mixed
Continuous cultivation	No	No/yes	No/yes
Land-clearing allowed	Yes	Yes	Yes
Burning organic material (weeds, plants, etc.)	No	Yes	Yes
Mechanised labour	Yes	Yes	Yes
Share of world production (%)	1	20	79

2.3.2 Alternatives to Cotton Fibres

A second set of options covers alternative fibres, both natural and man-made, as well as recycled fibres:

- *Switch to alternative natural fibres.* One approach is to switch to alternative natural fibres such as hemp or flax. Compared with cotton, hemp has much lower environmental impacts because it requires almost no pesticides as well as only a modest amount of fertilizer (van der Werf 2004) and has much higher productivity levels per unit of land (Cherrett et al. 2005). Indeed, an LCA analysis showed that organically grown hemp is much more environmentally friendly than cotton (and polyester) (Cherrett et al. 2005). At the same time, however, hemp is very much constrained regarding its diffusion in the clothing industry because its fibre characteristics make textile production more difficult and less appealing to consumers (Cherrett et al. 2005).
- *Replacement of natural fibres with man-made fibres.* Cotton can also be replaced by manufactured (man-made) fibres. An increasing share of clothing uses synthetic fabrics such as polyester (Shishoo 2007) which are also highlighted due to their durability. However, petrochemical-based (nonrenewable) materials cause many environmental and health problems in all phases of the product life-cycle and thus do not necessarily represent a more sustainable alternative to clothing made from conventional cotton. A long overlooked fact is that the use of synthetic materials in consumables such as clothes, shoes, tires etc. leads to abrasion and, hence, leakage of non-biodegradable plastic particles into the natural environment ultimately harming natural systems and species (including humans) living therein (EMF 2016). It is for this reason that consumables should be designed in harmony with the biological metabolism (Braungart et al. 2007). A more promising alternative might be the substitution of natural fibres with man-made fibres from renewable sources such as lyocell fibres based on cellulose (Shishoo 2007; TextileExchange 2011), “qmilch” based on milk proteins (Schölch 2013), or soybean protein fiber (Sanches et al. 2015). However, these fibres are currently representing only small niches in the clothing industry, and their diffusion still needs to be proven.
- *Use of recycled fibres.* A further approach is the use of recycled fibres. Cotton recycling is so far rarely used with one exceptions being H&M, which intends to increase the use of recycled fibres of both cotton and polyester; however, detailed information is given only on polyester (H&M 2011). Overall, polyester occupies the lion’s share of recycled fibres, and cotton recycling is only slowly gaining more attention (TextileExchange 2011). Certification systems are increasingly available to guarantee recycled contents in the finished good, e.g., the Global Recycling Standard (GRS). However, the contribution of recycling to increase the industry’s sustainability is often overstated. In fact, recycling is mostly “downcycling” (Braungart et al. 2007), i.e., collected materials (e.g., from plastic bottles) are of lower value and are not used for the same purpose again (i.e., plastic bottle) but for “more forgiving purposes” (e.g., carpets). Also,

products with recycled contents can often not be recycled again because of the mix of different plastics. The diverse and sometimes unspecified sources of the recycled content can also lead to a new problem: lower or uncertain human-toxicological characteristics—or “material health” (Braungart et al. 2007)—of the recycled fabric. Some may even consider the term “plastic recycling” to be misleading because the diffusion of recycled plastics in industry applications also cements the demand for virgin plastic and thus further stabilizes the existing (plastics) regime (e.g., Geels 2002).

Although all of the presented approaches can play a role in advancing sustainability, natural fibres—particularly cotton—are considered to be the most popular fibres with overall very good fibre characteristics regarding their use in clothing (DU 2009b). It is thus unlikely that cotton will be generally replaced at least in the near future. It is thus of major importance to consider sustainability strategies for cotton, which is the topic of this chapter. Although we have introduced other improvement approaches, it is *not* the aim of the chapter to compare the sustainability of cotton versus noncotton fibres.

Given the chosen focus on cotton, we have explained *organic* and *improved* cotton strategies as alternatives that are linked to *organic* production and *integrated* production systems, respectively. As an umbrella category, practitioners and researchers often refer to them as “sustainable cotton” (e.g., Goldbach et al. 2003; H&M 2011; Illge and Preuss 2012) although, to be more precise, it should be called “*more sustainable cotton*” (or “*less unsustainable cotton*”). Although we focus on organic cotton in this chapter, empirically (as we will see later in the text) the two approaches are closely interrelated, and thus it is not always practicable to deal with the two production systems in a separate manner (it should also be mentioned that organic and improved cotton often simultaneously lead to social benefits, such as eliminated health threats of pesticides, higher incomes of farmers due to price premiums, and better working conditions in production due to additional social criteria in certification systems such as GOTS).

3 Method

We followed a case study research approach (Yin 2003) with the focus on the clothing industry. The case is “illustrative,” emphasizing the dynamics of the industry, rather than an “in-depth” case on a single company. It is an embedded single-case design (Yin 2003, p. 43) using two units of analysis: The analysis focuses on the industry level, although we also specifically consider individual companies (incumbents) and how they respond to sustainability challenges. We selected the clothing industry for its high relevance to society and severe negative sustainability impacts. First, clothing is a basic human need. Second, the current practices in the industry are mostly unsustainable in all phases of the product life cycle from cotton plantation to fibre production, production of clothing, finishing of

Table 2 Top 10 textile retailers in Germany (Hansen and Schaltegger 2013, p. 589)

Company	Sales revenue (textiles) 2010 [Mio EUR]	Rank in global organic cotton sourcing 2010	Organic products	Availability of public data	Selected for case study
Otto	4.158	10	Own collection ("PURE WEAR")	High	+
H&M	3.211	1	Own collection ("Organic cotton")	High	+
C&A	3011	2	Own collection ("Bio cotton")	High	+
Metro (incl. Galeria Kaufhof)	2.418	–	Selected items	Low	–
Karstadt	1.973	–	n.a.	Low	–
P&C	1.334	–	n.a.	Low	–
Tengelmann (includes Kik)	1.195	–	Selected items	Low	–
Lidl	1.049	–	Selected items	Low	–
Aldi group	1.034	–	Selected items	Low	–
Tchibo (textiles)	945	–	Selected items	High	+

clothing, and end-of-life treatment (see previous above). As we focus on incumbents' responses to sustainability challenges, we have chosen 4 of the 10 largest players in the German clothing retail sector (TextilWirtschaft 2011), of which 3 belong to the top 10 organic cotton buyers (TextileExchange 2012). The selection was also based on information availability and the related knowledge about the scope of organic textile practices (Table 2).

The four companies in focus can be briefly characterised as follows:

- Otto is a major mail-order business belonging to the Otto Group, a family business founded in Germany. The company operates in mainstream markets but has aimed for integrating sustainability strategically for several decades.
- H&M, a Swedish company, is one of the global top players in fashion retail focusing on fast fashion.

- C&A is Dutch fashion retail company with headquarters in the Netherlands and Germany. It is fully family owned through its holding company. For many decades associated with a low-budget image, the company has recently moved toward higher quality and prices.
- Tchibo, based in Hamburg, Germany, is one of the largest German consumer-goods retail companies. Through a shop-in-shop system and its own stores, Tchibo sells a diverse product portfolio including coffee, textiles/clothing, furniture, and mobile phone contracts, amongst others. The company is known for its weekly changing assortment of goods.

For the following case study, we collected data from secondary sources such as previously published research, industry studies and reports, market reports, and company reports. For the sake of data availability (e.g., sustainability reports), the data collection was based mainly on a snapshot from the year 2011, but it also covered broader historical accounts where necessary.

4 Illustrative Case Study: Transformation in the German Clothing Industry

4.1 Pioneering the Organic Market in Germany

The German market for ecological textiles and clothing was mainly pioneered by Hess Natur. In 1976, Hess Natur was founded by Hans Hess as a mail-order business in Germany with the aim of developing healthy and eco-friendly clothing free of pesticides and other chemical residues (Hess Natur 2009, 2011; Illge and Preuss 2012; Paulitsch 2001; Schaltegge 2002). Thus, they banned polyester and other synthetic fibres (today this has partly changed) and focused on natural fibres instead. They also exerted rigorous control of the clothing supply chain with regard to the use (and ban) of chemicals and other health-threatening substances. Hess Natur also focused on more regional sourcing and production (e.g., in Europe instead of Asia) to spur local economic cycles, keep transportation impacts low, and improve supply-chain transparency (Paulitsch 2001).

Although in the beginning the focus was on producing clothing without negative health impacts, a next step further upstream the supply chain led to the questioning of existing cultivation practices of natural fibres and hence to investigate the impact of organic cotton. Because the supply for organic cotton was virtually non-existent, Hess Natur, partly in cooperation with development aid institutions or NGOs, invested in development projects aimed to increase organic cotton cultivation (e.g., in Africa). In 1991, in partnership with the Sekem farm in Egypt, Hess Natur was the first company worldwide to invest in organic cotton cultivation (Hess Natur 2009). Ultimately, Hess Natur developed its own market for textiles and clothing based on organic cotton. In 2008, Hess Natur was still the global number 10 organic cotton user in the world, although its relative share dropped considerably with the

market entrance of large incumbents; hence, it is no longer part of the top 10 TextileExchange 2011).

Hess Natur probably developed the world's most stringent sustainability criteria for clothing and the textile supply chain and cofounded the International Natural Textile Association in 1999, which issued organic textile standards and certification schemes in Germany (Paulitsch 2001) and subsequently led to the GOTS standard, which is now applied on a global level (Pay 2009, p. 4).²

While in the beginning the development of organic markets was the task of early pioneers, mainstreaming was only possible through incumbents who followed and reinforced this trend.

4.2 *Mainstreaming the Organic Market in Germany*

4.2.1 Overview

An "early follower" in the organic cotton trend was the Otto Group, the largest textile retailer (mail-order business) in Germany (cf. Table 1). The company's engagement is strongly driven by the (family) majority owner and CEO Michael Otto. Already in the 1980s, Otto acknowledged the importance of environmental protection and formulated it as a corporate goal (Goldbach et al. 2003; Seuring et al. 2004). Otto confirmed its engagement by purchasing organic cotton and developing its own label, "Pure Wear." In 2010, Otto has become the 10th largest buyer of organic cotton worldwide (TextileExchange 2012).

In the last few years, other conventional retailers have entered the market for organic cotton clothing (Table 3). The retail sales volume of organic cotton products has grown steadily for the last decade (Fig. 2). For example, C&A has purchased organic cotton since 2006 and in 2009 founded its own brand, "Bio Cotton," for 100 % organic clothing (C&A 2012a). Today C&A, the second largest textile retailer in Germany, has taken a leading role in the purchase of organic cotton making it one of the world's largest buyers of organic cotton. In terms of quantity, it has long overtaken the pioneers Hess Natur, Patagonia and Otto (TextileExchange 2011). In 2011, C&A sold approximately 32 million items made from organic cotton, and the company plans to double this number in the short term. This strong diffusion into the mass market is only possible because C&A did not pass the higher resource costs of organic cotton (compared with conventional cotton) on to the consumers but rather accepts a smaller profit margin (C&A 2012a, b, p. 104).

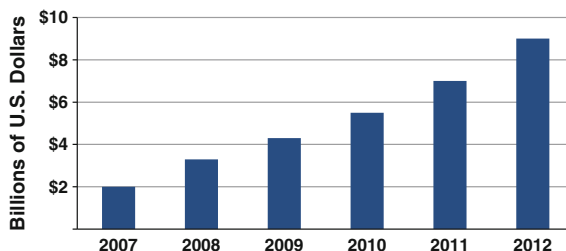
²Internationally, the US-based outdoor clothing company Patagonia was another small pioneer replacing conventional with organic cotton in 1996 (Fowler and Hope 2007). The company was one of the largest organic cotton buyers in the world until 2006 (TextileExchange 2011).

Table 3 Organic cotton (OC) and improved cotton (IC) use by large German retailers (based on Hansen and Schaltegger 2013, p. 591 and Schaltegger and Hansen 2013, p. 187)

		C&A	H&M	Otto	Tchibo
<i>Organic cotton (OC) history</i>	First documented use:	2007	2004	1995	2006
	Own collection since	2008	2007	~ 1999	2008
	Collection name	Bio cotton	Conscious collection	PURE WEAR	n.a.
<i>Use of organic cotton (2011)</i>	Global sourcing of OC (Rank)	#2	#1	#10	–
	OC (tons)	12.500 ¹	15.000	450	210
	OC items sold (Mio items)	32	n.a.	n.a.	3.4 (OC + IC)
	OC (% of total business)	13 % ^a	7.6 % ^b	1.5 % ^a	0.5 % ^b
	OC + IC/Sustainable cotton (% of total business)	13 % ^a	7.6 % ^b	2.2 % ^a	5 % ^b
<i>Corporate goals</i>	By 2012/2013	– Double sales of OC items	– Use 5 % IC (BCI)	– 5 % OC – 10 % IC (CmiA) (in own brands only)	– Maintain OC – Sell 8.5 Mio sustainable textiles (OC + IC) which equals 15 % of total cotton products
	By 2020	– Promoting OC through Cotton Connect initiative – 100 % sustainable cotton (OC + IC)	– 100 % sustainable cotton (OC + IC + recycled cotton)	– 100 % sustainable cotton (OC + IC)	n.a.

¹Data from 2008^aitems^btons**Fig. 2** Global retail sales of organic cotton products.

Source TextileExchange 2012, p. 22



4.2.2 Marketing Strategies, Long-Term Strategies, and Supply Management

The strategies of the textile retailers in Germany to market organic cotton follow different paths, which can be described by the following characteristics:

- First, retailers may sell *only a selected item in organic quality* for piloting or experimentation (e.g., Tchibo), introduce a new organic collection (e.g., C&A, H&M, Otto), or transform the entire product portfolio (the latter is limited to pioneering companies such as Hess Natur and Patagonia; however, the future will show whether incumbents such as C&A also take this route as planned in the long-term).
- Second, *differences exist with regard to certification*. All retailers mention the use of certification standards GOTS and/or OE. The actual certification is very important because they differ with regard to whether they only control for the organic content (OE) or additionally for production characteristics in the entire supply chain (GOTS). However, detailed information on the share of certification in relation to overall organic cotton use is very difficult to obtain.
- Third, not all retailers analysed use labels of independent certification systems (e.g., GOTS) *at the point of sales*. Often they only use their own proprietary label such as PURE Wear (Otto) or Bio Cotton (C&A). Reasons for this may vary, but probably they include increased flexibility of retailers, desire to reduce their dependency on a single certification system, and desire to simplify communication to consumers in case several (competing) certification systems are used simultaneously.
- Fourth, retailers do not always use either integrated or organic qualities in a pure manner. Organic cotton is also used in *blending strategies* where integrated or organic fibres are mixed with conventional cotton (Hustvedt and Dickson 2009). Although all organic certification systems allow for a tolerance of $\leq 5\%$ of conventional material in the final goods, specific blending certification allows to vary the degree of organic cotton and other fibres (e.g., the minimum amount of organic cotton in the final good is 5 and 70 % in the OE blended and the GOTS “made with x % organic” standards, respectively). For example, H&M sells both 100 % organic and blended organic clothes (H&M 2013). With the blended-cotton strategy, incumbents can transform the entire product portfolio more easily because only a minimum amount of cotton needs to be mixed into the clothes (although it is not part of this analysis, Nike now sells 90 % of brand items with a minimum of 5 % organic cotton; Nike 2011, p. 27).

For future development, it will be interesting to investigate both the short- and long-term goals of retailers more closely. Two of the four retailers aim to considerably increase the share of organic cotton (C&A and Otto). H&M and Tchibo set goals on increasing or introducing cotton from integrated production. As a response to Greenpeace’s “Detox” campaign, C&A and H&M, together with other retailers, have adopted the long-term goal of using 100 % sustainable cotton by 2020 (C&A 2012a, b, p. 100). To what extent this will include cotton with organic or integrated

quality remains open, but possibly both strategies could be pursued simultaneously, and the specifics could depend on how quickly the different cotton-production systems can be extended at which cost.

Because the strongly growing demand faces a very limited supply, C&A has had problems similar to those Hess Natur had three decades earlier as the industry was beginning to change. Their response was to found the initiative “Cotton Connect” to promote the cultivation of organic cotton (C&A 2012a, p. 106). According to a recent press release, C&A is planning to double the sales of certified organic clothing (C&A 2012b). Other large retailers have also invested in more sustainable cotton cultivation, although this was not with a specific focus on organic quality but rather on integrated production. For instance, Otto founded and invested in the initiative “Cotton made in Africa,” whereas H&M and Tchibo invested in the “Better Cotton Initiative.”

In sum, the market observation shows that innovative pioneer companies and conventional global retailers, who have often borrowed their strategies from the pioneers, have initiated a notable change in the German clothing industry. This can be seen in the forecasts of most of the market studies predicting strong growth of the cultivated area for organic cotton as well as in an increasing need for retailers to rethink their strategy in terms of sustainability (cf. Memon 2012; Pay 2009; Textile Exchange 2011; Willer and Kilcher 2011). The currently low share of organic cotton in the global cotton market of about 1 % (Pay 2009, p. 5) is thus expected to grow considerably.

5 Discussion and Implications

5.1 Discussion

The example of the clothing industry shows how the diffusion of the certification of organic cotton and the transformation of the market is driven by the efforts of market actors alone. Regulatory aspects do not play a decisive role in this market. The extraordinary efforts of an early pioneer and the related success in a niche market led to new technological possibilities (organic cotton; healthy and eco-friendly clothes) and related production and certification standards. Conventional mass market retailers (e.g., C&A) have only recently engaged in this trend, but are already leading purchasers of organic cotton and sometimes even have ambitious goals for their further transformation. This rapid transformation of a few conventional players in the market has taken place for at least four reasons:

- *Value through healthy products:* The introduction of organic textiles can, in cases where a high level of health awareness exists and the intangible value of the product is increased through sustainability attributes, represent additional customer benefits (e.g., Hustvedt and Dickson 2009).

- *Reputational risk*: The risk of scandal accompanying conventional clothing products can have a significant effect on brand value. The Detox campaign of Greenpeace and the numerous responses on YouTube films and activities in retailer stores may have spurred the transformational activities of the large clothing retailers.
- *Continuous use of existing production processes*: Even if the scarcity of organic cotton is a huge challenge and requires a strong and fast expansion of areas of organic cotton cultivation, the change from conventional to organic cotton is relatively simple and does not require new, expensive production technologies (e.g., new machines) or work processes (this will change once the sustainability focus is expanded from regular cotton production and use to the whole supply chain as is done under certification systems such as GOTS).
- *No sunk costs of transformation strategy*: To switch to organic instead of conventional cotton does not cause new substantial investments in production technologies (e.g., for spinning, weaving, etc.) and thus neither endangers existing sunk costs in production, warehouses, logistical systems, etc. nor causes new ones. In case of missing demand for organic cotton, most costs do not have a sunk cost character, but they can be seen as investments in improved supply chain partner relationships, quality management, and efficiency improvements.

Extant research in sustainable entrepreneurship usually emphasizes that incumbents use lower-level standards of sustainability for their innovations in the mass market (e.g., Hockerts and Wüstenhagen 2010). The analysis of the organic cotton transformation of the clothing market in Germany, however, shows that not only lower-level standards (i.e., “improved cotton”) but also the highest level (i.e., organic cotton) is being diffused in and by incumbents. This should not hide the fact that many differences can still exist with regard to pioneering and incumbent companies. For example, whereas pioneer Hess Natur rigorously controlled the entire textile value chain, incumbents differ in their ambition. Depending on the specific certification standard, the control is often limited to fibre quality (e.g., OE 100) and does not account for chemical treatments during fabric and clothing production (and thus, ironically, cannot say anything about the ecological and health characteristics of the end product). We also did not explicitly examine the social standards in the value chain besides those already integrated in the considered certification systems. Further research should investigate the contingencies involved in which specific organic (and social) standards are adopted by incumbents.

The change from conventional to organic cotton presents a case of strategic innovation for large German clothing retailers because they are challenged to (a) address new customer segments or develop the consciousness of their existing customers, (b) develop new competencies for the tighter coordination of the upstream supply chain (particularly regarding the organic quality of fibres through a chain of custody), and (c) develop strategic partnerships with NGOs, multi-stakeholder initiatives, or industry initiatives for developing the organic and other forms of more sustainable cotton supply. This reflects the move from

anonymous price-based to negotiation-based coordination mechanisms in the supply chain, at least for the time that sustainable cotton fibres are scarce (Goldbach et al. 2003).

Still, while switching to higher quality fibres is a good start for the sustainability-oriented transformation of the industry, other ecological and social improvements in later phases of the value chain—or its complete redesign—is also necessary. One interesting development is the upsurge of new brand manufacturers such as manomama in Germany (Plieth et al. 2012), Switcher in Switzerland, and American Clothing in the USA, operating with innovative business models based on regional value creation through vertical integration and thereby offer entirely different solutions to broader social (and ecological) problems—together demonstrating the importance of new business models for sustainability (Schaltegger et al. 2012, 2016). Another is of course to deal with (planned) fashion obsolescence as the root cause for the every accelerating take-make-waste cycles in “fast fashion”.

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