THE NEW ROUTES OF TEXTILE PRODUCTION FROM ECOTEXTILES TO ORGANIC TEXTILES

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Environmental issues have been gaining importance with regard to all aspects of industrial production. There is also a growing trend for the general public to recognize the need for environmental protection. Ecology can be described as an environmental science that deals with the relationships between living organisms and their interactions with environment. The content of ecology has been enlarged due to its increasing importance and. this environmental action also affects the textile industry. Therefore, the “textile ecology” becomes pronounced. As an eco-friendly production method, “organic textile” concept has emerged in recent years. In organic textile production, all steps from fiber to the end product, there is no harmful effect on users and all products can be recycled without any harm to the environment. Organic textile is currently a niche market as compared to traditional textile and usually in a niche market; the profits are high due to less competition. As a niche marketing strategy, all the organizational efforts are used to satisfy the targeted customers, at substantial profits. In this study, an overview about textile ecology and organic textiles is given.

Keywords: textile, ecology, organic textiles.

TEXTILES AND ECOLOGY

The textile production involves multiple manufacturers. The first stage of the production process is fiber manufacturing, which takes fibers from natural sources, such as cotton or wool, and uses them in their existing form, or converts products such as oil or wood into manufactured fibers such as polyester. The next stage is yarn production, where raw fibers are twisted to form yarn. Textiles are then produced by taking yarns or fibers and connecting them using one of two main fabrication methods: weaving (for fabrics such as denim, oxford, or taffeta) or knitting (for fabrics such as tricot, jersey, and rib).

After the textile is fabricated, the material is finished to impart certain performance properties such as resistance to water, stains, static electricity, abrasion, or wrinkling. The final step in textile production is coloring the fabric through various dyeing and printing methods. The finished fabric is then shipped to apparel manufacturers, where it is cut and sewn into garments for consumers to purchase in a retail environment. The relationship between the product and the planet does not end with manufacturing, however. The packaging methods of retailers, the amount of apparel consumer’s purchase, and the choice of garment care methods and disposal habits by consumers can further heighten the cumulative effect of textile and apparel products on the environment.

Table 1 identifies the negative environmental effects that may occur at each stage of the textile complex during the production process. These violations take many forms. They include land use issues such as overgrazing and water contamination from the cultivation and harvest of natural fibers such as cotton or wool, or worker health and safety issues from the production of mote, a small particle of fiber that is the cause of “brown lung” among textile workers, to landfill consumption from discarding textile scrap waste and packaging materials. However, the chain does not end with purchase.
The consumer’s choice of whether to wet laundering or dry cleaning and whether to
discard their clothing into the landfill or alternately recycle or donate it to a charitable
organization for reuse all contribute to the cumulative affect clothing and textiles have
on the environment.

Table 1. Environmental challenges at each stages of textile complex [1]

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<th>PRODUCTION STAGE</th>
<th>ENVIRONMENTAL STAGES</th>
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| Fiber Production | Natural Fibers:
                   - Chemical use (for fertilize, insecticide, growth control, harvest
                   management, cleaning)
                   - Bioengineering
                   - Irrigation (cotton)
                   - Soil erosion
                   - Overgrazing and water contamination (wool)
                   Manufactured Cellulosic Fibers
                   - Oil consumption
                   - Chemical processing
                   - Harvesting of raw materials
                   - Recyclability
| Yarn Production  | Fibers waste-mote (dust) together with short fibers, plant waste,
                   soil or other chemicals
| Textile Production| Weaving:
                   - Waste diversion rates (to power looms)
                   - Energy consumption
                   - Finishing
                   - Waste diversion rates (to power looms)
                   - Energy consumption
                   - Chemical processing
                   - Dyeing and printing
                   - Released of dyes, pigments and other chemicals containing color,
                   salts, acids, heavy metals into water systems
                   Waste production
| Apparel production| Textile (from scraps after the pattern is cut out)
                   - Paper (discarded patterns)
                   - Bobbins (industrial-sized spools of thread)
                   Human capital - sweatshops, community development
                   Retail
                   - Energy consumption (transportation)
                   - Landfill disposal
| Post production   | Laundering (water use and energy consumption)
                   - Dry cleaning (use of perchloroethylene)
                   Post consumption
                   - Landfill disposal
                   - Recycling

There is always an environmental impact the textile production. The impact starts
with the use of pesticides during the cultivation of plants for the natural fibers, the
erosion caused by the sheep farming or the emissions during the production of synthetic
fiber. So there is the environmental effect in the process of production, where thousands
of different chemicals are used to reach the final stage of textile products.
Awareness of environmental problems has increased considerably during recent years and the environment has become a major issue in the international textile trade. This is due to the environmental and health legislation and the environmental policies that are being executed through market demands. The end users in developed countries are highly sensitive about the issues like azo dyes and also child labor in the textile production.

Developed countries are reviewing the regulation of harmful substances in the textile products. The major issues are banned azo dyes, regulation of formaldehyde, regulation of Pentachlorophenol (PCP), limit values for residues of pesticides, banned allergic disperse dyes and regulation of the content of chromium.

Eco labels ensure that a textile product is eco-friendly and so it gets a friendly response from the importers. Eco labels for textiles are widely recognized and are gaining much importance in the developed countries like EU and USA. The world-wide recognized Eco-label for textiles is OEKO-TEX 100, which guarantees the consumer that the product will not harm the health during wearing. OEKO-TEX 100 requires unit values/concentrations on PH, carcinogenic, azo dyes, formaldehyde, chlorinated phenols, pesticides, heavy metals and allergic dyes and determines the risks according to the intake of harmful substances to the body either by inhalation, digestion or contact to the skin.

The biggest environmental problem associated with the textile industry is the water pollution caused by the discharge of untreated effluents. Waste water arising from the washing and dyeing sections of textile production contains a substantial amount of organic and suspended pollution, such as dyes and caustic soda, which have negative impacts on environment. The growing concern on this issue by the developed countries requires an immediate action to manage it properly.

The trade of textile products is very much sensitive in respect of the environmental issues and so the importers may demand certain guarantees for product, for example some of the leading importers at EU market demand that all purchased textile goods have been tested according to OEKO-TEX Standard 100. So the growing concern regarding the environmental impact of the textile production should be taken care of much in advance.

The textile dyeing industry consumes large quantities of water and produces large volumes of wastewater from different steps in the dyeing and finishing processes. Wastewater from printing and dyeing units is often rich in color, containing residues of dyestuffs and chemicals, and requires proper treatment before being released into the environment. The toxic effects of dyestuffs and other organic compounds, as well as acidic and alkaline contaminants, from industrial establishments on the general public are widely accepted. Increasing public concern about environmental issues has led to closure of several small-scale industries.

Consumers in developed countries are demanding biodegradable and ecologically friendly textiles. Cotton provides an ecologically friendly textile, but more than 50% of its production volume is dyed with reactive dyes. Unfortunately, dyes are unfavorable from an ecological point of view, because the effluents generated are heavily colored, contain high concentrations of salts, and exhibit high biological oxygen demand/chemical oxygen demand (BOD/COD) values.

Especially in dyeing textiles, ecological standards are strictly applied throughout processing from raw material selection to the final product. This has become more critical since the German environmental standards regarding dye effluents became effective. The main challenge for the textile industry today is to modify production
methods, so they are more ecologically friendly at a competitive price, by using safer
dyes and chemicals and by reducing cost of effluent treatment/disposal. Recycling has
become a necessary element, not because of the shortage of any item, but because of the
need to control pollution [2].

In this concept, another alternative way has emerged as “organic textiles” for both
environment and people health as well.

**ORGANIC COTTON AND TEXTILES**

Tones of toxic chemicals are used in the conventional farming and in the production
of clothing and textiles. From the farming of the crop, to the production of the yarns, to
the finishing of garments, chemicals are used that eventually end up in the environment,
causing devastation to plant and animal life indiscriminately and also to the to farmers
and their families who are in direct contact with these harmful chemicals, this becomes
an even bigger issue that we cannot ignore.

The textile industry has an enormous impact on the environment. Today many of the
clothes are made of synthetic materials originated from petrochemicals which have
negative effects over global warming. They are also non-biodegradable. Therefore,
organic cotton fiber is used almost in every product from personal care items to the
children’s products, clothes of all kinds and styles, together with the consumer
awareness.

Textiles which are made from organic agricultural products, produced in an eco
friendly manner in all steps from fiber to the end product, have no harmful effects on
users and can be recycled without any harm to the environment are called organic
textiles.

The organic cotton business is potentially promising, as organic cotton is predicted
to become a bigger issue in the future.

Organic cotton is based upon organic agriculture. Agricultural production is
considered ‘organic’ when it has been certified as ‘organic’ by an independent
inspection and certification bodies according to the rules and regulations that apply in
that particular country, region, or envisaged consumer market. Cotton has a great share
in textile, so the apparel industry plays a significant role for the cultivation of organic
cotton. But the key role belongs to the consumer, who has to demand more organic
cotton textiles, to force the apparel companies to use this cotton as the raw material. As
the demand of organic cotton in the textile industry increases, more and more
developing programs for organic cotton can be set.

The first organic cotton project started in 1990, in Egypt. Today organic cotton is
grown in over 22 countries, especially in Benin, Burkina Faso and Mali. As of 2007, the
largest producers of organic cotton are Turkey and India. According to “Organic
Exchange”, China, Syria, Peru, Uganda, Tanzania, Israel, the United States and Pakistan
are under the top ten organic cotton producing countries in the world [3].

The International Federation of Organic Agriculture Movements (IFOAM), which is
the representative body for organic agriculture worldwide, defines ‘organic agriculture’
according to four principles:

- The principle of health: Organic agriculture should sustain and enhance the
  health of soil, plant, animal, human and planet as one and indivisible.
- The principle of ecology. Organic agriculture should be based on living
  ecological systems and cycles, work with them, emulate them and help sustain
  them.
The principle of fairness. Organic agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.

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.

Organic agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current, future generations, environment. Farmers 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’ products can not be sold as ‘organic’, until the procedure is completed.

Requirements for Processing

Private standards have also been developed for the environment-friendly processing of organic cotton fiber into yarn, fabric and garments. Many different voluntary standards for the ecological processing of organic cotton and textiles were developed, among others by the following control and certification agencies: Control Union/Skal (Netherlands), Organic Trade Association (OTA) (United States), Internationaler Verband der Naturtextilwirtschaft (IVN) (Germany), Soil Association (United Kingdom), Japan Organic Cotton Association (JOCA) (Japan) and Naturland (Germany). Individual companies may also have their standards for the ecological processing of their 100% organic cotton textiles and clothing. Global harmonization of organic textile standards is underway. Global Organic Textile Standards (GOTS) have been developed recently by the certifying bodies IVN, JOCA, Soil Association and OTA.21 Other certifiers are expected to join the GOTS initiative, which was launched on 1 October 2006. The harmonized standard aims to ensure the organic status of textiles, from harvesting of the raw materials, through environmentally and socially responsible manufacturing up to labeling, in order to provide credible assurance to the end-consumer. GOTS enables textile manufacturers to qualify their organic fabrics and garments with one certificate accepted in all major world markets, which is an important step towards harmonization and transparency of textile labels (IMO, 2006).

The organic cotton business network Organic Exchange has established standards for textile certification which do not require all cotton used to be organic. The Organic Exchange Blended Standard (2005)22 relates to the tracking and tracing of certified organic cotton fiber that is blended into conventional textiles, for example at a rate of 5% organic cotton with 95% other fibers (conventional cotton, synthetic fibers, wool, etc.) [4, 5]. World production of organic cotton amounts to 6,000 tons of fiber annually, or about 0.03 % of global cotton production. Turkey produces the most at 29%, with the U.S. being second at 27% and India third at 17% (Ton, 2002). Demand for organic cotton is highest in Europe (about 3,500 tons or 58% of the total) and the U.S. (about 2,000 tons or 33%) (Ton, 2002). Demand in the U.S. increased at an annual rate of 22% between 1996 and 2000 (Organic Trade Association, 2001; cited by Ton, 2002). The organic cotton facts become a new business prospect. The result shows that, at present, there are more than 30 companies that are using organic cotton for a smaller or bigger part of their product range, such as Nike, Otto, Sam’s Club/Wal-mart, American Apparel, Hess Natur, H&M, Howies, IKEA, Marks & Spencer, Zara and more than 1,200 small and medium sized brands.
CONCLUSION

In the course of environmental issues and sustainable life for the next generations, people pay more attention to ecologic and organic products. The demands for the modern textile products cannot be realized without the use of specific chemical substances, however. Fashionable colors, easy-care properties, a long life span and many other functional properties are now demanded for textiles, and are essential in some cases, depending on the intended use (e.g. for workwear). People also try to save the planet by taking green action. Therefore, the organic textile demand increases together with increasing awareness. The organic cotton trends continue to expand and won’t be only a brief trend. Due to its various product categories, organic cotton products can be used in any public scope. From children’s garments to home textiles, organic cotton provides a solution for all the needs. In the future, organic cotton will take place in the next fashion trends. And not at least because consumers are persuaded to contribute something for the environment while they are buying clothes.

REFERENCES