

## *Potential Threats of Consumer Textiles*

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### **Abstract**

Local is global and global is local. With the acquaintance of globalization to the world, the perception of things and happenings has been varied and modified radically. With multidimensional rising reservations and challenges to ourselves the threats that textile industry proposes and promises acquire quite an important status, especially considering potential threats in everyday use consumer textiles being a very specific and crucial element of it. The global concerns regarding various textile processes has been surged up to an almost alarming extent. The global trend for eco-friendly products has also been extended to textile and apparel products, particularly those products which directly come into contact with the skin for prolonged period. This has created a stout vacuum that demands a sustainable and eco-friendly approach to the solution of the issue. An effort is made to create awareness among consumers of textile products regarding their potential safety threats. It involves highlighting the threats and hazards which should be controlled so that this sector becomes a responsible partner in the creation of a nontoxic environment. A review of probable hazardous textile chemicals is presented here along with the discussion on expected venues of health risks. Such awareness might help in bringing in to limelight a list of damaging textile chemicals which should be restricted for the sake of environmental protection, controlling occupational illnesses among workers of textile sector and provision of nontoxic, safe textile products for consumers.

Keywords: consumer textiles, environment protection, globalization, hazardous chemicals

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## **Introduction**

Nearly every single one on this planet is consumers of textile products. A vast range of every day product categories are prepared by the textile sector. The consumer range spans across all user segments, regardless of age, genders and nature of social or professional engagement or health status. This gigantic contribution places textile sector as a leading partner in global economic activity. The magnitude of textile activities, from production to marketing, usually involves international and intercontinental movement of products. As a result of such global movement of products whatsoever is contained by them also becomes a global concern (Das, 2000). Almost all textile oriented products are used in a way that every consumer is directly or indirectly exposed to the chemical content of these goods. The endless array of textile production dominantly utilizes large quantities of chemicals. This sector is known for its intense use of chemicals. It is an established fact that among these textile chemicals some are harm full for the environment and some are injurious to human health producing allergic reactions which can be persistent or bio accumulating (Hangzhou, 2013). It is very recent that attention is given to the hazardous aspect of chemicals contained in textile products. With the emerging technological advancement enormous expansion of textile activities has occurred.

Increasingly complex, longer and global nature of textile supply chain has made it difficult to exactly identify the presence and nature of hazardous textile chemicals in textile products and production (Nazia, 2010). However some unharmonised, voluntary efforts are seen in textile industry regarding labeling or listing of restricted chemical content (Nations, 2011). Additionally, the absence of unified legislation covering the prospects of permissible range of textile chemicals and the permissible level of hazardous textile chemical has exposed the consumers to prospective environmental and health intimidation of congenial textiles. This all reflects a severe need of an organized handling of the matter for the regulation of textile chemical usage locally level as well as globally. Failure to do so might result in disastrous human health and environmental impacts (Kevin, et al 2014).

## **Objectives**

The objective of this concept paper is to create awareness among the arena of consumer textiles regarding its potential safety issues highlighting threats and hazards which should be controlled so that this sector becomes a responsible partner in the creation of a non toxic environment (Textiles, 2005). All this is driven by the increased knowledge about hazards associated with chemicals used in textile sector. Among numerous commodities of today's world textile products are identified as a group that might contain hazardous chemicals. A review of probable hazardous textile chemicals is presented here along with the discussion on expected venues of health risks. Such awareness might help in formulation of a list of damaging textile chemicals which should be restricted for the sake of environmental protection, controlling occupational illnesses among workers of textile sector and provision of non toxic, safe textile products for the consumers (Soytas, 2006).

This awareness will bring into limelight a dire need for the creation of a pool of specific rules, locally as well as globally, for chemicals to be used on different groups of textile products. Emphasis should be placed on the availability of complete

information about chemicals throughout the lifecycle of textile products. While seeking options for such legislative decision making consultants from textile industry, experts of environment protection and authorities of consumer rights protection should join hands for the larger benefit of humanity (Agency, 2013).

### **Nature of Consumer Textile Sector**

Consumer textile industry involves all industrial segments contributing in designing, manufacturing and distribution of textile goods for utilization. Industry activities comprise of production of fiber from natural or synthetic sources, spinning activities for the formulation of variety of yarns, knitting or weaving units responsible for structuring of textiles, additional steps of dyeing , printing finishing , final make-up and packaging and distribution (Hangzhou, 2013) . Apart from this fiber oriented practices all steps involved in manufacturing of leather articles are also part of textiles (Kevin, et al 2014).

Textiles play an important role in global economy as well as it is an important component of world trade flows. For many developing countries the outcome of textile activities account for a major proportion of annual exports. According to World Trade Organization total world export of textiles value is estimated to be around US\$196 billion and that of clothing is US\$258 billion, representing 2.2% and 2.9% respectively of world merchandise trade. According to World Trade Organization statistics most of the world textile exports are done by developing countries including India, Pakistan, Turkey, Indonesia, Thailand and Mexico ranking among top 15 textile exporters. Overall Asia accounts for 46.1 % of world textile export. On the other hand biggest importers of textiles include EU and US (Agency, 2013).

### **Chemicals Used in Textile Sector**

Textile industry is known for its intense use of chemicals from the production of raw material to the desired finished article. This excessive use of chemicals is in correspondence with the complex and wide range of requirements dictated by desires of a large variety of consumers. From textile fiber production till finished consumer article the processing involves utilization of numerous chemicals. Some of these chemicals are destined to remain with the product for its life time and some are designed to act as carry-over during the manufacturing steps of production (Soytas, 2006).

The definition of hazardous chemicals is a priory of this exploration, which will lead to the formulation of non exhaustive list of chemicals and will serve as an indicator of chemicals which might be restricted. Probability of utilization and presence of such elements can be during the textile industry processing stages or such elements can be found in the final product. More focus is required to spot all such chemicals in textile products or production which are endocrine disrupting chemicals (EDCs), chemicals that are persistent, bioaccumulating and toxic (PBT) or are group of chemicals which are very persistent and very bioaccumulating (vPvB) (Agency, 2013).

Table 1 contains an overview of the most commonly used chemicals as well as their function or required performance during processing chain of textile production. Table

also contains information about the release pathway of these commonly used textile chemicals during the use phase (Textiles, 2005).

Some recent studies have been conducted to measure concentration levels of such chemicals in the products on the rack. A Swedish study exploring presence of Nonyl Phenol Ethoxylates (NPE) in towels found the evidences of its presence in almost every item. A similar study on water repellent sports clothing also concluded the evidence of Per Florinated Compounds (PFCs) in all sampled pieces (Agency, 2013).

<b>Chemical category</b>	<b>Chemical name</b>	<b>Release pathway</b>
Detergents and auxiliaries	Nonyl Phenol Ethoxylates (NPEs)	Water
Wrinkle, water oil or stain resistant coatings	Per-Florinated Compounds (PFCs)	Water
	Formaldehyde	Air
Fire retardant finishes	Poly Brominated Diphenyl Ethers (PBDEs)	Water
	Hexa Bromo Cyclo Dodecone (HBCD)	Water
	Short Chain Chlorinated Paraffins (SCCPs)	Water
	Asbestos	Air
Plastic Coatings	Phthalates	Water
	Heavy Metals	Water
Anti-bacterial and anti-mould agents	Silver	Water
	Triclosan	Water
Dyes and Colorants	Heavy Metals	Water
	Azo-Dyes	Water
Leather Finishes	Chromium	Water
	Short Chain Chlorinated Paraffin (SCCPs)	Water
Others		

Table 1: Chemicals of concern in Textiles.

### **Threatening Textile Chemicals**

Groups of chemicals listed in table 1 are identified as being of some concern. But textile processing contains many more chemicals utilized in multiple stages of processing like spinning, pre treatments, dyeing, printing or finishing. Most of the chemicals are used without an intention of their presence in the final article; these are designed to be released during processing after they impart their function in some stage of processing. But the promised absence of such chemicals is only possible if optimum conditions of fabrications are maintained throughout the manufacturing phase. Strict quality control standards should be in place to signal alerts of product impurities and abrupt abnormality during processing resulting in residual contents found in final products (Kevin, et al 2013).

## **Legislation Regarding Substantial Existence of Hazardous Chemicals in Consumer Textiles**

The enormous textile productions involving significant applied chemistry and global utility of textile products make this sector to be in need of clear regulations. Following is an over view of some of the major legislation applicable to textiles concerning their chemical content (Das, 2000).

**REACH** is a European legislation for the level of chemicals contained in the textile products. It emphasizes the disclosure of information with respect to certain substances which meet a set criterion for substances of very high concern (SVHC). The list of SVHC keeps on increasing with the more available knowledge of probable hazards associated with certain chemicals. Most of the substances listed in SVHC are related to textiles as described in European Chemical Agency website. For such chemicals in products REACH requires information disclosure to protect the safety rights of consumers (Kevin, et al 2013).

**Consumer Product Safety Improvement Act (CPSIA)** is a US federal law that requires a third party testing for the levels of lead in goods for children (Agency, 2013).

**California Proposition** is an initiative against exposure of consumers to toxic chemicals found in products. According to this state is required to publish an updated list of harmful chemicals in products which might cause cancer, birth defects or other reproductive harms. It empowers user to be informed about significant amount of chemicals in products they purchase or which were released in environment during product manufacturing. This information is regarded as “clear and reasonable” warning before exposing anyone to listed chemicals. Allowed levels of chemicals are in accordance to human health standards. Random sampling for chemical content testing of different products is regularly conducted to ensure compliance with the set standards (Soytas, 2006).

**Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture** is a Japanese law governing the control or prohibition of hazardous compounds to humans or environment (Hangzhou, 2013).

**European Eco-label** is an European Commission Decision. This legislation involves strict legislation and certification and primarily addresses textile consumer products. This involves a stringent set of condition not only on level of chemicals in final textile products but chemicals used during processing of textiles and chemical content of raw textile resource. According to this approach certain chemicals are restricted to maximum levels others are allowed within a safe range according to the hazard classification system. The hazard classes are continuously updated as new chemicals are associated to some hazards (Textiles, 2005).

## **Declaration Systems Of Textile Product Chemical Contents**

It is interesting to investigate the mechanisms that exist for the transmission of information regarding chemical concerns of any textile product. This information takes on various forms, at time it directly addresses what is in the product and at times

it addresses “negative content information”. Although efforts are aimed to ensure that harmful chemicals should not remain in the final product for guaranteed product safety standards of targeted markets. Along with conventional labels, some companies also provide ecolabels, supplying a little more information about chemical contents of product. A restricted substance list (RSL) is often given by the buyers which must be observed by the manufacturer to pass quality checks. But this RSL varies across different companies. There is hardly any information passed on about full disclosure of all chemicals utilized in production line or information about full disclosure about chemicals contained in the final product.

**Fiber content information** Currently it is found that there exists no authentic information system for knowing what chemicals are contained in textile products except for the information of nature of its fiber content. There are established labeling requirements of certain import countries. For USA market the label should include fiber content, country name and name of manufacturer. For textile care labeling some symbols are evolved by International Association for Textile Care Labeling. Such labels are required to be a permanent part of product throughout its life (Das, 2000).

**Restricted Substance List (RSL)** is a company specific list. It comprises of chemicals that are strictly prohibited in the company’s products. This imposes effective ban on the use of chemicals and provides a clear direction to the company suppliers. Such RSL is usually put in place by the companies manufacturing for the market; with this list company requires all suppliers to conform to this standard. But for the efficient conformity and compliance strict testing standards must be imposed and administrative control needs to be very tight. Being company driven there is great variation in contents of the list (Nazia, 2010).

**Ecolabels** are mostly regional and specifically target aspects of sustainability and environmental impact of textile processing. Some target the harmful chemical content of the textile products. For textile sector over 70 labels are available (Textiles, 2005).

**Environmental Product Declaration (EPD)** is primarily a life cycle assessment tool. Its major concern is communication regarding the environmental performance of any product or system. The information is directed towards environmental impact associated with textile product including its raw material acquisition, chemical content, energy utilization in manufacturing, chemical emission to air or water or soil and waste generation. Textile sector still lacks behind in using EPDs (Soytas, 2006).

**Selected Company Systems** are small initiatives to make negative content list or positive content list of company’s products available to public. This is another advanced level of product information disclosure (Nations, 2011).

**ChemicALL System** is an extended database and chemical information system, designed to address needs of designers and textile users. This tool was evolved to help designers and end users to make informed decisions or to carry an informed dialogue with suppliers regarding chemicals present in final products (Agency, 2013).

## **Stake Holders Chain Concerning Consumer Textile Products**

For the chemical content initiative understanding the concerning stake holder chain is very necessary. This helps to bring into limelight needs and uses of different chemicals in textile sectors at different phases. Different sectors of stakeholders possess different concerns regarding utilizations of certain chemicals in textile manufacturing. Priorities of each segment are interestingly diversified based on their capacities, roles, priorities, economic and social context. For this reason all parties who can contribute to the information system regarding chemical content of textile product are included here (Das, 2000).

**Governments** are not directly involved in the designing or manufacturing or distribution activities of textiles but possess a key role with regard to control of hazardous chemicals in the textile products. They play very vital part of policymakers and policy enforcers. Governments can exercise their control in varying degree on different segments of textile manufacturing activities being run in their territory. This unfolds the significant role of governments regarding such sensitive matter of consumer safety. Their contribution is many fold including control during manufacturing for occupational health and safety standards or during distribution for traceability standardization or during use for consumer rights protection or during export to ensure compliance to international standards for exchange of information regarding chemical content of textile products. Most of the government's role is needed in making rigorous efforts for identification and control of hazardous substance that might become part of consumer articles (Soytas, 2006).

**Manufacturers** are the major partners of stakeholder chain of textile product life cycle. They are directly concerned with all decision making regarding discouraging use of harm full chemicals in different stages of manufacturing. Generally they have much influence on their suppliers and can easily influence the different steps of multistage fabrication of consumer textiles. So their role in controlling hazardous chemical content in textiles is very vital. They are directly responding to the legislative authorities and the policies of the markets so influencing suppliers to abide by the ultimate consumer demand of product safety assurance. Activities of global textile manufacturing environment are very complex (Hangzhou, 2013).

Manufacturing stages require clear chemical content information of textile materials being used. Designers are held responsible for making right decisions about chemical content of selected materials to full fill the desired functional performance of product as well as promising personal and environmental safety standards. It is highly recognized that the information delivery system at this stage should be capable of providing efficient, complete and authentic information. Multi stage processing of textiles requires a continual information exchange with regard to its chemical content across different stages of entire manufacturing.

**Distributers:** Distributers are those companies who receive final manufactured goods and deliver these to a point of sale. Distributers can be the large brand name companies who may or may not operate retail chains. Apart from retailers all type of importers and people involved in logistics are categorized as distributers. This group of stakeholders directly relate to legislated requirements. They have to obey all legal

responsibilities and maintain a system of check and balance of appropriate chemical content information to meet these obligations.

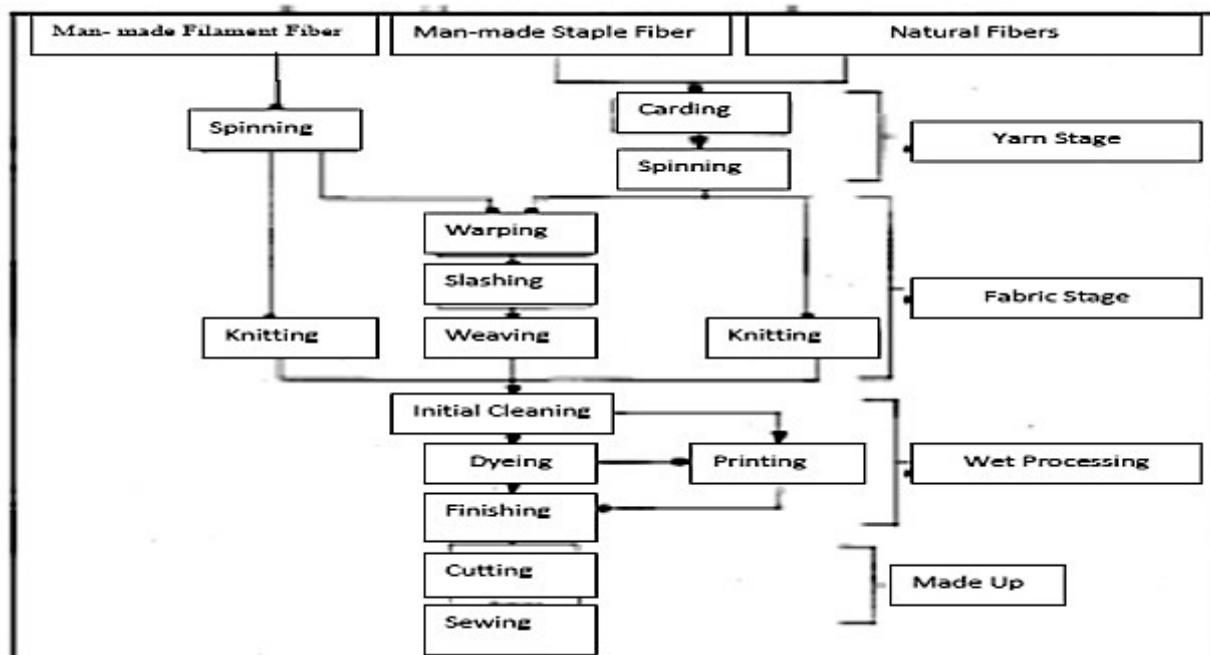


Figure 1 : Typical multiple stage complex flow of textile processing.

Large brands need to develop an appropriate corporate policy based on need of knowledge about product's chemical composition (Hangzhou, 2013). A common practice among the distributors is widespread ignorance of hazardous aspects of textile chemicals. On the contrary this sector is trying its level best to devise a system to comply with the current legislation and regularities (Nazia, 2010). Amidst the textile value chain sectors the distributors are specifically leading the efforts to establish an efficient control over the textile chemical content of the consumer products (Agency, 2013).

**Consumers:** It is strongly felt that development of a system to effectively communicate the chemical contents of wide range of consumer textile products to the consumers is needed. This will not only help in making right decisions of purchase but if consumers are kept informed they can take appropriate actions with the products at hand. Consumer safety assurance should be promised at all stages of manufacturing. Consumers, more than any other group of stakeholders, are directly affected by the absence of an effective information exchange system (Nations, 2011). Thus consumer demand is estimated as major force for increased exchange of information regarding chemical content of textile products. General public must be given awareness and education about the facts of environmental and health risks from textile chemicals in daily use products. Currently there is no sound system of efficient information exchange for consumers (Das, 2000). Presence of eco-labels bridges this gap to some extent but does not provide behind the scene information to its full spectrum (Textiles, 2005). There is dire need for media articles about hazardous aspects of textile chemicals found in the products to create public awareness, but this campaign might not be fruitful to the textile chain segments in developing countries.



Presence of chemicals of concern in textile products can only be reduced if it can be communicated systematically to all stakeholders so that processing procedures can be revisited to bring needed improvements. Consumer choices are predominantly affected by price, design, perceived quality, and awareness about damaging chemicals (Kevin, et al 2013).

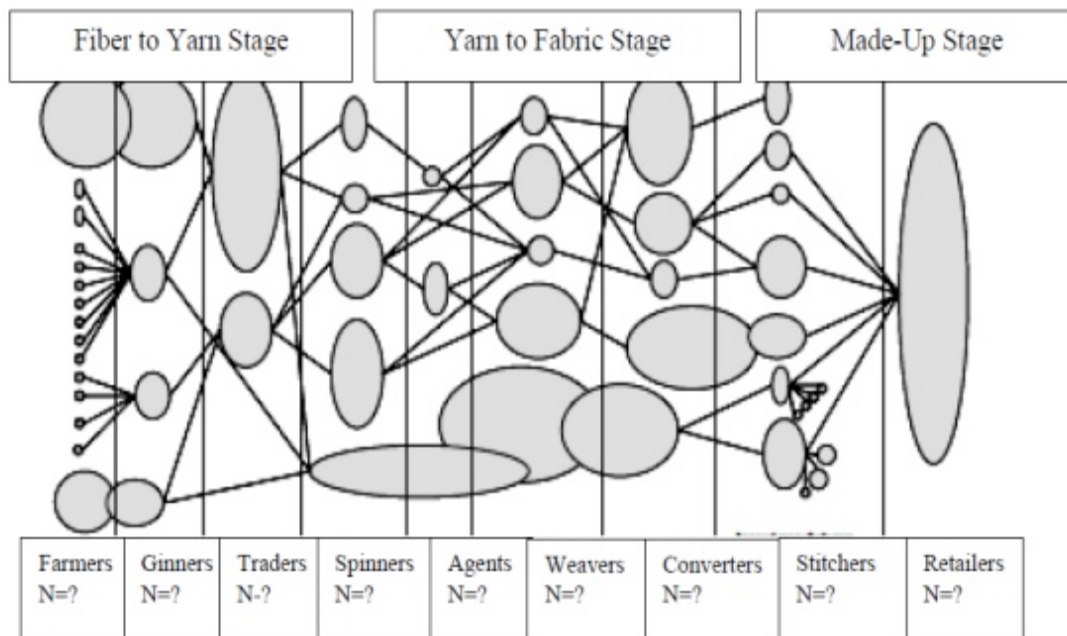


Figure 2: Textile Value Chain Illustrating Typical Business Relations

### Obstacles in Information Exchange Across Stakeholder Chain

The theme found common among all stakeholders is efficient use of chemical information found or not found in products for evaluation and assurance of user safety. A common practice of provision of negative-content list does not address this situation. A revised strategy is needed to provide positive-content list which will directly address exchange of chemical in product information (Soytas, 2006). Historically legislations and regulations have been devised to monitor, control and ensure minimized chemicals of concern in the products (Agency, 2013). Desire of consumer safety depends on proper exchange of information but the nature of information needed and manner of its presentation varies widely. In short the throbbing query to be addressed is what information exchange mechanism is most effective? Diversity of textile activities renders this information exchange a complex and hard to handle issue. This remains a major obstacle in solving this issue through standardized practices (Kevin, et al 2014).

### Conclusion and Recommendations

Current era assorted progress in the textile sector demands that it must become able to derive the validity of the claim of safer products by establishing a mutually agreed upon information exchange mechanism. Already established mechanisms of negative-content list or chemical oriented eco-labels are just assurances of absence of unwanted chemicals. The delicacy of the issue requires formulation of legislative base

to ensure user safety throughout the textile production to maintain product quality along with worker health. Current practices of chemical information exchange are diverse in terms of scope, method, design and criterion. Through the legislations all companies putting product in the market are held responsible for product safety. Hence different stakeholders of textile production chain should mobilize to compile, extract and pass on required information throughout the supply chain. All such practices will ensure enhanced product safety. In today's world the chemicals of concern are all such substances which yield negative effect on human health in some manner or damage the environment. A chemical content confirmation system will enable designers and active manufacturers to make wiser and informed decisions regarding textile products to control and reduce the hazards associated to the presence of chemicals of concern in everyday use consumer products. Such efforts require accurate set of measures majorly including supervised, oversight and trustworthy testing systems.

Such efforts will enable stakeholders to exercise improved management of the textile chemicals present in the products, these mutual measures are needed to ensure availability, appropriateness and accessibility of needed information.

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