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Recycling of Textiles

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Introduction

The increase in demand and consumption for textiles is a result for global population growth and the living standards improvement. Most of the solid recyclable wastes in the textile industry refer to natural and synthetic fiber materials, in addition to fabric wastes upon the manufacturing process. Textile manufacturers undertake a range of waste-generating activities such as washing, drying, warp preparation, weaving, dyeing, printing, finishing, quality and process control, and warehousing, in addition to garment making. The major wastes generated by this sector are fiber wastes, scraps, hard fibers, beaming wastes, off-cuts, packaging, and spools and Dyeing, printing and finishing processes use up to 200 l of water per kilogram of fiber, making waste water the largest waste in this sector by volume.

Recycled Products

A recycled product or item refers to materials that have been recovered or diverted from solid wastes either from the manufacturing process or after usage. Meanwhile any product possessing any percentage of recycled materials must be stated for customer.

There are different methods for textile recycling; mechanical, chemical and thermal recovery. Considering the diversity of textile materials waste and forms, several technologies and techniques of waste recycling must work in an integrated way in order to achieve a noticeable impact on recycling.

Textile wastes can be classified into two categories

Pre-consumer (Production):

- Waste originates from manufacturing of textiles products.
- Textile off cuts from garmenting section
- Defective rolls of fabric or leather items

Post-Consumer:

- Waste originates from consumers
- Worn out textiles goods

Benefits of Reducing Waste

Improving waste management can benefit both business and the environment by:

- Reducing cost of purchasing materials (Maximizing the efficiency of material usage)
- Increasing profitability (lost product=less profit)
- Minimizing costs of disposal and treatments of
- Minimizing environmental impacts by reducing use of raw materials and producing less waste
- Improving public image and employee satisfaction through promoting an environmentally responsible image and providing a safer workplace.

The suitability and benefits of waste management depends upon the nature and size of business and the scale of application, in addition to the compliance with environment regulations and other requirements. The waste hierarchy provides a framework for managing waste: avoid; reduce; reuse; recycle; and dispose. Waste characteristics and cost are two relevant factors in recycled product manufacturing.

Limitation of Recycling

- Although the environmental awareness of the general public has increased significantly in recent years, their willingness to actively participate in waste reduction still needs to be enhanced.
- Promoting waste avoidance on purely environmental reasons may not be sufficient. As costs for collection and disposal services are not linked directly with the quantity and sorting of wastes generated through charging,
- There is no financial incentive for waste producers to reduce waste.
- Low values, high transportation cost or lack of market demand for recovered materials particularly.
- The predominance of small and medium recovery and recycling enterprises discourages investments in waste recovery technologies.

Textile Product Design via Waste Generation

Designing for the full life cycle is a new and modern extension of the actual demands concerning the product, as well as fulfilling

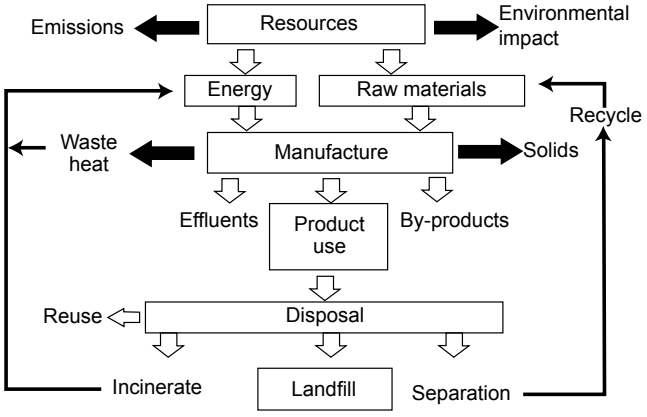

Figure 1: Life-cycle of the product (adapted from Furness, J.).

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environmental demands. A good product design can improve all major operational performance criteria.

The product life cycle starts with the ideation process according to needs, requirements, and market analysis, processing and supply of raw materials and energy needed for the product. It then covers the production process of the product, until its ultimate disposal. Environmental impacts occur all over the different phases of the product life cycle. Figure 1 Key factors are the consumption of input materials (water, non-renewable resources, and energy) and production of output materials (waste, water, heat, emissions, and waste) in addition to other factors.

That's to say that textile industry is delivering wastes and pollutants to the environment differing in the phase of the pollutants and its load. Thus designers must take functionality and budget into consideration concerning textile product design and manufacturing, where Functionality is achieved by choosing or combining the right materials.

The materials chosen have an influence on the processes of manufacturing as well as on the processes of recycling and disposing the product at the end of its life.

Development of an environmental database, setting minimization and reduction programs, implementation of new processes, alternative materials, awareness and training of new production techniques and attitudes in addition to continuous monitoring and evaluation are set to be ways of new production, processing of materials, and waste minimization and recycling.

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