

# Feasibility Study of Environmentally Sound Approach for Apparel Recovery Technologies

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## Abstract

The main purpose of this study is to research ways for waste reduction in manufacturing, materials regeneration and clean production in apparel manufacturing in Taiwan, in order to achieve 3E: Efficiency, Economy and Environmental Protection. Specifically, this study hopes to address the following three areas:

- (1) To study the processing technologies which can turn apparel wastes to resources
- (2) To increase the efficiency in the use of energy and resources in apparel production
- (3) To establish a system for improving the recovery from unwanted apparel in Taiwan, in order to improve environmental protection and to reduce pollution.

## Introduction

The need for clothing is only second to food. The demands on apparel have been increasing rapidly as the increase in human population and their desire in improving their appearance. This remarkable demand has placed significant impact on environments from apparel industry. In order to reduce these impacts, we need to study how apparel is produced, what types of apparel are purchased, how apparel is used and what recovery systems can be applied when clothes are no longer needed or wanted. Turning apparel wastes to resources is an area, which is a key for reducing waste generation and protecting environment. This new approach can also provide new line of product in apparel industry, added economic incentives, and better protect environment.

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- (1) To study the processing technologies which can turn apparel wastes to resources
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- (3) To establish a model for improving the recovery from unwanted apparel in Taiwan, in order to improve environmental protection.

## Methods

The methods used for this study are information collections, and synthesis. The procedures for information include: literature and data collection, interviews, consultation with environmental experts for processing technologies. Literature and data collection includes textile technologies stored in C.D., on Webs, stored by related industries, and government institutes. Interviews are conducted at key universities and institutes in textile areas. Consultations are carried out with textile recovery specialists, environmental engineering specialists and environmental consultants, project managers. The research framework used for synthesis includes analyses, interviews, expert verification and in-situ investigations, focussing on the following issues: (1) the processing technologies which can turn apparel wastes to resources. (2) the change of the original production method to increase the efficiency in the use of energy and resources in apparel production. and (3) to develop a recovery system using waste materials in apparel production. The in-situ investigations are used in examining the following items and processes: the recycled materials (unwanted apparel) to be sampled, overall product designs, the reduction in the amount of solid and gas wastes during production, quantity reduction in raw and waste materials and increasing recycling in package, green label (the environmentally friendly production), availability of recovery systems (recovery technologies), and the production processes for use of the newly available resources from wastes materials and bi-products. Through the above steps, the feasibility of environmentally sounded approaches of apparel recovery technology are proposed.

## **Results and Discussion**

### **Change and Recreation of Apparel Valuation**

The original production systems include only the apparel production, but include no consideration for consumer environmental education, recovery, and resource recreation from wastes. The new production approach includes the activities important for materials recycling and consumer education. The new production system introduces the new valuation systems, encouraging volume reduction in waste materials, improving safety and resource reuse. The new production systems can not only efficiently reduce the amount of waste materials, but also turn the waste materials into new products. In such system, the production cost is greatly reduced, in the meantime apparel industry are able meet an environmentally comprehensive liability system.

### **System for Turning Wastes Materials to Resources**

To establish environmentally sounded raw material management system, in which environmental consideration will be included in the raw material procurement, production, and apparel manufacturing. This system is critical for an efficient raw material management. For such a system tom function properly, a guideline on standardization for raw production materials needs to be established. This standardization can facilitate the material recovery, enhance the product quality and encourage the meeting of environmentally sounded apparel quality. It also needs to establish an integral environmental product design and development system as well as recovery

processing, separation techniques, and low pollution methods, which ensure clean production and result in new bi-products. Environmental protection in many instances brings pressure on business, but in this case it can bring the new products, which could create new business opportunities and profits.

#### Clean Production System to Reduce Wastes and the Level of Pollution

The change of production system from the old system, which uses the OEM production approach for mass production to the production adopting clean manufacturing processes. The latter is preferred by many modern consumers who consider the protection of environment as important as the low price in products. The clean production system are encouraged and adopted by many countries. Such trend is likely to continue and to be expanded to many more countries as the concerns of environment rises. The clean production method also has the following five advantages: minimizing waste generation, minimizing raw material needs, improving segregation and reuse, increasing energy recovery, and improving safe disposal.

#### Establish Apparel Recovery and Reuse System

The establishment of apparel recovery and reuse system can turn wastes to resources. Business can recover wastes as resources for its own or other producers to use, and turn them to new products, which can generate new profits. But there is no system in place currently available in Taiwan, the amount of recovery materials in Taiwan is low only in about 3%. The following ways are suggested to increase apparel recovery rate:

To set up streamline procedures for recovering and recycling raw materials.

To find appropriate mix of raw apparel materials for production.

To provide complete data on each apparel

To include the environmental costs in apparel pricing

To study apparel recovery rate basing on population, geographic location and convenience.

To properly label the level of recycling apparel in new products.