



## Recycling of garments scrap

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Open Access Research Journal of Engineering and Technology, 2023, 04(01), 001–007

Publication history: Received on 02 January 2023; revised on 08 March 2023; accepted on 10 March 2023

Article DOI: <https://doi.org/10.53022/oarjet.2023.4.1.0051>

### Abstract

The garments factories left behind different quantities of scraps of waste and unnecessary clothes utilized but can recycle this scraps and tap including in other applications. The aim is to recycle clothes scraps and use it in two applications, the first application is to manufacture clothes for baby clothes using a singer machine and over lock machine and the second application is wood industry compressed using the method a mechanical machine hot pressure. Results obtained from the first application is baby clothes close quality of clothes imported and results are made get it from the second application they are fragile plank samples compact and that proportion of the substance . Large quantities of scarps are extracted from garment factories that cannot be counted, these factories use different raw material and pattern of fabrics in the manufacture of different type of clothing.

**Keywords:** Garments scraps; Recycle; Compressed wood; Raw material

### 1. Introduction

The history of recycling goes a long way back. Recycling is not a new concept. The practice of recycling has been around for thousands of years. However, it has been affected predominantly by supply and demand, much as it is today.

Recycling has a history that dates back to the historic times. As early as 400 BC (and even earlier), people have been recycling. For example, archaeological evidence indicates that glasses from the imperial Byzantine times were being recycled in the ancient city of Saga lassos, located in current day Turkey. There is also evidence that early Romans recycled bronze coins into statues that could be sold at a higher monetary value than the original coins. In hard times (eg. wartime), metals from everything like jewelry and coins were being melted for weapons or other necessary goods. Pottery recycling operations have been uncovered as well. Archaeologist also deduced from waste remnants about the history of recycling – that recycling was a popular practice during times of distress [1].

Less waste remains were found where there were also other indicators of distress such as famine, war and widespread illness. During these times of distress, new materials might have been scarce, making the recycling of waste necessary. As for the history of recycling prior to the industrial revolution, recycling and general household re-using was actually a commonplace practice. Before mass production flooded the market with loads of materials and products, it was generally cheaper to reuse items as opposed to buying new ones. And when materials did become worn beyond further use, recyclable ones (eg. glass, aluminum) were recycled into new items. For example, evidence shows that scrap bronze and other metals were collected in Europe and melted down for perpetual reuse. In Britain, dust and ash from wood and coal fires were being down cycled as a base material in brick making. In other words, during these times in the history of recycling, recycling was mainly motivated by the economic benefits of using recycled feedstock instead of virgin material [2].

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The history of recycling took a turn during the times of industrialization. As it became easier and cheaper to produce goods (through technological innovation and mass production), it also became easier and sometimes cheaper to throw used items away. Nonetheless, anytime there was a massive economic slump, people would look for ways to make the most of what they had. Great Depression, people reused and recycled materials because they could not afford to buy new items or acquire virgin materials [3].

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## 2. World War

A highlight in the history of recycling was during World War II. During the war, financial constraints and massive material shortage due to war efforts made it necessary for our ancestors to reuse goods and recycle materials. The war efforts demanded much of the resources, leaving little for the home front. Some items (eg. metal, rubber and even certain food items) had to be rationed as they were needed overseas at the warfront. It became necessary for most homes to recycle their waste, as recycling offered an extra source of materials. There was also a general patriotism in recycling then. There were massive campaigns in many countries, urging people to donate metals and conserve fiber, in contribution to war efforts and as an expression of patriotism. Recycling materials to be used at home also meant more resources could be sent overseas at the warfront. This in turn meant a greater chance of victory at war [4].

As with the other times, after the WWII period, the history of recycling was greatly influenced by economic reasons. When the war ended, resource conservation programs established during the war were continued in some countries without an abundance of natural resources, such as Japan. However, for other countries such as the USA, recycling efforts were largely forgotten.

In the 1940s and 1950s, when land filling became a cheap way to dispose trash, recycling was less popular. Nevertheless, in the 1970s, recycling became more popular again and drop-off recycling centers were established. The environmental movement had started since 1960s, and there was greater public awareness and rising environmental consciousness. A milestone in the history of recycling was the introduction of the universal symbol for recycling. In the form of a Mobius strip, the symbol was designed by Gary Anderson in the late 1960s, after a Chicago-based recycled- Container Company sponsored an art contest to raise environmental awareness. Since then, the triangle has been used to represent the recycling hierarchy of reduce, reuse and recycle [5].

The increased interest in recycling in the 1970s was also a result of rising energy costs. Significant savings were achieved through recycling. For example, recycling aluminum used only 5% of the energy required with virgin production. There were also significant energy savings when recycling glass, paper and metals as compared to extracting the raw materials. In the early 1970s, Rose Rowan started with the idea of towing a –recycling|| trailer behind a waste management vehicle to collect. Trash and recyclable items at the same time. This innovation allowed for the introduction of curbside collection in the late 1980s and 1990s, which made it even easier for people to recycle.

For the United States, the first city to mandate recycling was Woodbury, New Jersey. Other towns and cities soon followed suit, and today many cities in the U.S. make recycling a requirement (read more about the recycling practices today in the various countries).

Clare Hussey, Pammi sinha-2009, stated that to develop a culture of getting rid of clothes by recycling, where the present study to collect waste and scraps post-industrial stage and left garment and used clothing and home textiles industry has been to sort through all the fabric and classification according to type, color, class, grade level, and where the composition (of one kind or mixed), and use them in the work of designs unfit for work carpets, upholstery, stuffing pillows and toys fiber. More recently Reem and Hiba 2015, in their graduation research for particular for fulfillment for bachelor degree (un published) , recycling scraps used clothing , this research covered how to make use of the fabric scraps obtained when the cutting process occurred and also make use of the second-hand clothes in order to add value and contribute to environmental conservation. A children's doll and other different products with multiple uses were designed. In Banipat which is 90km from the Indian Capital Delhi they worked in recycling clothes were donated by people from the United States, United Kingdom ,Europe ,Germany, Canada and the Far east, Asia, South Korea, and others. Heaps of coats, heavy and light jackets, and pants disposed of by consumers are cut and torn into a tangle of threads for recycling and used in making blankets, rugs and bedspreads, and is being shipped back to the west in a strange sight [6].

Also in Indian the Daharam pal and lin industries produces 10,000 kg of yarn per day from 20 tons of used cloths that are placed in an open space under a tin canopy until they are transported to the shredder to extract the filament fibers this raw materials are then used to produce blankets school uniforms, and red and black squares curtains spread among the Masai community in Tanzania and Kenya. In November 2016 Huda and Abdalrahim they researched paper this study

reviewed how to make use of fabric waste obtained from the cutting process in order to increase the added value, and also contribute in keeping the environment, clean. In addition of using the cad /cam in cutting process, there is still huge amount of waste found and need to be used. From the visits to some of garment factories it's founded that huge quantities of fabric waste thrown away and not used. This study used two methods of recycling of garments waste in the garments industry, the hand loom and sewing machine for producing samples of carpet and bedspreads and blankets from the fabric waste. Calculations for producing one unit were done. The total costs obtained and compared with the sales return expected and the results show that there was high profitability which confirms that it is promising to invest in recycling waste of garment manufacturing.

A textile factory recently opened in hong kong it is the first of its kind; it depends on the collection of the clothes old and unwanted and converted back into yarn for spinning a brand that reuses clothes old for the environment. The factory can handle about 340tons of garment waste it reduces stress on waste cube.

## 2.1. Method used for recycling

There are many and varied methods use it over the years for disposal from scraps of clothes, it evolved these methods improved continuously in order to achieve the maximum possible benefit from scraps of clothes, including:

- Chemical methods
- Traditional methods
- Mechanical methods

### 2.1.1. Chemical Methods

This methods is represented by use of organic materials and litter add them to clothing scraps and that get to keep it and analyze it, and then after that get rid of them, this method doesn't achieve any take advantage of scraps as they reduce especially worth if it's this the clips are made of cotton fibers 100%.

### 2.1.2. Mechanical methods

Cloth grinding machine

It is a chopper that minces types and different materials from clothes scraps they are used later after being chopped in mattress fillings and pillows.



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**Figure 1** Jeans recycling machine

This machine recycling each a kind of jeans (shirts, trousers, dresses, bags) and converting into bristles again, and in the same machine these bristles are used and transformed to the canvas can be used again.

## 2.2. Waste recycling machine

Products can quickly open various waste rags, filament waste cotton, old clothes, cotton, chemical fibers, linen, non-woven fabrics and other scrap.



**Figure 2** Waste recycling machine

The device eliminates the traditional processing technology, and use of wire no advanced international new teeth and open knob design double gear, achieving high speed continuous production and production of high and low frequency conversion control is adjustable products for adjustment, any car stops feeding automatically, advanced, economical and low maintenance cost products can quickly open various waste rags, yarn waste cotton, old clothes, cotton, chemical fibers, linen, non-woven fabrics and other scrap. Improve lager yield and quality of the machine, it is equipped with a dust discharger for purification workshop environment, improve workers' operating environment Feature:

- Wide application range.
- Advanced product design, economical, low maintenance.

Industrial waste shredder for textile/ garment waste al fudayah 1200B-J, Jaw crusher 1200-800kg/hr scrap shredder description industrial waste shredder for cutting/ textile , scrap fiber crusher textile scrap.

### 2.3. Important of Research

To shed some light on the important technical problems especially the technical and economical facing the recycling of waste in garments manufacturing to useful products

### 2.4. Research problem

The large amount of waste produced during the cutting process to be considered

### 2.5. Research Objectives

- Produce useful products from the garments waste.
- Increase the added value of the product.
- Keep the environment clean and healthy from the waste of garments industry.
- Create new jobs for people.

## 3. Material and Method

### 3.1. Material

**Table 1** The type of fabric Scraps

No	Fabric	Percentage
1	cotton	100%
2	Polyester	100%
3	Cotton + Polyester	65% +35%
4	Polyester +viscose	50%+50%

Composite was manufactured through a process based on four different materials (scraps) from various materials. Table (1) shows different materials

A polyester resin is used with the hardener (Methyl Ethyl Ketoneperoxide).

- It hardens at normal temperature (room temperature).
- It is not affected by moisture.

**Sawdust:** Sawdust was used because it is an essential ingredient in making particleboard.

### 3.2. Method BSC THESIS

Recycling used different many methods including mechanical and chemical method. The mechanical method applied for the scraps samples. The samples were divided into two types' pure cotton and different raw materials of fabric (polyester, viscose). Pure cotton scraps was used for the production of children's clothes. On the other hand blended scraps of polyester and viscose were used for production of compressed wood. Four different samples were manufacturing using different materials Scraps such (polyester, viscose etc.).

**Table 2** Weight used in the sample

Fabric	Weight Sawdust	Weight Scrap	Weight Plant Sticker	Weight Hardener	Pressure	Temperature	Time
Cotton 100%	744 g	317 g	138.1 g	2.8 g	150 bar	190 °C	7 min

**Table 3** Weight used in the sample 2

Fabric	Weight Sawdust	Weight Scrap	Weight Plant Sticker	Weight Hardener	Pressure	Temperature	Time
Mixed Scrap	744 g	317 g	138.1 g	2.8 g	150 bar	190 °C	7 min

**Table 4** Weight used in the sample 3

Fabric	Weight Sawdust	Weight Scrap	Weight Plant Sticker	Weight Hardener	Pressure	Temperature	Time
Mixed Scrap	687 g	295 g	157 g	3 g	150 bar	35 °C	7 min

**Table 5** Weight used in the sample 4

Fabric	Weight Sawdust	Weight Scrap	Weight Plant Sticker	Weight Hardener	Pressure	Temperature	Time
Mixed Scrap	687 g	295 g	157 g	3 g	150 bar	190 °C	7 min

The size of chips has been reduced to very small sizes. Sawdust weight, scrap weight, hardener weight and plant sticker weight were measured using Sawdust weight. Materials were mixed together in a mixing machine (mixer) for one

minute. The mold of 34\*34\*1.6 dimensions were used to manufacturing a composite plate, a hot pressure machine curing for. Temperature of 190°C were applied for 7 minutes.



**Figure 3** Hot pressure machine

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#### 4. Results and discussion

Subsequent to the description of the production process, the physical-mechanical properties of the composite, in order to give an overview of its performances. Moreover, also a preliminary investigation of the samples.

Samples have low impact resistant so it prefer to use in light weight application in furniture, automobile, etc.



**Figure 4** The samples after recycling

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#### 5. Conclusion

The fabric scraps were recycled according to their size and types. Mechanical methods were used for both experiments. 100% cotton big scraps used for to producing the baby's cloth, small scraps of various materials were used to make particle board. Using urea formaldehyde or epoxy to produce compressed wood is more effective, than adhesive substance used in this work. Using specialized sewing machines to sew knitted fabrics. Spatial machine that returns the scraps to the filaments used in the production of new threads and fabrics.

## **Compliance with ethical standards**

### *Disclosure of conflict of interest*

No conflict of interest.

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