



(REVIEW ARTICLE)



A review of the socio-economic advantages of fabric recycling operations from the textile industry in Hai Phong city

Nguyen Thi Quynh Nga ^{1,*}, Tran Thi Tuyet Nhung ¹, Nguyen Tran Tram Anh ¹, Dao Hong Hanh ¹, Ngo Thu Thuy ², Luu Trung Hieu ³ and Ta Thai Hung ⁴

¹ Faculty of Management, Finance, Vietnam Maritime University, Haiphong, Vietnam.

² School of Excellent Education, Vietnam Maritime University, Haiphong, Vietnam.

³ Faculty of Electric, Electronics Engineering, Vietnam Maritime University, Haiphong, Vietnam.

⁴ International Success Education, Vietnam Maritime University, Haiphong, Vietnam.

International Journal of Science and Research Archive, 2024, 11(02), 1963–1967

Publication history: Received on 17 March 2024; revised on 23 April 2024; accepted on 26 April 2024

Article DOI: <https://doi.org/10.30574/ijrsra.2024.11.2.0750>

Abstract

The textile/apparel industry is of great importance to the economy in terms of trade, employment, investment and revenue all over the world. This sector is however characterised by substantial losses, due to production excesses on the one hand, and the “throw away” culture on the other. This state of affairs suggests that textile recycling is needed. Apart from the environmental and ecological advantages which can be brought about by the re-use and recycling of textiles, there are many benefits of a socio-economic nature. This paper analyses current trends on textile recycling, the barriers impeding greater recycling, and outlines the socio-economic advantages of moving towards a circular economy. Some examples of on-going initiatives are discussed, together with some of the measures that may be used to further reduce the current waste deriving from the apparel sector in Hai Phong city.

Keywords: Textile recycling; Benefits of a socio-economic; Barriers; Apparel sector; Hai Phong city.

1. Introduction

The apparel industry is of great importance to the economies of every country in terms of trade, employment, investment and revenue. In 2023, the size of the global apparel market reached USD 1685 billion. At the same time, supply chain processes are characterised by fragmented and relatively low-tech systems, which have major environmental impacts such as the use of large quantities of water and chemicals, high emissions of greenhouse gases and generation of waste.

Global annual figures are given for: Total Greenhouse Gas Emissions (GHG) (1200 million tonnes); water usage (93 billion cubic metres); fertilisers for cotton (8 million tonnes); pesticides for cotton (200,000 tonnes); chemicals (42 million tonnes) and dyestuffs (1 million tonnes). The share of textiles in total municipal solid waste generation in 20123 in USA accounted for over six percent (16.22 million tonnes), out of which 16.2 percent (2.62 million tonnes) was recycled, and 64.5 percent was landfilled. The EU textile industry generates waste estimated at 16 million tonnes per year. Much of this waste is incinerated. According to the Ministry of Environment of Korea between 2015 and 2023, textile waste volume increased by 17 percent, from 54,677 to 64,075 tonnes, respectively. Vietnam's textile industry generates an estimated 15 million kg of waste each year. Especially in Hai Phong, businesses in the area throw away nearly 5 million kilograms of fabric scraps per year. So the amount of waste fabric waste is very significant. If appropriate treatment measures are not taken, this situation will cause serious pollution to the environment.

* Corresponding author: Nguyen Thi Quynh Nga

The reuse and recycling of textiles could be considered as a route to socioeconomic benefits and a means of boosting a nation's economy. Indeed, the advocacy for a "circular economy", in which materials continue to circulate in the economic system in a cascade of reuse and recycling, has been gaining strength as it is translated into commitments made by policy, business and civil society representatives. In a report commissioned by the European Union, consultancy firm McKinsey estimates that the transition to a circular system could generate a net economic benefit of V1.8 trillion by 2030. More recently, reports by the Club of Rome have concluded that the circular economy would deliver socioeconomic benefits in the form of enhanced energy efficiency, reduced carbon emissions and the creation of employment in the EU. For the textiles sector specifically, an economic system in which fabric and fibre recycling is fully integrated, has been said to reduce resource needs (water, fossil fuels, chemicals) and to generate new jobs in the collection, sorting and recycling of clothing. These socio-economic benefits have been widely projected, yet the available evidence remains scarce. By reviewing the literature, this paper aims to address the gap between circular economy thinking and proof-of-concept for textile reuse and recycling.

Most of the contemporary social advantages of textile reuse and recycling are related to charity activities. For instance, in the UK, charity organizations collect textile waste and resell it through their shops, and surplus stocks are sold to recycling firms. The contents of clothing banks belonging to charities are directly collected by recycling firms which compensate the associated charity based on the weight of the collection. The earned profit is closely tied with internal and external activities and projects to help people and communities where carers and supporters are needed.

In Brazil, recyclable waste collectors, most of whom live in poverty, are integrated into a cooperative or association and supported by local government. They contribute to neighbourhood improvement, waste cleaning, demonstrating resource recovery behaviours, and creating opportunities for greater community cohesion.

Every phase of the life cycle of textile waste recycling (i.e. collection, sorting, transport, recycling) creates employment and gives opportunities for small or family businesses. More often, textile recycling is considered not as an end in itself, but as a route to implement the circular economy, i.e. a closed loop production system. It could become one of the solutions that helps companies in the process of moving towards sustainable business performance. Textile recycling leads product manufacturing towards a reduction of production costs, depending on recyclable materials being a low-cost and efficient alternative with low environmental impact. As an example, ECOSIGN reported that recycling secondhand clothes could reduce greenhouse gas emissions by 53%, reduce pollution associated with chemical processing by 45%, and reduce water eutrophication levels by 95%.

Textile recycling is also perceived as one of the key directions needed for a sustainable transition of the sector. By responding to a rising recognition that the industry should take responsibility to reduce its pressure on raw resources in the face of growing global populations, fashion brands have started to incorporate textile-totextile recycling in the production of their products.

The environmental benefits of textile reuse and recycling have been addressed recently. A major conclusion is that reuse and recycling in general reduce environmental impacts, mainly because the need for primary resources is reduced. However, environmental benefits are not the only consequences of circular economy initiatives. The circular economy policy document outlines the benefits of helping to create new business opportunities, bringing about more innovative and efficient ways of production and consumption, and creating opportunities for social integration and cohesion. These are socio-economic and socioenvironmental benefits which are worthy goals, but the evidence base to support the claims is weak. However, there is very little on socioeconomic benefits, and the topic is mostly covered by the phrase: "analysis of a broader approach that places human activity into a long term CE perspective". The gap in the literature resides on the fact that there is a paucity studies which look at the issue of textile recycling in an integrated way, so a scientific study of the topic is a timely effort. The novelty of the paper resides on the fact that it clarifies the content of socio-economic benefits, identifies achieved socioeconomic benefits, and also points out others that have yet to be achieved.

2. Methods

2.1. Literature review

Based on the analysis of the various studies, our paper was segmented to cover four related aspects of textile recycling: trends on textile recycling in Hai Phong; barriers to textile recycling; examples of socio-economic benefits of textile recycling; and lessons learned. Details of these are presented in subsequent sections. Being the central-theme of this review, the methodology for deducing the socio-economic advantages of textile reuse and recycling is further elaborated in the next section.

2.2. Examples of socio-economic benefits of textile recycling

2.2.1. About environment

- Minimize waste into the environment during the production process of textile and garment factories.
- Do not use specialized machinery such as fabric dyeing machines to avoid the risk of polluting the water source.
- Using fabric scraps from the textile industry will help save on processing costs: burning, chemical treatment, etc. It also limits air pollution when burning fabric.
- Does not use management software, does not consume a lot of cloud space, and protects the environment to the maximum.

2.2.2. About society

- Reduce the unemployment rate in Hai Phong: operate a small business model, creating conditions for people who do not have main income to participate in the production process (housewives do not work in factories). companies, factories...) The production processes are basic so they can satisfy even those who are not highly skilled.

2.2.3. Economic

- Fabric scraps from garment factories and businesses seem to be thrown away, but when they are collected and recycled, they will become unique clothes and accessories. Those clothes and accessories are sold on the market, creating a fashion cycle, bringing economic efficiency.
- Doing business in a small retail model will cost less management costs, labor costs, factory rental costs and bring higher profits.

3. Trends on textile recycling

In Ha Dong, Hanoi, since 2017, the Vun Art model has appeared - a collective economic model to create impact, founded by Mr. Le Viet Cuong, a person with a mobility disability. Vun Art was born with the desire to preserve and introduce traditional culture, create jobs for people with disabilities and utilize excess materials in the production process to protect the environment. To date, the cooperative has become a training and working place for 21 people with disabilities. Every day, young people with disabilities still use their hands to meticulously work with each small scrap of fabric, cutting, assembling, gluing..., creating large and small paintings, fabric bags... rich in Vietnamese cultural colors. From Dong Ho folk paintings, Temple of Literature, Sword Lake..., all have profound cultural and humanistic significance. Realizing the positive effects that Vun Art brings to the environment, many garment factories have proactively transported scrap fabric here. Materials used to produce canvas paintings and canvas bags are usually felt and environmentally friendly burlap. This contributes greatly to reducing textile waste discharged into the environment.

In Saigon, in 2016, a fashion brand “Crazy Lips” appeared. “Crazy Lips” was founded by a former international student majoring in design at Parsons School, New York - Tom Trandt (real name Tran Minh Dao). The products here are designed entirely from recycled waste and excess materials during the production process. At the studio, Tom and his team often find ways to use scraps of fabric to make new products, then create smaller accessories with leftovers. Moi Dien collaborated with Converse on a campaign in 2019, to recycle waste from shoe factories into streetwear for the community.

In Hanoi, from April 12, 2024 to April 16, 2024, the exhibition “Touching a flower” was held - creating paintings from scrap fabric. The painting exhibition “Touching a flower” is part of the 4V for “Fabric” project for Vietnam (4V Vietnam). The 4V Vietnam project was established through the ASEAN Social Impact Program 2023, organized by Fulbright University Vietnam, in addition to sponsorship from the US Agency for International Development (USAID). 4V’s mission is to recycle scrap fabrics and fabric scraps from private factories in Hanoi City, reassembling them into chiffon panels so that artists and art creators can create based on them. creating works that are both decorative in application and convey the author’s content and message into the work, in addition, expanding the scale of the painting exhibition to many different countries. The exhibition “Touch a Flower” aims to spread the meaning and spirit of using recyclable materials such as fabric scraps to create colorful works used in the field of painting, thereby reducing minimize the negative environmental impact of waste in the textile industry. The exhibition “Touch a Flower” includes 30 paintings painted on recycled canvas, showing interesting multi-dimensional perspectives, full of artistry and environmental protection beauty meticulously depicted on assembled canvas frames. from rags. Each work displayed at the exhibition represents a world, a personality like the distinct style of the young generation of Gen Z artists.

4. Barriers to textile recycling

This systematic review of literature has shown that despite its growing popularity, the textile industry is faced with numerous challenges such as triggering environmental pollution, noise pollution, deterioration in humans' health and resource limitations. Recycling of textile products, as part of the broader transformation from a linear to a circular economy, has been identified as a potential solution to these challenges.

As far as barriers are concerned, there are numerous obstacles to textile recycling, which on many occasions prompt a low recycling rate. Globally, few countries, if any, are yet able to utilise 50% or more of their potentially recyclable materials. For instance, less than 12% of the potentially recyclable materials are collected in Brazil while the rates in South Africa, Russia, and China are 10%, 11%, and 20% respectively. Developed economies such as Canada, France, and Italy have relatively higher rates of 32%, 40%, and 43% respectively. In Vietnam, especially Hai Phong, recycling capacity reaches 25%. In 2023, the textile reuse and recycling rate in the UK increased from 22% to 33%. Some of the major barriers to the optimization of textile recycling are discussed below:

4.1. Economic viability

At present, many recycled textile wastes are unsuitable for multiple recirculation and use. This is largely due to the widespread production of lower-grade products (downcycling) from textile recycling. Limited recirculation and reuse is not economically viable and discourages investment in textile recycling. The relatively high prices of some recycled textile fibres are influenced by the high cost of the recycling processes, including transportation, which discourages prospective investors.

4.2. Non-availability of recyclable textile materials

The quantity of textile waste that is suitable and accessible for recycling is grossly insufficient. Limited quantity of used textiles and textile waste are collected and sorted for recycling. Informal operators are mainly small-scale and labourintensive, utilizing basic recycling technologies, which significantly lower process efficiency. Their varying level of commitment and experience, irregular work hours and inconsistent collection pattern also affect the quality of the collection and sorting of recyclable materials.

4.3. Technological limitations

A major reason for the limited quantity of recyclable materials is the lack of technologies for sorting textile waste in preparation for recycling. Automated sorting will improve the efficiency of the production process and increase the quantity of textiles that are suitable for recycling. In addition to the challenges of sorting, chemical and mechanical textile recycling technology are also limited, requiring significant investment in research to overcome existing limitations and introduce more efficient and effective techniques.

4.4. Lack of information and limited public participation

Limited public awareness on the merits of recycling contributes immensely to the low recycling rate, causing market inefficiency as well as stakeholders' apathy to large scale investments. Successful policies' implementation depends on the individual behaviour of residents. The best waste recycling policies may be ineffective if there is no corresponding change in citizens' behaviour. The knowledge barrier (ignorance of what to recycle) and the attitude barrier (non-commitment to the ideals of recycling) are two of the fundamental consumerrelated barriers to recycling. Currently, many countries prioritize recycling communal waste such as glass, wood, paper, plastic, and metal, while textile recycling is less prioritized and publicized. Ineffective information dissemination negatively impacts governmental management as well. Regulators are unable to collect sufficient data necessary to formulate appropriate policies and manage the downstream textile recycling industry.

4.5. Poor Coordination, weak policies and standards

Uncoordinated collection of waste as a barrier to efficient recycling. The absence of an integrated and wellcoordinated framework and policies to enhance the overall efficiency of the textile recycling eco-system negatively affects the industry. Different components of the value chain work independently, sometimes with conflicting interests. Centralising the operations of these respective components will enable the formulation of harmonised policies and regulations addressing specific industrial standards, technology standards, classification standards and test standards. The lack of unified and generally-acceptable standards affects the operation and development of the recycling industry.

5. Conclusions

The field of textiles is a consumption area which, along with food, housing and mobility, causes greatest environmental impacts. By means of re-use and recycling, some of these environmental impacts may be reduced. The current available technologies allow both government and business on the one hand, but also consumers on the other, to practice recycling in a way which makes it both environmentally sound, ethically just, and economically acceptable. There is a great potential for the textile recycling sector to contribute to the circular economy. It can reduce the production of new textiles from virgin materials and hence reduce the use of water, energy and chemicals in the production chain. However, textile recycling is still facing a number of challenges, such as limited practical technologies for recycling, technical problems related to the complexity of clothes, and immature markets. The size of the markets is not large enough to absorb the volume of material that would come from the comprehensive recycling of clothes.

For all fibres and recycling methods currently being used, recycling is still a better environmental and socio-economic option, whose benefits far outweigh mere incineration. The socioeconomic benefits, although not huge, are sufficient to justify the pursuit of this option on a variety of grounds. The novelty of the paper resides in the fact that it clarifies the content of socio-economic benefits, and identifies the achieved socio-economic benefits while also highlighting others that have yet to be achieved. A greater emphasis to Extended Producer Responsibility may be useful in that it encourages producers to pursue sustainable design practices, which may reflect positively over the entire product lifecycle.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

- [1] WRAP, 2018. WRAP research shows four main barriers to recycling.
- [2] Statista, 2018. Global Apparel Market Size Projections from 2012 to 2025, by Region (In Billion U.S. Dollars).
- [3] U.S. EPA, 2016. Advancing Sustainable Materials Management: 2014 Fact Sheet.
- [4] United States Environmental Protection Agency, Washington, DC.
- [5] Resyntex, 2018. Resyntex: a new circular economy concept.
- [6] Martin, 2016. Unwanted milestone for UK textiles recycling sector.
- [7] Remy, Speelman, Swartz, 2016. Style that's sustainable: a new fast-fashion formula.
- [8] Broega, A.C, Jord~ao, Martins, S.B, 2017. Textile sustainability: reuse of clean waste from the textile and apparel industry.
- [9] Communist Party of Vietnam Electronic Newspaper (2023), Vietnam's textiles and garments aim to export.
- [10] Online Finance Magazine (2023), Promoting the development of Vietnam's textile and garment industry.
- [11] Quyen Hoang (2018), Crazy Moi and creative frontiers.