



Empowering Women through Sericulture: Transforming Defective Cocoons into Opportunities

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This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

In South Asia, particularly India, women face significant challenges stemming from gender discrimination, poverty, and caste-based inequalities. Self-Help Groups (SHGs) have emerged as a pivotal approach to women's empowerment, promoting both economic independence and social awareness. This review paper explores the role of sericulture, specifically the crafting of handicrafts from silk cocoons, as a means of enhancing women's livelihoods in rural areas. By utilizing cut and pierced cocoons, artisans can create a diverse array of decorative and functional products, contributing to both personal income and community development. This innovative use of by-products in handicrafts not only fosters creativity but also promotes self-employment, allowing marginalized women to gain economic agency. Moreover, engaging in cocoon crafting serves as a therapeutic activity, improving mental well-being and providing a sense of purpose. The study emphasizes the importance of integrating bio-crafts into the broader sericulture industry. This integration not only enhances sustainability by making use of waste materials but also provides a reliable income stream for women and their families. The potential for value addition through skilled craftsmanship transforms what would otherwise be discarded into valuable products, contributing to the local economy. Ultimately, these initiatives improve women's economic status and contribute to their social empowerment, offering a multifaceted solution to entrenched gender inequalities in South Asia. By equipping women with skills and resources, fostering community support, and promoting environmentally sustainable practices, the crafting of silk cocoon handicrafts exemplifies a holistic approach to addressing the challenges faced by women in rural areas. Through this innovative model, women can achieve greater independence, enhance their social standing, and participate actively in their communities, paving the way for a more equitable and empowered society.

Keywords: Women's empowerment; self-help groups (SHGs); handicrafts; economic independence; caste discrimination; rural development.

1. INTRODUCTION

The situation for women in South Asia is marked by significant challenges, with gender discrimination and poverty playing major roles in their hardships. In India, these issues are often exacerbated by caste or ethnicity-based discrimination. However, the country's growing civil society and democratic culture, alongside efforts for women's empowerment, have led to notable progress. Both governmental and non-governmental organizations have designed and implemented various strategies to address these issues (Singh et al., 2022).

One of the most successful and widely adopted approaches has been the Self-Help Group (SHG) model. SHGs have become a cornerstone of women's empowerment initiatives in India, providing not only financial resources but also a platform for collective action. Although these groups serve many purposes, empowering women has emerged as a primary goal, reflecting their increasing role in social and economic development. The success of SHGs has led to their replacement of other

strategies, highlighting their effectiveness in achieving empowerment (Jakimow et al., 2006).

Since 2002, federated SHGs at the village level have progressively taken on roles traditionally held by commercial operators, such as managing the distribution of subsidized food grains under the Public Distribution System (PDS). By doing so, they ensure that essential resources reach those most in need, while also increasing the leadership roles of women in their communities. SHGs have been instrumental in transforming the position of women in rural India, enabling them to become more financially independent and socially active. Through initiatives like food distribution and sericulture, these groups offer women opportunities to improve their lives and play more significant roles in the economic and social fabric of their communities, as outlined by Singh et al. (2022) and Jakimow et al. (2006).

Sericulture, the practice of rearing silkworms and producing silk, has also provided another avenue for economic empowerment, particularly for women. It serves as an important source of income, food, and other resources, contributing

to both rural livelihoods and national development (Nazeer et al. 2012). For many, sericulture represents not just a source of material wealth but a pathway to greater social and economic security. For some of the people, it is the fountain head of rich fashion fabrics. It is a great source of food, fuel and fertilizer to a nation (Deiningner et al., 2009).

The most commonly cultivated silkworm species in sericulture is "*Bombyx mori*". India ranks as the second-largest silk producer globally and is also the top consumer of silk. Karnataka is the leading silk-producing state in the country, where over a million people rely on sericulture for their livelihoods. A notable aspect of sericulture is its emphasis on transforming waste into wealth (Kallimani et al., 2014). Almost no part of the silkworm's body or its by-products goes unused. The waste produced from rearing silkworms, mulberry cultivation, and silk reeling can be recycled, often leading to the creation of valuable products, sometimes even more costly than the original silk itself (Vijayendra et al., 2014). Modern sericulture technologies must incorporate effective waste utilization to enhance sustainability and minimize environmental waste accumulation (Arindam, 2015). Sericulture, as an agro-based industry, stands out for its potential to reverse income flows from wealthier individuals to poorer communities, generate substantial employment, and recycle by-products effectively. Planned recycling of sericultural by-products can significantly increase the net income of sericulturists, potentially adding up to 25% more value across various sectors of sericulture.

Certain waste products, such as round or dumble-shaped cocoons, are often discarded or burned (Mandre et al., 2006). However, other by-products, like pupae, leftover from silk cocoon production, are repurposed as fertilizer, animal feed, or for oil extraction. Handcrafted items can also be made from defective cocoons produced in cocoon markets, with local materials and traditional techniques (Savitri et al., 2013). Unreeled silk cocoons, for example, have proven to be useful raw materials for handicrafts. These handicrafts contribute to diversifying production and boosting both productivity and profitability. The creativity and imagination involved in crafting such goods provide them with higher added value and strong market appeal (Agatha Popescu et al., 2008).

Cocoon-based crafts, aside from their aesthetic appeal, have the advantage of retaining their lustre for many years. This form of craft offers an avenue for developing human skills while creating opportunities for self-employment and income generation (Manohar Reddy, 2008). The potential to turn these crafts into a full-time enterprise is significant, considering the available capital, expertise, market demand, and the establishment of sales outlets (Kaul et al., 2014). Furthermore, individuals or families, regardless of age or gender, can engage in this activity during their leisure time as a secondary income source (Manna et al., 2011).

Designers have shown interest in using silk cocoons for creating unique products by combining them with other materials through manual methods, showcasing creativity and producing items with material warmth and beauty (Matei et al., 2013; Chinnaswamy et al., 2014). The use of unreeled silk cocoons in handicrafts and decorative art offers an alternative for diversifying production, adding value, and increasing family income within sericultural communities (Alexandra et al., 2013).

2. MATERIALS REQUIRED FOR CRAFTING

Cut and pierced cocoons, which serve as fundamental raw materials for crafting, are typically sourced from government egg/seed production centers and cocoon markets. These cocoons are cut open at one end, producing both the cap and body, which can be utilized to create various handcrafted products (Kallimani et al., 2016). For the production of one lakh disease-free silkworm eggs (DFLs), approximately 4.25 lakh bi-voltine cocoons are required, yielding around 163 kg of cut cocoon material, which can then be employed for crafting purposes (Chandrashekhar et al., 2015). This material plays a crucial role in supporting artisans and sericulture farmers, contributing to both economic value and sustainable waste utilization.

The materials required for crafting with silk cocoons can vary depending on the specific type of craft or product being made. However, the following are some common materials and tools used in silk cocoon crafting:

1. **Silk Cocoons:** The primary material, either unreeled or defective cocoons, typically obtained from sericulture farms.

2. **Cutting Tools:** Scissors, craft knives, or specialized cutting tools to shape and manipulate the cocoons as needed.
3. **Needles and Thread:** Essential for sewing or joining pieces of cocoon together, or for adding embellishments.
4. **Glue or Adhesive:** Used to attach various parts of the craft, especially when creating intricate designs or combining cocoons with other materials.
5. **Paint and Dyes:** To color the silk cocoons or to enhance their visual appeal for decorative purposes.
6. **Beads, Sequins, and Other Embellishments:** For adding decorative elements to handcrafted items like jewelry, ornaments, or other art pieces.
7. **Fabric:** Sometimes combined with silk cocoons to create layered designs or mixed-material crafts.
8. **Wire and Thread:** Useful for creating structure, such as in jewelry-making or forming the base of certain decorative items.
9. **Frames or Molds:** If shaping the cocoons into specific forms, wireframes or molds may be used to guide the design.
10. **Basic Handcrafting Tools:** Pliers, rulers, and tweezers to manipulate small parts and handle intricate detailing.
11. **Decorative Accessories:** Items like ribbons, laces, or artificial flowers may be incorporated to enhance the final product's aesthetic value.
12. **Varnish or Sealant:** Applied to protect and preserve the craft, especially if it will be used as a decorative item over a long period.

These materials, combined with creativity and imagination, can produce a variety of handcrafted goods, from jewellery and ornaments to larger decorative items.

2.1 Dyeing Process

An essential step in the production of cocoon handicrafts is the coloring or dyeing process, which enhances the visual appeal and value of the crafts. Natural dyes are often preferred as they emphasize the artist's creativity and authenticity. In contrast, silk yarn and fabric are usually dyed using chemical dyes. While dyeing the cocoons, soft water is recommended because hard water

can lead to uneven coloring and higher dye consumption.

The process begins by boiling the water, after which the appropriate amount of dye is added. For dyeing 1 kg of cocoons, approximately 100 grams of dye powder is required. The dye powder is first mixed with 100 ml of hot water, stirring constantly to avoid lumps, and then the dye solution is filtered. This solution is added to the boiling water and stirred thoroughly to ensure even color distribution. Next, deflossed, double cocoons and clean cocoons are submerged in the dye solution. Continuous stirring is necessary to ensure the cocoons absorb the color uniformly. It is important to keep the dye bath temperature below 50°C, as higher temperatures can affect the sericin content of the cocoons, leading to a distorted appearance in the final product.

Once the cocoons have absorbed the dye evenly, they are removed from the solution and laid out to dry in the shade. Drying them in a single layer is crucial to prevent the color from fading, ensuring the final product maintains its vibrant appearance (Tzenov et al., 2011).

2.2 Cocoon Craft Products

Cocoon craft products offer a wide variety of creative and decorative items, which are made from silk cocoons. These handcrafted items include:

- Single flowers like Roses, Chrysanthemums, Asters, and Jasmine.
- Different types of garlands including single-row garlands, cocoon cap garlands, and big VIP garlands.
- Bouquets made from materials such as bamboo, sheet paper, and thermocol.
- Greeting cards and wall hangings.
- Flower pots and bunting (Jasmine, Crossandra).
- Door decorations, such as curtains and hangings.
- Photo frames and various decorations for marriages, birthdays, and festive events like New Year.
- Crafts made from natural beads, including Jobi seeds and Rudraksha beads.
- Flower vases and many more innovative and aesthetic creations.

Instructions for creating specific cocoon crafts:

Pierced Cocoon Flower:

1. **Cut the cocoon:** Shape the cocoon into petals, ensuring that each cocoon yields three or four petal shapes.
2. **Arrange petals:** Assemble three or four cut cocoons into the shape of a flower.
3. **Secure the petals:** Use adhesive to firmly hold the petals together.
4. **Decorate the core:** Once the flower is dry, insert a soft decorative needle into the center of each flower to form the core.
5. **Create the stalk:** Tie a knot or attach a wire at the top and bottom of the flower to create a stalk.
6. **Cut leaves:** Use green-dyed cocoons and cut them into leaf shapes.
7. **Arrange the leaves:** Place the leaves around the flower to create a natural, leafy look.

Pierced Cocoon Garland:

1. **Snip the cocoon:** Use zigzag scissors to cut the open end of the cocoon.
2. **Assemble the garland:** Stitch or fasten five to six of these cocoons together, securing the ends tightly.
3. **Create a larger circle:** For a fuller garland, use a thicker thread to sew a bigger circle of cocoons. To add elegance, use multicolored cocoons.
4. **Garland size:** Approximately 500–600 cocoons are needed to create a garland with a rich, bouncy appearance.
5. **Longevity and elegance:** Garlands made from cocoon flowers are visually appealing and can last for many years, making them ideal for long-term decorative use.

Pierced Cocoon Bouquet:

1. **Arrange the flowers:** Begin by assembling around 25 to 50 bundles of cocoon flowers, each made from differently colored cocoons, into a floral arrangement.
2. **Determine bouquet size:** The number of cocoon flowers used depends on the desired size and design of the bouquet.
3. **Wrap the bouquet:** Once the flower arrangement is ready, wrap it first in a clear sheet to hold it together, followed by a layer of glittery craft paper to enhance its appearance and give it a polished bouquet look.

These cocoon crafts are not only visually striking but also sustainable, offering a unique way to repurpose silk cocoon waste into art and decoration.

Other Pierced Cocoon Decorative Items:

Discarded, deformed, or rejected cocoons, along with cocoon by-products, can be creatively repurposed to craft small gift and decorative items like keychains, earrings, colorful birds, or other aesthetically pleasing objects that showcase craftsmanship (Thakur et al., 2022). The process involves cutting cocoons into tiny pieces according to specific designs or patterns. These pieces are then assembled and adhered onto craft paper, velvet paper, or drawing paper to form the desired shapes. After the final artistic touches are applied, these handcrafted items are ready to be presented as gifts or displayed in glass frames (Sulochana et al., 2014). These cocoon-based crafts highlight not only sustainability but also the creative potential of sericulture by-products, turning waste into valuable artistic pieces.

2.3 Advantages of Cocoon Crafts

The biocraft unit has resulted in a variety of cocoon crafts, with the vibrant colors of these creations attracting and inspiring many. Recognizing their potential, the unit has provided training to Self-Help Groups (SHGs), farm youth, and physically challenged individuals to help them earn income through cocoon-based crafts. This activity serves as a secondary source of income during leisure time and also contributes to improving health conditions, particularly for those with diabetes and hypertension. Crafting cocoon products provides a means of earning for unemployed or underemployed people, making it especially suitable for women and physically challenged individuals.

Specialized training allows participants to learn craft techniques that promote self-employment and act as a form of physiotherapy, which improves their well-being. Research has shown that engaging in creative activities can significantly enhance mental health, reduce stress, and provide a sense of purpose, particularly for marginalized groups. Additionally, if bio-crafts are fully integrated with the sericulture industry, they can generate multi-channel income streams, contributing to greater sustainability. The captivating art of crafting from waste or cut cocoons not only fosters human skill

development but also provides opportunities for self-employment, offering an economical solution that contributes to the livelihood of many (Dandin et al., 2005).

Furthermore, the cocoon crafting industry encourages environmental sustainability by promoting the use of waste materials that would otherwise be discarded. By transforming these materials into valuable products, artisans not only contribute to waste reduction but also raise awareness about environmental conservation within their communities (Singhal et al. 2005).

3. CONCLUSION

The integration of sericulture and cocoon crafting presents a transformative opportunity for women in South Asia, particularly in India. By utilizing the by-products of sericulture, women can engage in creative, economically viable handicraft production, which fosters both personal income and community development. Self-Help Groups (SHGs) have been instrumental in empowering marginalized women by providing them with the skills and resources needed to succeed in this sector. Cocoon crafts not only enhance women's economic independence but also improve their social standing within their communities. This initiative addresses both gender discrimination and poverty by creating sustainable income streams while fostering artistic talents. The training given to women and marginalized groups further supports self-employment, improves health outcomes, and contributes to the overall well-being of rural communities. Additionally, these initiatives often involve the participation of local artisans and designers, further enriching the cultural heritage of the region. The successful integration of cocoon crafts into the sericulture industry serves as a multifaceted solution to entrenched inequalities, demonstrating how innovative practices can empower women and promote sustainable development in rural areas. By creating a supportive ecosystem that combines education, community involvement, and environmental awareness, this initiative not only uplifts individuals but also strengthens the social fabric of communities, fostering a culture of resilience and self-sufficiency. Ultimately, the growth of the cocoon crafting sector signifies a step towards a more equitable society where women can thrive and contribute meaningfully to the economy.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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